Remedial Investigation Work Plan and Interim Remedial Measure

Carillon Cleaners

327 Main Street
Huntington, New York
Site No. V00510-1

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1. Introduction

On behalf of our client, Gabriele Flickinger, GEI Consultants, Inc. (GEI) has prepared this Remedial Investigation Work Plan and Interim Remedial Measure (IRM) for the Carillon Cleaners site located at 327 Main Street in Huntington, Suffolk County, New York. A site location map and a site plan are included as Figure 1 and Plate 1, respectively. The work plan is submitted to the New York State Department of Environmental Conservation (NYSDEC) and the New York State Department of Health (NYSDOH) for review and approval, and to the Suffolk County Department of Health Services (SCDHS) for its review. This document has been revised since it was submitted to the NYSDEC, NYSDOH, and the SCDHS in September 2004 and on June 26, 2006. The changes to this document include the results of a recent indoor air survey and expansion of the existing soil vapor extraction system on site.

Implementation of the scope of work described in this plan is intended to generate sufficient data to complete the remedial investigation, thereby defining the nature and extent of soil and/or groundwater impacts associated with the dry cleaning operations. The work plan has been prepared in accordance with the NYSDEC draft Guidance for Site Characterization and Remedial Investigations (DER-10). The IRM portion of this document was completed and is being revised in response to the results of indoor air surveys that indicate elevated concentrations of chlorinated solvents in the Chinese restaurant that abuts Carillon Cleaners.

Preparation of this work plan was performed in accordance with the Voluntary Cleanup Agreement (VCA) of Site No. V00510-1, Index No. W1-0919-02-04.

GEI reviewed the data and findings of previous site investigations to develop this work plan. Section 3 of this document summarizes those data and findings.

The purpose of this work plan is to describe the methods and procedures to be implemented in performing a remedial investigation of the site. This work plan and IRM includes the following components:

- A brief site history
- An evaluation of previous investigation results
- A proposed scope of work for the remedial investigation
- A modification of the existing Soil Vapor Extraction (SVE) System

The appendices contain the following:

- A Community Air Monitoring Plan (CAMP)
- Quality Assurance Project Plan (QAPP)
- Health and Safety Plan (HASP)
- Resume of GEI's Data Validator
- Soil Disposal Waste Manifests
- GEI SVE Pilot Test Procedures
- SVE Pilot Test Results
- Soil Vapor Laboratory Analytical Results
- Proposed SVE System Component Vendors Information
- Proposed SVE System Design Calculations

2. Site Background

2.1 Site Location and Description

The Carillon Cleaners site is in a combination urban residential and commercial area of the Town of Huntington, located at 327 Main Street. Figure 1 shows the general location of the site. A Site Plan is depicted on Plate 1. The subject property is bounded by the following properties:

- Main Street to the south
- Claudia Dowling Interiors/Furniture (325 Main Street) adjacent to the east
- Imperial Chinese Restaurant (329 Main Street) adjacent to the west
- A paved parking lot to the north

Further east of the site is Bon-Bons Chocolatier (319 Main Street) and further west is the former location of Main Street Fruit & Vegetable Market currently vacant (331 Main Street).

2.2 Site History

The site background/history of the Carillon Cleaners site and surrounding area was developed through the review of historical summaries presented in previous investigation reports and work plans prepared by three firms: Anson Environmental LTD. (Anson), ARCADIS G&M, Inc. (ARCADIS), and Coastal Environmental Group, Inc. (Coastal). These reports are listed below:

- *Environmental Investigation Report, Carillon Cleaners, 327 Main Street, Huntington, New York,* prepared by Anson Environmental LTD., June 4, 1997.

- *Work Plan Environmental Investigation Report, Carillon Cleaners, 327 Main Street, Huntington, New York,* prepared by Anson Environmental LTD., June 18, 1997.

- *Summary of June and July 1997 Environmental Investigations,* prepared by Anson Environmental LTD., August 12, 1997.

- *Groundwater Sampling Results, Carillon Dry Cleaners,* prepared by Anson Environmental LTD., November 5, 1997.

- *Underground Storage Tank Abandonment, Carillon Dry Cleaners,* prepared by Anson Environmental LTD., November 5, 1997.

- *Groundwater Sampling, Carillon Dry Cleaners,* prepared by Anson Environmental LTD., December 29, 1997.

- *Letter to Mr. Walter Petrule of SCDHS, Carillon Cleaners Facility #4-0221,* prepared by Anson Environmental LTD., January 12, 1998.

- *Carillon Cleaners, Project Status and Proposed Remedial Activities,* prepared by Anson Environmental LTD., June 1998.

- *Project Status Report, Carillon Cleaners,* prepared by Anson Environmental LTD., August 14, 1998.

- *VCP Application for Carillon Dry Cleaners,* prepared by ARCADIS G&M, Inc., January 16, 2002.

- *Draft Voluntary Cleanup Program Remedial Measure Work Plan for the Carillon Dry Cleaners, 327 Main Street, Huntington, New York*, prepared by Coastal Environmental Group, Inc., February 12, 2003.

The site is currently used as a dry cleaner and has been under the same ownership since 1972. Gabriele Flickinger, the Voluntary Responsible Party (VRP) retains the ownership of the property but has sold the dry cleaning operation. From 1967 to 1972, a dry cleaner, identified as Zorn Cleaners, formerly occupied the site. Prior to the late 1960s, the site was apparently occupied by a Firestone Tire Stores gasoline and service station and appliance store.

In addition to the above reports, records indicate that the following former aboveground and underground tanks, as shown on Plate 1, were removed from the property:

- A 150-gallon tetrachloroethylene (PCE) aboveground storage tank (AST) (located in the basement of the building) and a 2,000-gallon fuel oil underground storage tank (UST) (Tank A on Plate 1) were removed in August of 1991.

- On December 8, 1997, Anson removed a 1,000-gallon gasoline UST (Tank B on Plate 1). Mr. Brian Cook of the SCDHS observed the tank removal activities.

The tanks that were removed in 1991 were cut into pieces and disposed of at the Huntington Landfill. Tank registration forms, filed with the SCDHS, indicate that the 150-gallon AST and 2,000-gallon UST were installed in 1968.

Furthermore, the owner of the subject property indicated that there was no piping outside of the building to fill the 150-gallon AST. The property owner also indicated that the dry cleaner converted to using canisters and that the spent/used canisters were stored by the unpaved area near the door along the east wall of the building in the rear parking lot.

According to the owner of the property, the subject property has always been connected to the sanitary sewer, which is serviced by the Town of Huntington.

3. Previous Investigation Evaluation

Previously completed investigations were evaluated to assess the potential distribution of contaminants related to the Carillon Cleaners site. GEI reviewed the findings from previous investigations identified in Section 2. Below is a general evaluation and summary of historical soil and groundwater quality at the site. Historical groundwater and soil data are summarized in Table 1 and Table 2, respectively.

- The hydrogeology beneath the site is generally characterized as the Upper Glacial aquifer that consists of typical morainal materials, which includes a mixture of sand and gravel.

- Based on previous investigative reports and regional information, groundwater generally flows in a north-northeast direction beneath the site. Depth to groundwater measurements have generally ranged from 15 feet to 17 feet below grade at the site.

- According to the *Environmental Investigation Report, Carillon Cleaners, 327 Main Street, Huntington, New York,* (Anson 1997) and the *Summary of June and July 1997 Environmental Investigations* (Anson 1997), three sets of soil borings were drilled between April 25, 1997 and July 1, 1997.

    - The first set of borings included eight borings, drilled to depths ranging from 1.5 to 12 feet below grade. Four samples of the eight borings were submitted for chemical analysis. The analytical results from these borings indicated that concentrations of PCE were present in excess of the SCDHS article 12 SOP No. 9-95 Standards for PCE at depths less than 12 feet.

    - The second set of borings, identified as Piezometer 1 through Piezometer 3, was drilled to a maximum depth of 12 feet below grade. Chemical analysis results of these borings showed elevated levels of PCE.

    - The third set of borings included nine soil borings, identified as SS #1 through SS #9. These were drilled to depths ranging from 1.5 feet to 12 feet below grade. Nineteen soil samples were collected from the nine borings. Of the 19 samples, 17 were submitted for chemical analysis. Chemical analysis results of these borings also showed elevated levels of PCE.

In addition to soil borings, seven temporary and four permanent groundwater-monitoring wells were installed to a total depth of 30 feet below grade. Elevated concentrations of PCE were identified in groundwater samples collected from these monitoring wells.

Anson recommended the installation of a SVE system to remediate the PCE contaminated soils as well as the installation of four additional monitoring wells, three of which would be 50 feet deep. The recommendation for installation of the four additional wells was not implemented. Anson installed the SVE system in the fall of 1997.

- According to *Groundwater Sampling Results, Carillon Dry Cleaners* (Anson 1997), 11 additional Geoprobe monitoring points, identified as GP-1 through GP-11, were installed to further delineate the PCE concentration. Groundwater was collected from four intervals at each probe point. A total of 44 groundwater samples were submitted for laboratory analysis. Chlorinated solvents were detected in all 11 sampling locations, including an upgradient or cross-gradient point. This result may indicate the presence of an offsite source of PCE.

- According to *Groundwater Sampling, Carillon Dry Cleaners,* (Anson 1997), three additional Geoprobe wells, identified as GP-12, 13, and 14, were installed upgradient and in front of the building on Main Street. Groundwater was collected from four intervals at each probe point. A total of 12 groundwater samples were submitted for laboratory analysis. Half of the samples were submitted to Anson's laboratory and the other half submitted to the SCDHS laboratory. The results indicated that PCE was present in all the locations. Anson indicated that there may be an upgradient source.

- According to *Carillon Cleaners, Project Status and Proposed Remedial Activities,* (Anson 1998), four additional off-site Geoprobe wells, identified as GP-15 through 18, were installed to further define the extent of upgradient and cross-gradient groundwater contamination. PCE was present in these wells. Anson indicated that there may be an upgradient source. A plume was identified using data from previous investigations showing concentrations of PCE greater than or equal to 500 parts per billion (PPB). The plume was described as 425 feet long, 75 feet wide, and a depth of 15 feet in the saturated zone. In addition to the off-site wells, three soil borings, identified as SVES 1 through 3, were installed in the area of soil contamination associated with the SVE system. The purpose of these samples was to determine the extent of soil contamination with the SVE system in operation. The analytical results

from these borings indicate that concentrations of PCE were present at levels below the SCDHS soil cleanup criteria.

- According to a *Letter to the Suffolk County Department of Health,* prepared by ARCADIS for the Carillon Cleaners, October 22, 1998, ARCADIS drilled three additional soil borings, identified as A through C. The borings were drilled continuously. Eight samples were submitted for chemical analysis. Chemical analysis results of these borings showed low levels of PCE at concentrations below the SCDHS Article 12 SOP No. 9-95 Standards for PCE of 1,400 PPB. In addition to these borings, one boring was drilled to a maximum depth of 100 feet below grade where a geophysical log was conducted. The log indicated that a silt-clay unit was present between 22 and 28 feet below grade, and a second silt-clay unit was present from 43 feet below grade to the end of the borehole.

  Based on the information of the log, the boring was converted to a monitoring well with its screen set above the first silt-clay unit. This well is identified as MW-5. ARCADIS's letter also indicated that one round of groundwater samples were collected for all on-site monitoring wells. The results of the groundwater samples indicated that PCE was present in all the locations.

- According to a *Letter from the Suffolk County Department of Health,* to Carillon Cleaners, August 31, 1999, the SCDHS indicated that they gave approval to shut down the SVE system on January 30, 1999 because the soil boring results submitted by ARCADIS demonstrated compliance with SCDHS soil quality.

- *VCP Application for Carillon Dry Cleaners,* prepared by ARCADIS for the Carillon Cleaners, January 16, 2002, is a summary of documentation of soil and groundwater quality. This application also indicates that additional rounds of groundwater data were collected and ARCADIS presented concentrations of PCE in the shallow groundwater table.

- Subsequent to submittal of the Voluntary Cleanup Program (VCP) application, the *Draft Voluntary Cleanup Program Remedial Measure Work Plan for the Carillon Dry Cleaners, 327 Main Street, Huntington, New York,* was prepared by Coastal Environmental Group, Inc. for the Carillon Cleaners, dated February 12, 2003.

- According to a *Letter from the State of New York Department of Health,* to Imperial Chinese Restaurant, September 19, 2003, the NYSDOH indicated that results of indoor air quality samples collected from the restaurant indicate elevated levels of PCE. In summary, a total of six indoor air samples were collected during two

separate events (April 1-2, 2003 and August 5-6, 2003). During each event, three samples were collected. The first sample was collected from outside, the second from the basement, and the third from the first-floor kitchen. The results are summarized on the table below:

Location	PCE Concentration ug/m^3	
	April 1-2, 2003	**August 5-6, 2003**
1st Floor Kitchen	810	80
Basement	1080	280
Outside	ND (Not detected)	20

ug/m^3 - micrograms per cubic meter

Furthermore, the letter indicated that prior to the August 2003 air sampling, the ventilation system at Carillon Cleaners was modified, which could have aided in the reduction of PCE concentrations in the air of the restaurant.

3.1 Work Completed Since Submission of 2004 Work Plan

- On April 25, 2005, GEI conducted the soil vapor investigation in the basement of the Carillon Cleaners facility. In addition to the soil vapor investigation, GEI conducted an investigation of the ambient air in the abutting Chinese restaurant located at 329 Main Street and outside the backdoor of the Chinese restaurant.

  A total of six soil gas samples were collected from the sub slab in the area of the former 150-gallon AST in the basement of Carillon Cleaners. Indoor air samples were collected in the basement, kitchen, and dining area of the abutting Chinese restaurant, and one sample located outside the back door of the restaurant. The laboratory analytical results of the indoor air investigation on site indicate concentrations of both PCE and trichloroethylene (TCE) above the NYSDOH Air Guideline Values. The soil vapor concentrations combined with the indoor air concentrations of PCE and TCE indicate that mitigation is the appropriate action according to soil vapor/indoor air matrix 1 in the Air Guideline Values.

- On October 3, 2005, GEI conducted a sub slab soil investigation under the basement at the Carillon Cleaners facility. The goal of this investigation was to collect soil and groundwater samples under the basement floor, in the area of the former PCE AST, and install vertical SVE wells for a planned SVE pilot test.

  Due to large cobbles under the concrete slab in the basement, only shallow soil samples and no groundwater samples were collected in the area of the soil vapor locations mentioned above.

During the concrete coring activities, a concrete vault, which extended approximately 1.5 feet below grade, was encountered in the northernmost boring. Soil samples in the area of the former PCE AST and the "vault" contained concentrations of PCE above the NYSDEC Standards, Criteria, and Guidelines (SCG). Concentrations of the water sample from the "vault" were also above the NYSDEC SCG for PCE.

- On January 23, 2006, GEI personnel supervised the excavation of 2-foot wide by 4.5-foot deep by 13 feet long trench that was completed by Coastal Environmental. The trench was excavated in the area of the former 150-gallon PCE UST and "vault" in the basement of Carillon Cleaners. The excavation exposed several of the 18-inch by 18-inch by 18-inch concrete "vaults" that were located along the north and west wall of the basement. The soils/cobbles encountered were very compact and difficult to excavate with the pry bar and suction from the hose that was attached to a vacuum truck.

- On January 30, 2006, Coastal Environmental installed approximately 13 feet of 2-inch diameter PVC number 10 slot well screen on a 3-inch layer of pea stone on the bottom of the SVE trench. The well screen was connected to 90^{o} PVC elbows and then to solid PVC 2-inch diameter riser that extended vertically to approximately 1 foot above the surface of the concrete floor. The screen was covered with approximately 1 foot of pea stone and then approximately 3 feet of gravel. An approximately 2-inch layer of bentonite clay was then placed on top of the gravel. GEI personnel installed two 12-inch long stainless SVE probes to a depth of approximately 1.5 feet below grade at locations 5 feet and 10 feet east of the SVE well. The probe excavations were backfilled with gravel with 2 inches of bentonite clay on top of the gravel. Concrete was poured on top of the trench and probe locations bringing them to grade with the concrete floor.

- An SVE pilot test was conducted on April 17, 2006 in the basement of Carillon Cleaners. The pilot test included a variable rate step test and a constant rate test. The maximum photoionization detector (PID) concentrations detected with a PID were over 500 parts per million per unit. The pilot test is discussed in detail in section 4.8.2.

- The SVE system installation activities began on December 11, 2006 and finished on February 2, 2007. The system includes the following components:

    - 13 feet of 2-inch-diameter schedule 40 number 10 slot PVC well screen
    - 96 linear feet of 2 inch diameter schedule 40 PVC riser pipe
    - Power Supply = Single phase 230-volts

- SVE System Blower = 2BH1400-7AV25 Siemens Regenerative Vacuum Blower – 1.7 HP TEFC, single phase, 230 volt, 60 Hz
- Inlet Filter Assemblies mounted at blower inlet
- Relief valve set at 6 inches of Hg
- Moisture separator – 60 gallons with a ball valve at the bottom to gravity drain the vessel. The tank will be fitted with a high water level switch and gauge
- Simplex NEMA 3R Control Panel – single phase – 230 Volt with a circuit breaker disconnect, control circuit transformer, and high separator level shut down with light
- All electrical wiring is contained within UL listed SCH 40 PVC rigid electrical conduit
- Three 0.25-inch-diameter air sampling ports before carbon, between the carbon vessels, and after carbon
- Three gate valves located in the riser located above the horizontal SVE well at each of the two outlets and after the moisture collection tank within the system shed
- One temperature gauge set inline between the two carbon vessels
- One pressure gauge on the inlet piping and one on the outlet
- Fully integrated remediation system with all plumbing, electrical, and mechanical components installed.
- U.L. certification
- Operations manual with plumbing and instrumentation diagrams

An illustration of the system is included on Plate 3.

All system components were inspected upon arrival to verify condition after transportation to the site and tested after installation to ensure proper installation. Pre-start-up system component testing was completed on February 2, 2007. The initial system start-up occurred on February 5, 2007.

- After the SVE system was installed and commenced operation (February 5, 2007), GEI personnel placed Summa canisters in the kitchen area, the dining area, and the basement of the Chinese restaurant, the basement of the furniture store that abuts Carillon Cleaners to the east, and in the Fitness Center to the northwest of Carillon Cleaners on March 21, 2007. One canister was also placed just outside the back door of the Chinese restaurant, three feet above the ground. The analytical concentrations of PCE and TCE in the March 2007 sampling event were higher than what was observed in the April 2005 sampling event, but less than the last sampling event (April 2003) that occurred during the "heating season".

- On April 27, 2007, GEI personnel conducted groundwater monitoring activities on site and down gradient of the subject property. Monitoring wells MW-2, MW-3, MW-4 and MW-5 were gauged for depth to groundwater, bailed, and sampled. The concentrations of volatile organic compounds in the wells were substantially reduced compared to the last groundwater sampling event in May 2001 or any other previous sampling events.

Based on our review of the previous investigations and correspondence, it appears that soil beneath the Carillon Cleaners building is impacted with PCE at concentrations above the NYSDEC SCG. Based on indoor air samples, it appears that vapors are entering the adjacent (Chinese restaurant) building. We do not know if the source of the indoor air contamination is related to soil and/or groundwater contamination originating at the Carillon Cleaners site. The remedial investigation will further assess the source of the vapors and identify potential migration pathways.

Based on historical groundwater data from monitoring wells, it appears that PCE levels in the shallow groundwater unit are decreasing. The results also indicate that PCE is naturally attenuating, as demonstrated by the presence of daughter products. However, groundwater samples collected from deeper intervals from temporary groundwater wells indicate elevated concentrations of PCE are present. The results also indicate the possibility of offsite sources of groundwater contamination.

Based on previous investigations, the PCE plume was described as being 425 feet long, 75 feet wide, and having a depth of 15 feet in the saturated zone. The remedial investigation will delineate the current horizontal and vertical extent of the plume.

4. Scope of Work

The scope of work addresses field investigation tasks that will provide a better understanding of the extent and degree of chlorinated solvent-related soil, soil gas, and groundwater impacts. The type of environmental sampling and the number and depth of sampling locations have been developed based on reviews of previous site investigation information. Accordingly, the proposed sampling program includes sampling of groundwater, subsurface soil, soil gas, and indoor air.

The scope of work includes the following tasks:

- Collection and review of regional information
- Field investigation preparation
- Soil Borings and soil sampling
- Groundwater screening
- Monitoring well installation
- Groundwater Sampling and Water Level Measurement
- Indoor Air Monitoring
- Water Use Survey
- Qualitative Human Health Risk Assessment
- Remedial Investigation (RI) Report Preparation

Descriptions of each proposed work activity are provided separately below.

4.1 Collection and Review of Regional Information

The initial element of the investigation will involve collecting and reviewing information on other potential sources of contamination in the area of the site. The information we gather will be used to assess the relative contribution of the source at the Carillon Cleaners site to the overall regional problem and the degree to which contamination originating at the site may commingle with other potential plumes. The following is a list of sources of information and investigation techniques that may be used in order to better understand the regional problem and to identify potential areas of environmental concern.

- Prior environmental studies/reports
- Local and state agency files
- State and federal environmental databases
- Interviews with past/present property owners/operators
- Site plans and construction drawings

Based upon the results of the document review, we will attempt to place the Carillon Cleaners plume within the context of other potential regional sources of chlorinated solvent contamination.

4.2 Field Investigation Preparation and Mobilization Activities

Upon approval of the Work Plan by the NYSDEC and authorization from our client, GEI will mobilize to the site and prepare for the field investigation program. A field operations center will be set up on the site in a mobile van. The initial field mobilization will include the following items to be completed at the commencement of the field RI activities:

- Establish a decontamination area
- Establish a waste storage area
- Identify and mark proposed sample locations
- Identify underground utilities

4.2.1 Establish Decontamination Area

Equipment decontamination will take place on a plastic-lined, bermed decontamination area. During the preliminary site visit, the location of the decontamination area will be chosen. Drilling equipment will be steam cleaned with a pressure washer or with brushes and water within the established decontamination area. Wastewaters produced during the cleaning will be collected from the decontamination pad and placed into United States Department of Transportation (DOT)/UN-approved drums, properly labeled and stored at the established waste storage area at the site. The drums will be characterized and properly disposed of by the site owner.

Equipment used for sample collection (e.g., stainless steel split spoons, sample spoons, and hand trowels) will be decontaminated prior to use and reuse, or disposable sampling equipment will be used. All decontamination liquids will be collected and stored within 55-gallon DOT/UN-approved drums at the established waste storage area and will be subsequently characterized and disposed of by the site owner.

4.2.2 Establish a Waste Storage Area

Investigative-derived wastes including soil cuttings, groundwater, and decontamination waters will be collected and stored within 55-gallon DOT/UN-approved drums at the established waste storage area. The drums will be placed on a plastic-lined, bermed waste storage area. The location of the waste storage area will be decided during the preliminary site visit to be completed prior to the start of the field investigation.

4.2.3 Identify Sample Locations and Underground Utilities

During the preliminary site visit, the approximate sample locations will be determined and marked by GEI personnel. The proposed locations will be measured from existing structures. Each sampling location will be marked with stakes and/or white paint. Once marked, the drilling subcontractor will provide the boring locations to the utility clearance organization and the Town of Huntington to identify potential utility conflicts at the site.

4.3 Field Investigation Sampling and Analysis

This section discusses the proposed soil, groundwater, soil gas, and indoor air sampling and analysis activities. Table 3 presents the general rationale and proposed sampling and analysis for the samples. The proposed sample locations are shown on Plate 1.

The proposed analyses, analytical methods, and QA/QC samples are discussed under each of the following subsections for soil borings, groundwater screening, soil gas, monitoring well, and indoor air sampling procedures. Subsection 4.7 discusses laboratory data deliverables and data validation procedures.

4.3.1 Groundwater Screening

To further assess the horizontal and vertical extent of groundwater contamination associated with the site, groundwater from four existing wells (MW-2, MW-3, MW-4, MW-5), were sampled and analyzed. Previously installed wells MW-1, MW-T, CC-#1, Piezometer 1 and Piezometer 2 were not found during our recent groundwater monitoring event and are, therefore, not included in this program. The data from the existing wells can provide an understanding of how the PCE plume has migrated, attenuated, or grown (in concentration and/or in aerial extent). The March 2007 sampling was conducted in a clean-to-dirty order using the 2001 groundwater analytical data.

Groundwater samples were collected on March 21, 2007 from the existing wells MW-2, MW-3, MW-4, and MW-5 as follows:

- Prior to sampling, a round of groundwater elevation measurements were collected. The measurements were made from the surveyed well elevation mark on the top of the inner PVC casing with a decontaminated electric water/product level probe. The measurements were made in as short a time frame as practical to minimize temporal fluctuations in hydraulic conditions. The time, date, and measurement to nearest 0.01 foot were recorded in the field logbook.
- The probe was decontaminated using an Alconox wash and distilled water rinse.

- Plastic sheeting was placed on the ground to prevent contamination of the tubing associated with the purging (pump) equipment.
- Groundwater purging and sampling of the monitoring wells was conducted according to the procedures set forth in *Low Flow (Minimal Drawdown) Ground-Water Sampling Procedures* (EPA/540/S-95/504). The wells were purged and sampled at rates that minimize or eliminate significant draw down. Dedicated polyethylene tubing was used at each well. Water quality was monitored for pH, temperature, specific conductivity, oxidation-reduction potential (Eh), dissolved oxygen, and turbidity. The tubing volume was calculated and, upon removal of one tubing volume of groundwater, parameters were recorded at 5-minute intervals to determine well stability. Stability was achieved when pH was within 0.1 standard unit, temperature was within 0.5ºC, Eh was within 10 percent, and specific conductivity was within 10 percent for three consecutive readings.
- When stability was attained, samples were collected from the well. Samples for volatile organic compound (VOC) analysis were collected first using a disposable polyethylene bailer. Samples for all other analyses were collected directly from the tubing. Groundwater samples were placed directly into pre-cleaned and appropriately preserved sample containers provided by the laboratory.
- After all samples were collected, the polypropylene line and bailer, or other dedicated disposable sampling equipment, was properly disposed.

The samples were delivered to a New York Environmental Laboratory Approval Program (ELAP) certified laboratory within 24 hours of being collected. All samples were analyzed for VOCs plus TICs by method 8260. The groundwater laboratory analytical results are included on Table 1.

The data collected during the sampling activities will be used to form a basis for a well organized Geoprobe screening phase, to be followed by properly installed permanent monitoring wells which can help define the horizontal and vertical extent of the PCE plume. The below screening event will occur soon after the initial well sampling event.

The groundwater screening will initially be performed at 5 locations, shown on Plate 1. The screening will be conducted using direct-push equipment. At each location, at least three discrete intervals will be sampled. Table 3 lists the proposed sample depths for each location. Based on the results of these screenings, additional screening points may be installed.

Groundwater probes will be installed using a decontaminated screened sampler. The decontaminated probe and rods will be driven until the sampler tip is approximately 1 foot

below the target sampling depth. Once that depth has been reached, the expandable drive point will be disengaged and the rods pulled back a distance of about 2 feet to expose the screened sampler. Disposable polyethylene tubing, equipped with a bottom check valve, will be used to convey groundwater to the surface for collection. Each sample, upon retrieval, will be analyzed in the field for pH, conductivity, and temperature.

Within 48-hours of sample collection, the samples will be delivered to a New York ELAP certified laboratory. Each sample will be analyzed for VOCs plus tentatively identified compounds (TIC) by method 8260. In addition to VOCs, selective samples will also be analyzed for total lead.

After evaluating the results of the initial groundwater screening, additional sampling points may be sampled to delineate the plume. The NYSDEC will be informed prior to installing any additional points.

In addition to the five locations, one additional boring (angle boring) is proposed and is identified as GP-24. Prior to conducting the angle boring, an attempt will be made to install a micro well through the Carillon Cleaners basement floor in the area of the former 150-gallon PCE above ground storage tank. If the installation of the micro well is successful, the angle boring (GP-24) will not be necessary.

4.3.2 Monitoring Well Installation

Based on the results of the groundwater screening and considering the previously-collected data, additional monitoring wells may be installed to assess the vertical and horizontal extent of the contamination. Prior to installing the wells, we will prepare a data package and brief letter report summarizing the findings of the investigation to-date and proposing the location and depth of additional wells. After NYSDEC's review of the data and acceptance of the proposed locations, the wells will be installed.

Monitoring wells will be installed using hollow-stem auger drilling methods. After the completion of drilling and monitoring well installation, all wells will be developed prior to the collection of groundwater samples. The following procedures will be used to install and develop all monitoring wells:

- PVC 2-inch diameter threaded, flush-joint casing and screens will be installed.
- Wells will be screened in the unconsolidated deposits. Screens will have a length of 5 feet, and slot openings will be 0.010 inch. Alternatives may be used at the discretion of the field geologist, based on site-specific geologic conditions.

- If appropriate, a sump, 2 feet in length, may be attached to the bottom of the screen to collect dense nonaqueous phase liquids (DNAPL).
- Flush-mount protective casings will be used.
- Where appropriate, the annulus around the screens will be backfilled with #0 Morie silica sand (based on Site-specific geologic conditions and screen slot size) to a minimum height of 1 foot above the top of the screen.
- Neat cement grout, a bentonite pellet seal, or a bentonite slurry (30 gallons water to 25 to 30 pounds bentonite, or relative proportions) will be placed above the sand pack. If a pellet seal is used, it will be allowed to hydrate for at least 30 minutes before placement of grout above the seal. Where possible, the bentonite pellet seal will be a minimum of 24 inches in depth, except in those instances where the top of the well screen is in close proximity to the ground surface. In these instances, the well will be completed in accordance with specifications provided by the field geologist who will incorporate an adequate surface seal into the well design.
- A fine sand pack approximately 1 foot thick will be placed above and below the bentonite seal to isolate it and to prevent mixing of components.
- The remainder of the annular space will be filled with a cement grout up to the ground surface. The grout will be pumped from the bottom up. The grout will be mixed in the following relative proportions: 30 gallons of water to three 94-pound bags of cement to 25 pounds granular bentonite. The grout will be allowed to set for a minimum of 48 hours before wells are developed.
- A concrete surface pad (2 feet by 2 feet by 6 inches) will be sloped to channel water away from the well casing.
- A weep hole will be drilled at the base of the protective standpipe casing to allow any water between the inner and outer casing to drain.
- The top of the PVC well casing will be marked and surveyed to 0.01 foot, and elevations will be determined relative to a fixed benchmark or datum. The measuring point on all wells will be on the innermost PVC casing.
- Each outer casing will be permanently labeled using a steel hand stamp (i.e. MW-4).

Characteristics of each newly installed well will be recorded on a well installation checklist.

After a minimum of 48 hours after completion, one or a combination of the following techniques will be used in the monitoring well development:

- Surging
- Bailing
- Using a centrifugal pump and dedicated polyethylene tubing

- Positive displacement pumps and dedicated polyethylene tubing

Development water will initially be monitored for organic vapors with a PID. In addition, the development water will be observed for the presence of non-aqueous phase liquids (NAPL) or sheens. The development water will be contained in a tank and/or 55-gallon steel drums on site. The purge water will be disposed of in accordance with NYSDEC requirements. The wells will be developed until the water in the well is reasonably free of visible sediment (<50 NTU if possible or until pH, temperature, and specific conductivity stabilize as judged suitable by the field geologist). In no case will well development exceed 8 hours per well. Following development, wells will be allowed to recover for at least one week before groundwater is purged and sampled. All monitoring well development will be overseen by a field geologist and recorded in the field logbook.

4.3.3 Monitoring Well Sampling

All new wells will be sampled at least one week after they have been developed. Groundwater samples will be collected as follows:

- Prior to sampling, a round of groundwater elevation measurements will be collected. The measurements will be made from the surveyed well elevation mark on the top of the inner PVC casing with a decontaminated electric water/product level probe. The measurements will be made in as short a time frame as practical to minimize temporal fluctuations in hydraulic conditions. The time, date, and measurement to nearest 0.01 foot will be recorded in the field logbook.
- The probe will be decontaminated using an Alconox (or equivalent) wash and distilled water rinse.
- Plastic sheeting will be placed on the ground to prevent contamination of the tubing associated with the purging (pump) equipment.
- Groundwater purging and sampling of the monitoring wells will be conducted according to the procedures set forth in *Low Flow (Minimal Drawdown) Ground-Water Sampling Procedures* (EPA/540/S-95/504). The wells will be purged and sampled at rates that minimize or eliminate significant draw down. Dedicated polyethylene tubing will be used at each well. Water quality will be monitored for pH, temperature, specific conductivity, oxidation-reduction potential (Eh), dissolved oxygen, and turbidity. The tubing volume will be calculated and, upon removal of one tubing volume of groundwater, parameters will be recorded at 5-minute intervals to determine well stability. Stability is achieved when pH is within 0.1 standard unit, temperature is within 0.5ºC, Eh is within 10 percent and specific conductivity is within 10 percent for three consecutive readings.

- When stability is attained, samples will be collected from the well. Samples for VOC analysis will be collected first using a disposable polyethylene bailer. Samples for all other analyses will be collected directly from the tubing. Groundwater samples will be placed directly into pre-cleaned and appropriately preserved sample containers provided by the laboratory.
- After all samples are collected, the polypropylene line and bailer, or other dedicated disposable sampling equipment, will be properly disposed.

Within 48 hours of sample collection, the samples will be delivered to a New York ELAP certified laboratory. All samples will be analyzed for VOCs plus TICs by method 8260. In addition, select samples will be analyzed for the following parameters to assist in the evaluation of natural attenuation:

- Alkalinity
- Dissolved Organic Carbon
- Total Organic Carbon
- Ferrous Iron (Field)
- Manganese
- Sulfate
- Dissolved gases (ethane and methane)

Selected wells will also be analyzed for total lead.

4.3.4 Indoor/Outdoor Air Sampling

Previous sampling results, including results obtained since the submission of this work plan in September 2004 and June 2006, have shown the presence of chlorinated solvents in indoor air at the restaurant adjacent to Carillon Cleaners building. To further evaluate the potential presence of these compounds, additional air sampling were conducted within the restaurant during the winter (heating season) in March 2007 after the SVE system had been installed and was on line. In addition to the collection of indoor air samples from the adjacent restaurant, indoor air samples were also collected from the adjacent furniture store and from the fitness building in March 2007.

Prior to sampling, a questionnaire (provided in the August 2001 NYSDOH Indoor Air Sampling Guidance) was completed with the occupant and/or property owner to assess existing chemical storage/use. The most appropriate air sampling locations were selected. The indoor air samples were collected in areas representative of different indoor environments, including one in the area most likely to be affected by site-related impacts. In

addition, an outdoor/ambient air sample was collected at a location outside of the structure. At each air sample location, 1-hour composite samples were collected using SUMMA® canisters under low atmospheric pressure conditions. Indoor and outdoor air samples were analyzed for VOCs (by EPA Method TO-15).

All air sampling was performed in accordance with the NYSDOH Draft Soil Vapor Intrusion Guidance document.

Due to the concentrations of the PCE in the Chinese Restaurant, the SVE system in the basement of Carillon Cleaners will be modified in an attempt to reduce the VOC concentrations within the Chinese Restaurant. This modification is discussed below. Upon completion of the system modifications, an indoor air sampling event, as described above, will be conducted within the Chinese Restaurant basement and first floor.

4.3.5 Water Use Survey

After completing delineation of the plume, a water use survey will be conducted for areas beneath and within 1,000 feet downgradient of the plume. This survey has been partially completed to date. The survey will include research of available public records, contacting the local water supplier to confirm service connections, and a mail survey to residences or businesses within the area.

To date, the above portion of the water use survey was conducted for areas beneath and within 1,000 feet down gradient of the plume. The portion of the survey that was conducted included research of available public records and contacting the local water supplier to confirm service connections. GEI contacted John C. Milazzo, the FOIL Officer for the Suffolk County Water Authority. He has provided GEI with a Jpeg image and a spreadsheet. The Jpeg image is a map of the area within 1 mile of the site. In the image, dots represent SCWA customers. Summarized on the spreadsheet of all of the known SCWA customers within the area of concern, there are approximately 4,300 connections within the 1-mile radius. He indicated that it is estimated that the SCWA records are greater than 97 percent accurate in this area reducing the likelihood that a premises served by SCWA is not on the list. He further indicated that SCWA does not maintain records of the premises which it does not serve.

We plan to review the data and mail a survey to the residences or businesses within the areas that are not on the list. We also plan on reviewing other data related to SCWA supply wells within the area as well.
If any public or private wells are identified with the area, well construction details will be obtained, if available. If well construction details show that the well is not screened with the

same hydrogeological unit as the plume, no further action will be taken. If well construction details are not available or the well is screened within the same hydrogeological unit as the plume, permission will be sought to sample the well. Prior to sampling any private or public wells downgradient of the Carillon Cleaners plume, an assessment of the contribution of other potential sources in the area will be made. Any samples collected will be analyzed for VOCs using method 524.2.

4.4 Qualitative Human Health Risk Assessment

In accordance with direction provided by NYSDEC, a qualitative human health risk assessment will be prepared. This assessment will generally follow the guidelines provided in the November 9, 2000 document, titled *New York State Department of Health Qualitative Human Health Exposure Assessment* (Appendix 1B to NYSDEC's Draft Site Characterization and Remedial Investigation Guidance document). In general, the assessment will identify the exposure setting, identify exposure pathways, and evaluate the fate and transport of the contaminants. The assessment will include text discussions, tables, and graphics depicting the potential exposure pathways. The characterization will include all environmental data gathered pertaining to the RI. The qualitative assessment will identify potential risks for specific potential receptors based on complete pathways of exposure to contaminant levels exceeding default "screening criteria," such as the NYSDEC-recommended soil cleanup objectives (RSCO) and drinking water standards. The qualitative risk assessment will not quantitatively evaluate the potential carcinogenic and non-carcinogenic risks to potential receptors. In addition, the qualitative assessment will not evaluate potential alternative risk-based exposure criteria or risk-based cleanup criteria.

4.5 Survey and Sample Point Location

Following completion of the groundwater screening and monitoring wells, each of the new and existing groundwater monitoring points will be surveyed by a New York State Licensed Land Surveyor. The elevation of each monitoring well will be determined to ±0.01 foot. All locations and elevations will be tied to the New York State Plane Coordinate System.

4.6 CAMP

In accordance with NYSDEC and NYSDOH requirements, a CAMP will be implemented at the site during each phase of the intrusive field activities. For the proposed scope of work, this applies only to hollow-stem auger drilling. The objective of the CAMP is to provide a measure of protection for the downwind community (i.e., off-site receptors, including residences and businesses and on-site workers not involved with site RI activities) from potential airborne contaminant releases as a direct result of intrusive RI activities. Air monitoring stations will be set up upwind and downwind of each intrusive work area (i.e.,

boring and test pit locations). VOCs and respirable particulates (PM-10) will be monitored at the upwind and downwind stations on a continuous basis. Wind direction will be determined using a wind sock(s) and/or flagging poles installed on site. In addition to the fixed stations, VOCs and particulates will be monitored in the work zone using hand held equipment. VOCs and particulates will also be monitored around the perimeter of the work zone on a regular basis (hourly) by GEI air monitoring personnel.

VOC vapors will be monitored using a PID. Particulate dust will be monitored using a Miniram particulate meter. The equipment will be calibrated at least daily. The proposed CAMP is presented in Appendix A.

4.7 QA/QC and Data Validation

H2M or Air Toxics LTD., both approved New York State ELAP laboratories, will provide New York State Category B data deliverables. The data will be validated in accordance with New York State Analytical Services Protocol (NYSASP). The data validator will prepare a data usability report summarizing the adequacy of the analytical data obtained from the laboratory and discussing any pertinent data excursions or limitations on the use of the data. The data usability report will be used in preparing the RI report and will be submitted as part of the RI report.

Through the use of standardized sample collection and decontamination procedures, the quality of the samples during field collection can be assured. The data validation process will ensure that the data collected and reported by the laboratory are of sufficient quality that management decisions regarding the degree and extent of potential impacts can be reliably made. The data validation will evaluate whether the required quantitation limit has been achieved for each sample analyzed, and will evaluate the precision, accuracy, and completeness of the data. The data validator will use the duplicate samples, the MS/MSD samples, the trip blanks, and the equipment rinsate blank samples, as well as laboratory calibration blanks, spikes, and other standards to assess the quality of the data obtained. Any deviations from the required level of sample quality will be called out in the data usability reports prepared by the data validator and these deviations will be taken into consideration when using the data to explain site conditions. More detailed information is presented in the quality assurance project plan (QAPP) included as Appendix B. The resume of GEI's data validator is included in Appendix D.

4.8 SVE System

4.8.1 Background

On April 25, 2005, GEI conducted the soil vapor investigation at the Carillon Cleaners facility. In addition to the soil vapor investigation, GEI conducted an investigation of the ambient air in the abutting Chinese restaurant located at 329 Main Street and outside the backdoor of the Chinese restaurant on the same date. On March 21, 2007 (after the SVE system had been installed and was operating), indoor air samples were collected at the Chinese restaurant, the furniture store abutting the subject property, and the fitness center to the northwest of the subject property.

The NYSDOH "Air Guideline Values" in the draft Soil Vapor Intrusion Guidance for PCE and TCE are 100 ug/m^3 and 5 ug/m^3. PCE and TCE are constituents associated with the dry cleaning industry. The laboratory analytical results of the soil vapor and indoor air investigations on site indicate concentrations of both PCE and TCE above the NYSDOH Air Guideline Values. The soil vapor concentration of PCE beneath the floor of the basement in the area of the former PCE AST was greater than 94,000 ug/m^3. The remaining soil vapor samples collected on April 25, 2005 were all below 2,000 ug/ m^3. Due to the black staining on the floor in the area of the former PCE AST in the Carillon facility basement and the associated concentration of PCE (greater than 94,000 ug/m^3), this appears to be a source area.

The Soil Vapor/Indoor Air Matrix 1 table in section 3.4.3 of the draft Soil Vapor Intrusion Guidance provides actions that are recommended according to both soil vapor and indoor air concentrations. The maximum concentrations of PCE in the soil vapor (94,920 ug/m^3) and indoor air (629 ug/m^3) sampling event indicate that mitigation is the appropriate action. Therefore, a SVE system was installed on site, in February 2007, to mitigate the exceedances.

On October 3, 2005, GEI conducted a sub slab soil investigation under the basement at the Carillon Cleaners facility. The goal of this investigation was to collect soil and groundwater samples under the basement floor, in the area of the former PCE AST, and install vertical SVE wells for a planned SVE pilot test.

GEI contracted with Zebra Environmental (Zebra) to conduct the concrete coring and "hand" soil boring activities on site. Zebra advanced 4-inch diameter holes through the concrete floor of the Carillon Basement in five locations. Due to encountering large cobbles during the soil boring activities and boring "cave-in," Zebra was unable to advance beyond 2.5 feet below grade in any of the boring locations. Many of the cobbles were too large to remove

through the 4-inch diameter concrete cores. Therefore, the soil samples were collected from 0.5 to 1.5 feet below grade.

During the concrete coring activities, a concrete "vault," which extended approximately 1.5 feet below grade, was encountered in the northernmost boring. GEI observed pieces of clay pipe, soil, and water within the vault. When the PID tip was lowered into the vault, the alarm sounded and a reading of 150 parts per million per volume was observed. GEI personnel asked Mr. Fred Flickinger about this "vault." Mr. Flickinger stated that he had no knowledge of this vault. Water and a soil samples were collected from this vault for laboratory analysis.

Soil samples in the area of the former PCE AST and the "vault" contained concentrations of PCE above the NYSDEC SCG. Concentrations of the water sample from the "vault" were also above the NYSDEC SCG for PCE.

On December 12, 2005, a contractor hired directly by the Flickingers cut and/or jack hammered the concrete floor in the basement of the Carillon Cleaners facility in the area where the trench and three SVE probes were to be installed. The contractor opened a 2-foot wide by 15-foot long trench in the floor. At the northern end of the opening, the contractor removed the concrete "vault" just below the surface of the floor. The contractor also opened three small holes in a straight line perpendicular and east of the larger opening. See Plate 2 for a Site Plan for the trench and SVE probe locations.

On January 23, 2006, GEI personnel met with Coastal personnel, who were also contracted directly by the Flickingers, to direct the trenching and SVE well installation activities in the basement of Carillon Cleaners. The subcontractor excavated the area utilizing a pry bar, shovel, and suction from a vac-truck to create a 2-foot wide by 13-foot long by 4.5-foot deep trench. The vac-truck deposited the excavated soil in a roll-off for storage until disposal could be arranged. Approximately 14 tons of PCE-impacted soil was transported and disposed of at the Model City facility according to all local, State of New York, and federal laws. Manifests were provided to GEI to document the disposal. A copy of the manifest is included in Appendix E.

On February 6, 2006, PVC slotted well material (2-inch diameter by 15 feet long, No. 10 slot) was then placed in the trench by the subcontractor on approximately 3 inches of pea stone and then covered with approximately 1 foot of pea stone. Both ends of the PVC well screen were then connected to solid PVC 90^{o} elbows and 2-inch diameter riser and extended vertically to approximately 1 foot above the floor grade. The remainder of the trench was then backfilled with gravel. A 2-inch bentonite layer was place on the gravel. The subcontractor then replaced the concrete floor to the thickness that was previously removed.

GEI personnel excavated down 2 feet below grade in two of the three small holes that are perpendicular to the trench. A large cobble was encountered in the third hole (approximately 15 feet from the SVE well) and the hole was abandoned. A 12-inch long Geoprobe™ soil vapor probe was installed into the two holes (5 feet and 10 feet from the SVE well) by GEI. The probes were then back filled with coarse silica sand and capped with bentonite clay to prevent short circuiting along the bottom surface of the concrete floor. The subcontractor then repaired the concrete floor in the area of the probes leaving a small access port for each probe.

As part of the design of the SVE system, GEI personnel conducted an 8-hour pilot test for a SVE system on April 17, 2006. This pilot test provided information necessary to design the SVE system. The pilot test included the extraction of soil vapor from the horizontal SVE well within the trench in the basement of Carillon Cleaners. The two soil vapor probes and north end of the SVE well, mentioned above, were monitored for pressure differentials throughout the pilot test. The closest groundwater monitoring well was also monitored for pressure differentials. This information was utilized to determine the area of influence of each well and the appropriate equipment necessary to construct the SVE system. This pilot test is discussed in detail in section 4.8.2 of this work plan.

The SVE system was designed based on information collected during the pilot test described below.

- The following items were calculated and/or provided as part of the SVE design effort:
    - Estimated radius of influence
    - Blower size
    - Pipe sizes
    - SVE manufacture drawings and detailed specifications
    - Piping diagrams

4.8.2 SVE Pilot Test

On April 17, 2006, GEI, with the assistance of REREM Equipment, Inc. (REREM) of Albany, New York, conducted a SVE Pilot Test. The test was conducted in the basement of the cleaners using a Roots URAI 42 Skid rotary lobe head blower with a variable frequency drive. The blower had a range of 10 to 150 standard cubic feet per minute (SCFM) and up to 15 inches of mercury vacuum. The blower was attached to one end of the extraction trench using a flexible hose. The exhaust from the blower was then directed through two 200-pound carbon absorption drums that were connected together. The test was also attended by Gary Iadarola of GEI, Abdur Rahman and Robert Stewart of the NYSDEC, and Geralynn Rosser of the SCDOH. The test was broken down into two parts, a variable flow rate step test and a

constant rate test. Included in Appendix F is GEI's SVE test procedure. During the step test and the constant rate test, velocity, vacuum, and PID readings were collected. The PID readings were collected at three locations (before, between, and after the carbon drums). In addition to collecting PID readings, GEI also collected SUMMA canister samples.

GEI first performed a variable flow rate step test. Four separate tests were performed; each test had a duration of approximately one hour. The flow rate for the first step was approximately 50 SCFM and the flow rate for the last step was 200 SCFM. The vacuum at the trench was measured to be 1.25 inches of water for the first test and 11.16 inches of water at the fourth test. Vacuum readings were also measured at each of the vapor points. The results of the variable flow rate portion of the pilot tests show that at least 2 inches of vacuum was measured at least 8.3 feet away from the trench at a flow rate of 200 SCFM. In addition to vacuum readings, PID readings were also collected continuously at three locations (before, between, and after the carbon drums). The maximum PID reading between and after the carbon drums was measured to be 0.10 parts per million/unit (ppm/u). The PID readings prior to the first carbon canister ranged from greater than 500 ppm/u during the first step to 120 ppm/u at the end of the fourth step test. The results of the variable flow rate portion of the pilot test are included in Appendix G.

At the end of the variable flow rate step test, GEI reviewed the field data and decided to reduce the flow rate for the constant rate test to approximate 100 SCFM. The duration of this test was three hours. The vacuum measured at the farthest monitoring point (8.3 feet away) ranged from 0.90 to 0.83 inches of water. During the constant rate test, PID readings ranged from 151 ppm/u at the beginning of the test to 61 ppm/u, when the pilot test was complete. Results of the constant rate portion of the pilot test are also included in Appendix G.

Throughout the pilot test, GEI also collected soil vapor samples in laboratory-supplied SUMMA® canisters. SUMMA® canisters are passivated stainless steel vessels that have been cleaned and certified contaminant-free by the contract laboratory. Each SUMMA® canister will be shipped to the sampling site under a high vacuum (<1 m Torr) to ensure that the canister remains free of contaminants prior to use. After connecting the SUMMA® canister to the sampling port, a regulator valve on the canister was opened and the vacuum will slowly draw the sample into the canister over a period of approximately one minute. After collecting the gas sample, the valve was closed and disconnected from the sampling port.

The purpose of the SUMMA® canisters was to validate the PID readings and to assist in the evaluation of the quantity of carbon needed for a final system configuration. The SUMMA® canister samples were shipped overnight to a New York ELAP certified laboratory for VOC analysis by EPA Method TO-14A Modified. The VOC results of the SUMMA® canisters

ranged from 770 ppm at the beginning of the test to 49 ppm at the end of the test. When comparing the PID readings versus SUMMA® analytical results, the analytical results are 11 percent higher in concentration than the PID readings at higher concentrations and 23 percent lower than the PID readings at the lower concentrations. The analytical results are included in Appendix H.

Based on the results included in Appendix G for the above pilot test, we selected a blower with an operating maximum of 150 SCFM at 70 inches of water vacuum. Given the remote location of the system to the trench location and the large observed head loss of approximately 20 inches of water for the distance, this blower will provide adequate capacity and vacuum to achieve a 100 SCFM flow rate at 5 inches of water at the SVE trench.

4.8.3 SVE System Design

4.8.3.1 Original System Description

The SVE system components, with the exception of the carbon canisters were installed within a structure as depicted on Plate 2. The system is connected to the trench via a single manifold.

The SVE system has been installed in general accordance with the conceptual treatment train as depicted on Plate 2.

The soil vapor extraction system equipment consists of a SVE blower, a moisture separator with manual drain valve, a dilution air inlet valve, air filter, vacuum relief valve, and vapor phase carbon vessels. The SVE blower, moisture separator with manual drain valve, dilution air inlet valve, air filter, and vacuum relief valve were constructed by a vendor and shipped to the site on a skid. Vendor information for the SVE components are included in Appendix I.

As discussed in Section 4.8.2, the selected blower has an operating maximum of 150 SCFM at 70 inches of water vacuum to provide adequate capacity and vacuum to achieve a 100 SCFM flow rate at 5 inches of water at the SVE trench. The actual blower operation does not exceed 75 percent of the blower capacity. Based on the above information, we have also calculated a head loss at the extraction trench of approximately 42 inches of water. These calculations are presented in Appendix J.

The moisture separator includes a knockout drum set in-line between the blower and the manifold to remove water vapor from the air stream prior to reaching the blower.

There are three critical control logic components within the SVE and moisture separator portions of the system that would result in system shut down. These include:

- High-High float switch reading within the moisture separator. A High-High reading will indicate a failure of the transfer pump to remove accumulated liquid from the moisture separator. This reading will shut down the SVE blower to prevent moisture from entering the blower
- Mid-vapor phase carbon temperature indicator. A high temperature reading exiting the first vapor-phase granular activated carbon (GAC) container is indicative of an exothermic reaction within the vessel which will result in a significant decrease in loading capacity and potential discharge of untreated air. This will result in the shutdown of the blower.
- Pressure indicators at each vapor-phase GAC. A high pressure indicator is indicative of a blockage within the GAC vessels or piping and will result in the shutdown of the blower

4.8.3.2 System Modification

Due to the continued elevated indoor air PCE concentrations within the Chinese restaurant abutting the subject property, the following system modifications are proposed: Install a "T" in the 2 inch diameter PVC riser that is connected to the horizontal SVE well. Extend the 2 inch riser from the "T" through the concrete wall that separates the Chinese restaurant basement from the Carillon Cleaners basement. Elbow the riser at a 90^{o} angle down into the existing sump on the floor of the Chinese restaurant basement. Install a vertical SVE 2 inch PVC well in the existing sump from one foot below the bottom of the slab to approximately 3 feet below grade. Install a coarse silica sand pack from the bottom of the boring to 6 inches above the top of the well screen. Install 6 inches of bentonite from the top of the sand pack to the bottom of the floor slab. Finish with concrete to grade. The PVC riser will be fitted with two ball valves so that the existing horizontal well and the new vertical well can be isolated. A schematic of the modification is included as Plate 3.

4.8.3.3 System Performance Monitoring

Monitoring of the soil vapor is critical to assessing the performance and tuning the operation of this remedy. Performance monitoring includes a combination of analytical sampling and real-time monitoring of the soil vapor extraction influent, mid carbon and off-gas. Below, the types of monitoring being conducted are described followed by a schedule showing the frequency of monitoring during system startup and operation.

The soil vapor extraction system is being monitored to determine the system performance and capture of PCE from below the basement slab. Three locations are being monitored at the treatment system to determine performance of the extraction system. These locations include intake air at the system manifold, treated vapors between the two carbon vessels, and system off-gas discharge to the atmosphere. The intake air is being sampled to determine the PCE levels being captured and requiring treatment. This data can be used to make adjustments to the SVE treatment train operation over time as levels of PCE decrease. Treated vapors are being sampled between the two carbon vessels to determine carbon breakthrough of the first carbon vessel. If analytical results indicate breakthrough, then the second vessel in series will be moved forward and a new carbon vessel will be installed in the second position. In this manner, complete breakthrough of both carbon vessels will not occur prior to change out. The final off-gas will be sampled for PCE and any other required parameters to demonstrate that the system discharge is within prescribed limits.

Performance monitoring is being conducted in accordance with the following schedule:

	System Start Up Operation Period			
Performance Monitoring	**Pre-Startup**	**Start-Up to +2 Weeks**	**+2 Weeks to +8 Weeks**	**+8 Weeks to +6 Months**
SVE Combined Intake	Grab	Twice a Week	Twice a Month	Monthly
SVE Mid-Carbon	NA	Daily	Weekly	Monthly
SVE Off-Gas	NA	Daily	Weekly	Monthly

Following the completion of the system start-up 6-month period, the system performance monitoring data will be evaluated and the final operation and maintenance monitoring frequency will be established. This frequency will be at a minimum once per quarter.

In addition to vapor sampling, vacuum and air flow rate are also being measured during monitoring.

4.8.3.4 Soil Vapor Sampling Points

At the time of the system modifications, 8 inch diameter holes will be cored through the concrete, 5 feet, 10 feet, and 15 feet from the new vertical SVE well (in the Chinese restaurant basement). At each of these locations a boring will be advanced 2 feet below the bottom of the concrete slab. A 6 inch long stainless steel GeoProbe™ soil vapor probe will be installed in each of the 3 borings. A piece of 0.5 inch diameter polyethylene tube will be attached to the top of each probe and extended to grade. The borings will be backfilled with

coarse silica sand to 3 inches above the top of the probe screens. Bentonite will be installed into the borings from the top of the sand pack to the bottom of the concrete slab. The borings will be finished with a curb box cemented into place.

A soil vapor sampling point will be installed beneath the basement slab of the Claudia Dowling Interiors building located at 325 Main Street abutting the Carillon Cleaners building to the east. An additional soil vapor sampling point will be installed beneath the slab at the Tonl Fitness facility located at 335 Main Street to the northwest of Carillon Cleaners. These soil vapor points will be installed as described above. The installation and soil vapor sampling of these points depends on obtaining an access agreement from the owners of the Claudia Dowling Interiors building and the Tonl Fitness building.

4.8.3.5 Remedial System Modification Schedule

The project schedule for the modification of the SVE system is presented below. This schedule tracks from submittal of this work plan through implementation of the remedial system modification activities. The schedule may be modified due to comments.

TASK	MILESTONE DATE
▪ Submit Work Plan to the NYSDEC	September 2007
▪ NYSDEC Approval of work plan	October 2007
▪ Procurement of SVE System modification and Coring Contractors	October 2007
▪ Contractor Mobilization for SVE System Modification and Coring Contractors	October 2007
▪ Contractor Demobilization	October 2007

5. RI Report Preparation

5.1 Data Summary

Field observations and empirical data collected during the RI will be analyzed to develop a site conceptual model. A composite base map that accurately illustrates the locations and elevations of site features, including all sampling locations, will be developed. Analytical data will be validated to determine if the data meet acceptable criteria for precision, accuracy, and completeness. Validated analytical data will be tabulated and compared to applicable NYSDEC standards. Field observations will be compared and correlated with the validated analytical data to characterize impacted areas.

The conceptual model will be presented in graphical and tabular form. The impacted areas will be illustrated through boring logs, plan view maps, and cross sections. A groundwater flow map will be generated illustrating groundwater flow direction beneath the site. Iso-concentration contours will also be provided on figures, with the sampling date noted. At least two cross sections will be completed to depict the hydrogeology parallel and perpendicular to groundwater flow.

All site data will be managed in a database so that the physical and chemical data can be easily integrated and compared to NYSDEC standards.

5.2 RI and Remedial Action (RA) Report

GEI will prepare an RI/RA report for submittal to the NYSDEC. The report will incorporate the findings of the RI/RA activities. The information will be used to describe the nature and extent, and fate and transport of the contaminants associated with the Carillon Cleaners site. The report will identify specific contaminant concentrations throughout each media (e.g., soil, soil vapor, groundwater, etc.), which is necessary to determine whether any media require remediation or further evaluation. The report will also include SVE system details and as-built drawings. The Qualitative Human Health Risk Assessment will also be included in this report.

Key components of the RI portion of the report will include:

- Description of RI activities
- Discussion of site geology and groundwater flow patterns

- Distribution of analytical compounds in soil and groundwater
- Distribution of NAPL (if any)
- Identification of historic structures and associated waste source areas
- Comparison of site soil, soil vapor, and groundwater analytical data to NYSDEC standards
- Comparison of indoor air analytical data to NYSDOH draft Soil Vapor Intrusion Guidance
- Identification of areas that exceed the soil, soil vapor, and groundwater standards
- Boring logs and monitoring well construction details
- Site photographs

Key components of the RA portion of the report will include:

- Description of RA activities and SVE system
- Discussion of radius of influence and air flow patterns
- Distribution of analytical compounds in the soil vapor
- Comparison of effluent soil vapor analytical data to NYSDEC standards
- Comparison of indoor air analytical data and soil vapor to NYSDOH draft Soil Vapor Intrusion Guidance
- As-built drawings and photographs of the SVE system

6. Schedule

After receiving approval from the NYSDEC and authorization from our client, GEI will begin performing the records review and preparing to mobilize to the site. We anticipate being able to begin field activities within two months of NYSDEC approval of the work plan.

The initial field program will include the modification of the sub-slab SVE system in the basement of Carillon Cleaners and installation of the soil vapor probes in the basement of the Chinese restaurant. However, the schedule for this work will depend on obtaining an access agreement with the owner of the Chinese restaurant building.

Approximately two months after the conclusion of the system modification activity, GEI will submit an IRM report. Approximately three months after the completion of system modifications, the groundwater screening will be conducted. Within three months of receiving the screening results, a submittal with proposed locations of new monitoring wells will be issued to the NYSDEC's concurrence. Upon receipt of NYSDEC concurrence, a drill rig will mobilized within one month to install the wells.

Approximately three months after installing and sampling the wells, GEI will submit a draft RI/RA Report.

Tables

Table 1
Groundwater Analytical Data Summary
Carillon Dry Cleaners

Sample Location	MW-1						MW-2			
Date	5/20/1997	7/2/1997	9/11/1998	5/24/1999	8/17/2000	5/17/2001	7/2/1997	9/10/1998	5/24/1999	5/17/2001
Depth										
Company	Anson	Anson	Arcadis	Arcadis	Arcadis	Arcadis	Anson	Arcadis	Arcadis	Arcadis
Parameter (ug/L)										
Methylene chloride	ND	ND	ND	ND	**4J**	**0.4J**	ND	**1J**	ND	**0.3J**
Acetone	ND	ND	ND	ND	**3J**	ND	ND	ND	ND	ND
1,2 - Dichloroethene (total)	ND	ND	ND	ND	**1J**	ND	**5**	**5**	**16**	**10**
Chloroform	**10**	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	ND	ND	ND	ND	ND	**9**	**7**	**11**	**6**
1,1,2 - Trichloroethane	ND	ND	ND	ND	**0.7J**	ND	ND	ND	ND	ND
Tetrachloroethene	**2500**	**1000**	**270**	**480**	**37**	**190**	**170**	**150**	**200**	**92**
1,1,1 - Trichlorethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tert. Butylmethylether	ND	ND	ND	ND	ND	ND	4	ND	ND	ND
n-Proplybenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
p-Ethyltoluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3,5 Trimethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4 Trimethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,,5-Tetramethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

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Table 1
Groundwater Analytical Data Summary
Carillon Dry Cleaners

Sample Location	MW-3				MW-4				
Date	7/2/1997	9/10/1998	5/24/1999	5/17/2001	7/2/1997	9/10/1998	5/24/1999	8/17/2000	5/17/2001
Depth									
Company	Anson	Arcadis	Arcadis	Arcadis	Anson	Arcadis	Arcadis	Arcadis	Arcadis
Parameter (ug/L)									
Methylene chloride	ND	**6J**	ND	**0.6J**	ND	ND	ND	**39J**	**15J**
Acetone	ND	ND	ND	ND	ND	ND	ND	120	ND
1,2 - Dichloroethene (total)	ND	ND	ND	ND	**8**	**10J**	**9**	**19J**	**9J**
Chloroform	ND	**90**	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	ND	ND	ND	**890**	**800**	**860**	**650**	**550**
1,1,2 - Trichloroethane	ND	ND	ND	ND	ND	**10J**	ND	ND	ND
Tetrachloroethene	ND	**2J**	ND	**2J**	**1800**	**1500**	**2800**	**1100**	**800**
1,1,1 - Trichlorethane	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tert. Butylmethylether	ND	ND	ND	ND	ND	ND	ND	ND	ND
n-Proplybenzene	ND	ND	ND	ND	**10**	ND	ND	ND	ND
p-Ethyltoluene	ND	ND	ND	ND	**10**	ND	ND	ND	ND
1,3,5 Trimethylbenzene	ND	ND	ND	ND	**12**	ND	ND	ND	ND
1,2,4 Trimethylbenzene	ND	ND	ND	ND	**19**	ND	ND	ND	ND
1,2,,5-Tetramethylbenzene	ND	ND	ND	ND	**8**	ND	ND	ND	ND
Isopropylbenzene	ND	ND	ND	ND	**6**	ND	ND	ND	ND

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Table 1
Groundwater Analytical Data Summary
Carillon Dry Cleaners

Sample Location	MW-5				GP-1			
Date	9/10/1998	5/24/1999	8/17/2000	5/17/2001	10/14/1997	10/14/1997	10/14/1997	10/14/1997
Depth					20-24	40-44	58-62	76-80
Company	Arcadis	Arcadis	Arcadis	Arcadis	Anson	Anson	Anson	Anson
Parameter (ug/L)								
Methylene chloride	ND	ND	**25J**	**39J**	ND	ND	ND	ND
Acetone	ND	ND	**45J**	ND	ND	ND	ND	ND
1,2 - Dichloroethene (total)	**5J**	**2**	ND	ND	ND	**2**	**1**	ND
Chloroform	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	**14J**	**9**	**16J**	**9J**	**10**	**5**	**3**	**2**
1,1,2 - Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	**640**	**750**	**1600**	**1200**	**840**	**150**	**100**	**360**
1,1,1 - Trichlorethane	ND	ND	ND	ND	ND	ND	ND	ND
Tert. Butylmethylether	ND	ND	ND	ND	ND	ND	ND	ND
n-Proplybenzene	ND	ND	ND	ND	ND	ND	ND	ND
p-Ethyltoluene	ND	ND	ND	ND	ND	ND	ND	ND
1,3,5 Trimethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4 Trimethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND
1,2,,5-Tetramethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	ND	ND	ND	ND	ND	ND	ND

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Table 1
Groundwater Analytical Data Summary
Carillon Dry Cleaners

Sample Location	GP-2				GP-3			
Date	10/16/1997	10/16/1997	10/16/1997	10/16/1997	10/16/1997	10/16/1997	10/16/1997	10/16/1997
Depth	20-24	40-44	60-64	72-76	20-24	40-44	60-64	70-74
Company	Anson	Anson	Anson	Anson	Anson	Anson	Anson	Anson
Parameter (ug/L)								
Methylene chloride	ND	ND	ND	ND	ND	ND	ND	ND
Acetone	ND	ND	ND	ND	ND	ND	ND	ND
1,2 - Dichloroethene (total)	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	**1300**	**2**	**14**	**100**	ND	ND	ND	ND
1,1,2 - Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	**6400**	**220**	**350**	**4100**	**4**	**2**	**2**	**1**
1,1,1 - Trichlorethane	ND	ND	ND	ND	ND	ND	ND	ND
Tert. Butylmethylether	ND	ND	ND	ND	ND	ND	ND	ND
n-Proplybenzene	ND	ND	ND	ND	ND	ND	ND	ND
p-Ethyltoluene	ND	ND	ND	ND	ND	ND	ND	ND
1,3,5 Trimethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4 Trimethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND
1,2,,5-Tetramethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	ND	ND	ND	ND	ND	ND	ND

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Table 1
Groundwater Analytical Data Summary
Carillon Dry Cleaners

Sample Location	GP-4				GP-5			
Date	10/14/1997	10/14/1997	10/14/1997	10/14/1997	10/14/1997	10/14/1997	10/14/1997	10/14/1997
Depth	20-24	40-44	60-64	70-74	20-24	40-44	60-64	72-76
Company	Anson	Anson	Anson	Anson	Anson	Anson	Anson	Anson
Parameter (ug/L)								
Methylene chloride	ND	ND	ND	ND	ND	ND	ND	ND
Acetone	ND	ND	ND	ND	ND	ND	ND	ND
1,2 - Dichloroethene (total)	6	ND	ND	ND	**6**	ND	ND	ND
Chloroform	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	11	**2**	ND	ND	**240**	ND	**22**	**5**
1,1,2 - Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	**210**	**68**	**5**	**42**	**780**	**98**	**260**	**260**
1,1,1 - Trichlorethane	ND	ND	ND	ND	ND	ND	ND	ND
Tert. Butylmethylether	ND	ND	ND	ND	ND	ND	ND	ND
n-Proplybenzene	ND	ND	ND	ND	ND	ND	ND	ND
p-Ethyltoluene	ND	ND	ND	ND	ND	ND	ND	ND
1,3,5 Trimethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4 Trimethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND
1,2,,5-Tetramethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	ND	ND	ND	ND	ND	ND	ND

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Table 1
Groundwater Analytical Data Summary
Carillon Dry Cleaners

Sample Location	GP-6				GP-7			
Date	10/16/1997	10/16/1997	10/16/1997	10/16/1997	10/15/1997	10/15/1997	10/15/1997	10/15/1997
Depth	20-24	40-44	60-64	76-80	20-24	40-44	60-64	72-76
Company	Anson	Anson	Anson	Anson	Anson	Anson	Anson	Anson
Parameter (ug/L)								
Methylene chloride	ND	ND	ND	ND	ND	ND	ND	ND
Acetone	ND	ND	ND	ND	ND	ND	ND	ND
1,2 - Dichloroethene (total)	ND	ND	ND	ND	**3**	ND	ND	ND
Chloroform	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	ND	ND	ND	ND	ND	ND	**1**
1,1,2 - Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	**14**	**8**	**56**	**1**	**84**	**24**	**9**	**13**
1,1,1 - Trichlorethane	ND	ND	ND	ND	ND	ND	ND	ND
Tert. Butylmethylether	ND	ND	ND	ND	ND	ND	ND	ND
n-Proplybenzene	ND	ND	ND	ND	ND	ND	ND	ND
p-Ethyltoluene	ND	ND	ND	ND	ND	ND	ND	ND
1,3,5 Trimethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4 Trimethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND
1,2,,5-Tetramethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	ND	ND	ND	ND	ND	ND	ND

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Table 1
Groundwater Analytical Data Summary
Carillon Dry Cleaners

Sample Location	GP-8				GP-9			
Date	10/15/1997	10/15/1997	10/15/1997	10/15/1997	10/17/1997	10/17/1997	10/17/1997	10/17/1997
Depth	20-24	40-44	60-64	76-80	20-24	40-44	60-64	76-80
Company	Anson	Anson	Anson	Anson	Anson	Anson	Anson	Anson
Parameter (ug/L)								
Methylene chloride	ND	ND	ND	ND	ND	ND	ND	ND
Acetone	ND	ND	ND	ND	ND	ND	ND	ND
1,2 - Dichloroethene (total)	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	**80**	**2**	**2**	**20**	ND	ND	ND	ND
1,1,2 - Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	**500**	**360**	**200**	**110**	**12**	**80**	**110**	**4**
1,1,1 - Trichlorethane	ND	ND	ND	ND	ND	ND	ND	ND
Tert. Butylmethylether	ND	ND	ND	ND	ND	ND	ND	ND
n-Proplybenzene	ND	ND	ND	ND	ND	ND	ND	ND
p-Ethyltoluene	ND	ND	ND	ND	ND	ND	ND	ND
1,3,5 Trimethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4 Trimethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND
1,2,,5-Tetramethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	ND	ND	ND	ND	ND	ND	ND

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Table 1
Groundwater Analytical Data Summary
Carillon Dry Cleaners

Sample Location	GP-10				GP-11			
Date	10/16/1997	10/16/1997	10/16/1997	10/16/1997	10/17/1997	10/17/1997	10/17/1997	10/17/1997
Depth	20-24	40-44	60-64	76-80	20-24	40-44	60-64	76-80
Company	Anson	Anson	Anson	Anson	Anson	Anson	Anson	Anson
Parameter (ug/L)								
Methylene chloride	ND	ND	ND	ND	ND	ND	ND	ND
Acetone	ND	ND	ND	ND	ND	ND	ND	ND
1,2 - Dichloroethene (total)	**48**	**6**	ND	ND	**2**	**1**	ND	ND
Chloroform	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	**12**	**12**	ND	ND	**8**	**1**	ND	ND
1,1,2 - Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	**48**	**150**	**6**	**8**	**190**	**44**	**20**	**100**
1,1,1 - Trichlorethane	ND	ND	ND	ND	ND	ND	ND	ND
Tert. Butylmethylether	ND	ND	ND	ND	ND	ND	ND	ND
n-Proplybenzene	ND	ND	ND	ND	ND	ND	ND	ND
p-Ethyltoluene	ND	ND	ND	ND	ND	ND	ND	ND
1,3,5 Trimethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4 Trimethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND
1,2,,5-Tetramethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	ND	ND	ND	ND	ND	ND	ND

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Table 1
Groundwater Analytical Data Summary
Carillon Dry Cleaners

Sample Location	GP-12				GP-13			
Date	12/15/1997	12/15/1997	12/15/1997	12/15/1997	12/15/1997	12/15/1997	12/15/1997	12/15/1997
Depth	20-24	40-44	60-64	76-80	20-24	40-44	60-64	70-74
Company	Anson	Anson	Anson	Anson	Anson	Anson	Anson	Anson
Parameter (ug/L)								
Methylene chloride	ND	ND	ND	ND	ND	ND	ND	ND
Acetone	ND	ND	ND	ND	ND	ND	ND	ND
1,2 - Dichloroethene (total)	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2 - Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	ND	**12**	ND	ND	**240**	**690**	**19**	**35**
1,1,1 - Trichlorethane	ND	ND	ND	ND	ND	ND	ND	ND
Tert. Butylmethylether	ND	ND	ND	ND	ND	ND	ND	ND
n-Proplybenzene	ND	ND	ND	ND	ND	ND	ND	ND
p-Ethyltoluene	ND	ND	ND	ND	ND	ND	ND	ND
1,3,5 Trimethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4 Trimethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND
1,2,,5-Tetramethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	ND	ND	ND	ND	ND	ND	ND

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Table 1
Groundwater Analytical Data Summary
Carillon Dry Cleaners

Sample Location	GP-14				GP-15			
Date	12/15/1997	12/15/1997	12/15/1997	12/15/1997	3/25/1998	3/25/1998	3/25/1998	3/25/1998
Depth	20-24	40-44	56-60	66-70	20-24	40-44	60-64	76-80
Company	Anson	Anson	Anson	Anson	Anson	Anson	Anson	Anson
Parameter (ug/L)								
Methylene chloride	ND	ND	ND	ND	ND	ND	ND	ND
Acetone	ND	ND	ND	ND	ND	ND	ND	ND
1,2 - Dichloroethene (total)	ND	ND	ND	**3**	**10**	**6**	ND	ND
Chloroform	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	ND	ND	**3**	**16**	**8**	ND	ND
1,1,2 - Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	**52**	ND	**9**	**40**	**400**	**230**	ND	ND
1,1,1 - Trichlorethane	ND	ND	ND	ND	ND	ND	ND	ND
Tert. Butylmethylether	ND	ND	ND	ND	ND	ND	ND	ND
n-Proplybenzene	ND	ND	ND	ND	ND	ND	ND	ND
p-Ethyltoluene	ND	ND	ND	ND	ND	ND	ND	ND
1,3,5 Trimethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4 Trimethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND
1,2,,5-Tetramethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	ND	ND	ND	ND	ND	ND	ND

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Table 1
Groundwater Analytical Data Summary
Carillon Dry Cleaners

Sample Location	GP-16				GP-17			
Date	3/26/1998	3/26/1998	3/26/1998	3/26/1998	3/26/1998	3/26/1998	3/26/1998	3/26/1998
Depth	20-24	40-44	60-64	76-80	20-24	40-44	60-64	76-80
Company	Anson	Anson	Anson	Anson	Anson	Anson	Anson	Anson
Parameter (ug/L)								
Methylene chloride	ND	ND	ND	ND	ND	ND	ND	ND
Acetone	ND	ND	ND	ND	ND	ND	ND	ND
1,2 - Dichloroethene (total)	**34**	**5**	ND	ND	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	28	**5**	ND	ND	ND	ND	ND	ND
1,1,2 - Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	**340**	**25**	ND	**5**	ND	ND	ND	ND
1,1,1 - Trichlorethane	ND	ND	ND	ND	ND	ND	**4**	**5**
Tert. Butylmethylether	ND	ND	ND	ND	ND	ND	ND	ND
n-Proplybenzene	ND	ND	ND	ND	ND	ND	ND	ND
p-Ethyltoluene	ND	ND	ND	ND	ND	ND	ND	ND
1,3,5 Trimethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4 Trimethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND
1,2,,5-Tetramethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	ND	ND	ND	ND	ND	ND	ND

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Table 1
Groundwater Analytical Data Summary
Carillon Dry Cleaners

Sample Location	GP-18				B-1	B-2	B-3	B-4	B-5	B-6	B-7
Date	3/26/1998	3/26/1998	3/26/1998	3/26/1998	6/2/1997	6/2/1997	6/2/1997	6/2/1997	6/2/1997	6/2/1997	6/2/1997
Depth	20-24	40-44	60-64	76-80	30	30	30	40	30	40	30
Company	Anson	Anson	Anson	Anson	Anson	Anson	Anson	Anson	Anson	Anson	Anson
Parameter (ug/L)											
Methylene chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acetone	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2 - Dichloroethene (total)	ND	ND	ND	ND	**4**	ND	ND	**3**	ND	3	ND
Chloroform	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	ND	ND	ND	**8**	**9**	**9**	**6**	ND	**3**	**11**
1,1,2 - Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	ND	ND	ND	ND	**470**	**620**	**1400**	190	**19,000**	**41**	**2100**
1,1,1 - Trichlorethane	ND	ND	**3**	**2**	ND	ND	ND	ND	ND	ND	ND
Tert. Butylmethylether	ND	ND	ND	ND	**4**	**5**	ND	**4**	BDL	**4**	ND
n-Proplybenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	**3**	ND
p-Ethyltoluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3,5 Trimethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4 Trimethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,,5-Tetramethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

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Table 2
Soil Analytical Data Summary
Carillon Dry Cleaners

Sample Location	SS-1		SS-2		SS-3	SS-4		SS-5	
Date	6/30/1997	6/30/1997	6/30/1997	6/30/1997	6/30/1997	6/30/1997	6/30/1997	6/30/1997	6/30/1997
Depth in Feet	1.5-3.5	10-12	1.5-3.5	10-12	1.5-3.5	1.5-3.5	10-12	1.5-3.5	10-12
Company	Anson	Anson	Anson	Anson	Anson	Anson	Anson	Anson	Anson
Parameter (ug/L)									
OVM Reading	**4.1**	**4.5**	**7.1**	**6**	**26**	**4.5**	**0.6**	**1.9**	**1.5**
Tetrachloroethene	**950**	**210**	**6100**	**135**	**1800**	**5600**	**10**	**1900**	**1400**
Trichloroethene	**35**	ND	**60**	**15**	**10**	**20**	ND	**30**	**5**
Chloromethane	**20**	ND	ND	**20**	ND	**10**	**5**	**15**	ND
111 Trichlorethane	ND	ND	ND	ND	ND	**5**	ND	ND	ND
Acetone	ND	ND	ND	ND	ND	ND	ND	ND	ND

Notes:
Shading indicates Parameter Detected
ND = Not Detected
NS = Not Sampled
NM = Not Measured
Anson = Anson Environmental, LTD.
Arcadis = Arcadis G+M, Inc.

Table 2
Soil Analytical Data Summary
Carillon Dry Cleaners

Sample Location	SS-6		SS-7		SS-8		SS-9		P-1	
Date	6/30/1997	7/1/1997	7/1/1997	7/1/1997	7/1/1997	7/1/1997	7/1/1997	7/1/1997	5/19/1997	5/19/1997
Depth in Feet	1.5-3.5	10-12	1.5-3.5	10-12	4-6	8-10	4-6	6-8	1.5-3.5	10-12
Company	Anson	Anson	Anson	Anson	Anson	Anson	Anson	Anson	Anson	Anson
Parameter (ug/L)										
OVM Reading	**2.2**	**1**	**0.8**	**0**	**0**	**0**	**1.9**	**0**	NM	NM
Tetrachloroethene	**430**	ND	**100**	**ND**	**10**	**25**	**1500**	**25**	**18000**	**2100**
Trichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
111 Trichlorethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acetone	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Notes:
Shading indicates Parameter Detected
ND = Not Detected
NS = Not Sampled
NM = Not Measured
Anson = Anson Environmental, LTD.
Arcadis = Arcadis G+M, Inc.

Table 2
Soil Analytical Data Summary
Carillon Dry Cleaners

Sample Location	P-2		P-3		A	A	A	B	B	B
Date	5/19/1997	5/19/1997	5/19/1997	5/19/1997	9/4/1998	9/4/1998	9/4/1998	9/4/1998	9/4/1998	9/4/1998
Depth in Feet	1.5-3.5	10-12	1.5-3.5	10-12	6-8	8-10	12-14	2-4	4-6	10-12
Company	Anson	Anson	Anson	Anson	Arcadis	Arcadis	Arcadis	Arcadis	Arcadis	Arcadis
Parameter (ug/L)										
OVM Reading	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
Tetrachloroethene	**1100**	**280**	**80**	ND	ND	ND	ND	**120**	**10**	ND
Trichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
111 Trichlorethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acetone	ND	ND	ND	ND	ND	**19**	ND	ND	ND	ND

Notes:
Shading indicates Parameter Detected
ND = Not Detected
NS = Not Sampled
NM = Not Measured
Anson = Anson Environmental, LTD.
Arcadis = Arcadis G+M, Inc.

Table 2
Soil Analytical Data Summary
Carillon Dry Cleaners

Sample Location	C	C	SB-1	SB-2	SB-3	SB-4	SB-5	SB-6
Date	9/4/1998	9/4/1998	4/25/1997	4/25/1997	4/25/1997	4/25/1997	4/25/1997	4/25/1997
Depth in Feet	2-4	6-8	1.5-3.5	1.5-3.5	1.5-3.5	1.5-3.5	1.5-3.5	1.5-3.5
Company	Arcadis	Arcadis	Anson	Anson	Anson	Anson	Anson	Anson
Parameter (ug/L)								
OVM Reading	NM	NM	**5.1**	**7.5**	**3.2**	**6.2**	**6.2**	**7.5**
Tetrachloroethene	**87**	**99**	NS	**15000**	NS	NS	NS	**4100**
Trichloroethene	ND	ND	NS	150	NS	NS	NS	**24**
Chloromethane	ND	ND	NS	ND	NS	NS	NS	ND
111 Trichlorethane	ND	ND	NS	ND	NS	NS	NS	ND
Acetone	ND	ND	NS	ND	NS	NS	NS	ND

Notes:
Shading indicates Parameter Detected
ND = Not Detected
NS = Not Sampled
NM = Not Measured
Anson = Anson Environmental, LTD.
Arcadis = Arcadis G+M, Inc.

Table 2
Soil Analytical Data Summary
Carillon Dry Cleaners

Sample Location	SB-7	SB-7	SB-7	SB-7	SB-7	SB-8	SVES-1	SVES-2	SVES-3
Date	5/5/1997	5/5/1997	5/5/1997	5/5/1997	5/5/1997	5/5/1997	3/25/1998	3/25/1998	3/25/1998
Depth in Feet	1-3	3-5	5-7	7-9	10-12	0-2	7-8	10-11	6-7
Company	Anson	Anson	Anson	Anson	Anson	Anson	Anson	Anson	Anson
Parameter (ug/L)									
OVM Reading	**0.7**	**6.2**	**3.3**	**2.2**	**2.3**	**2.2**	**5**	**4**	**8.8**
Tetrachloroethene	NS	NS	NS	NS	**890**	**2700**	**430**	ND	**900**
Trichloroethene	NS	NS	NS	NS	ND	10	ND	ND	ND
Chloromethane	NS	NS	NS	NS	ND	ND	ND	ND	ND
111 Trichlorethane	NS	NS	NS	NS	ND	ND	ND	ND	ND
Acetone	NS	NS	NS	NS	ND	ND	ND	ND	ND

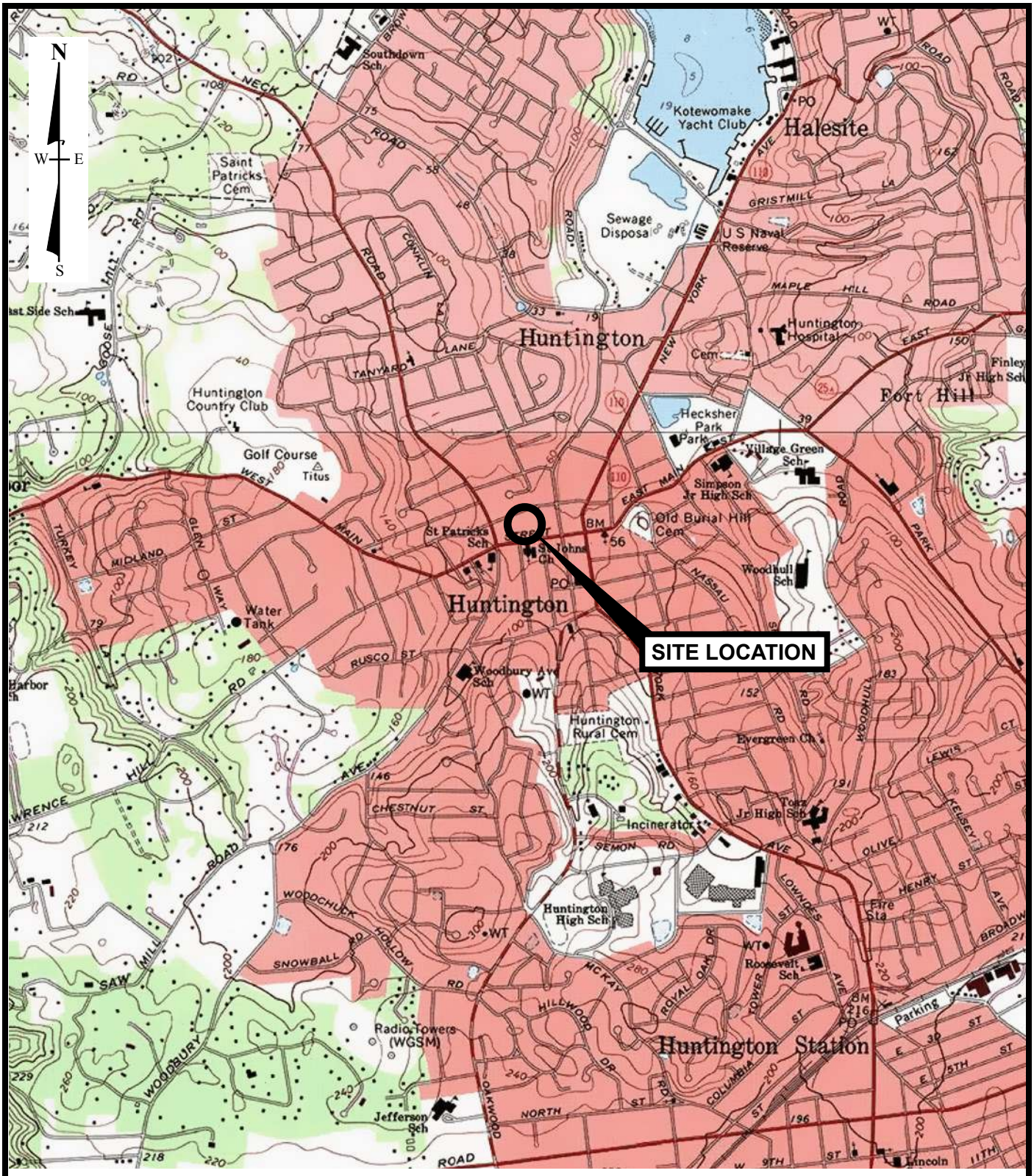
Notes:
Shading indicates Parameter Detected
ND = Not Detected
NS = Not Sampled
NM = Not Measured
Anson = Anson Environmental, LTD.
Arcadis = Arcadis G+M, Inc.

Table 3
Sample Descriptions, Rationale and Analysis
Carillon Cleaners
Huntington, New York

Sampling Location ID	Sampling Interval[4]	Sample Location	Sample Rationale	Sample Matrix/ Estimated Quantity			Analytical Protocals[1]	Holding Time[3]
				Soil	Water	Air	VOCs+TICs[2]	Days
Geoprobe™ Boring/Microwell								
GP-19	Water table +5 feet	Downgradient of Tank B	Provide vertical groundwater profile	If required	1		8260	10
	Water table + 25 feet				1			
	Water table +45 feet				1			
	Water table + 65 feet				1			
GP-20	Water table +5 feet	Vicinity of Boring B-5	Provide vertical groundwater profile	If required	1		8260	10
	Water table + 25 feet				1			
	Water table +45 feet				1			
	Water table + 65 feet				1			
GP-21	22 bgs or water table + 5 feet	Vicinity of GP-2	Provide vertical groundwater profile		1		8260	10
	water table + 75 feet				1			
GP-22	20-24	Downgradient of MW-5	Provide vertical groundwater profile		1		8260	10
	40-44				1			
	60-64				1			
	76-80				1			
GP-23	Water table +5 feet	Vicinity of MW-T and Tank A	Provide vertical groundwater profile	If required	1		8260	10
	Water table + 25 feet				1			
	Water table +45 feet				1			
	Water table + 65 feet				1			
Field Blank	--	--	one sample for every 20		1		8260	10
Trip Blank	--	--	one sample for every 20		1		8260	10
Blind duplicate	--	--	one sample for every 20		1		8260	10
Total	--	--	--	--	21	--	--	--
			Groundwater Monitoring					
MW-2	--	See Plate 1	Provide groundwater profile		1		8260	10
MW-3	--	See Plate 1	Provide groundwater profile		1		8260	10
MW-4	--	See Plate 1	Provide groundwater profile		1		8260	10
MW-5	--	See Plate 1	Provide groundwater profile		1		8260	10
Piezometer 2	--	See Plate 1	Provide groundwater profile		1		8260	10
Piezometer 3	--	See Plate 1	Provide groundwater profile		1		8260	10
Field Blank	--	--	one sample for every 20		1		8260	10
Trip Blank	--	--	one sample for every 20		1		8260	10
Blind duplicate	--	--	one sample for every 20		1		8260	10
Total	--	--	--	--	9	--	--	--
			Soil Gas sampling					
SG-1	--	Inside Basement of building	Verify the contamination in the unsaturated zone has been delineated	If required		1	Air -Modified TO-14 A Soil if required-8260	14
SG-2	--	Inside Basement of building	Verify the contamination in the unsaturated zone has been delineated	If required		1	Air -Modified TO-14 A Soil if required-8260	14
SG-3	--	Inside Basement of building	Verify the contamination in the unsaturated zone has been delineated	If required		1	Air -Modified TO-14 A Soil if required-8260	14
SG-4	--	Inside Basement of building	Verify the contamination in the unsaturated zone has been delineated	If required		1	Air -Modified TO-14 A Soil if required-8260	14
SG-5	--	Inside Basement of building	Verify the contamination in the unsaturated zone has been delineated	If required		1	Air -Modified TO-14 A Soil if required-8260	14
SG-6	--	Outside northwest corner of building	Verify the contamination in the unsaturated zone has been delineated	If required		1	Air -Modified TO-14 A Soil if required-8260	14
Total	--	--	--	--		6	--	--
			Downgradient of Plume					
Potential home owner well	--	To be determined during based on Water Use Survey	Potential groundwater impacts	If required	2		524.2	10
			Indoor/Outdoor Air					
IA -1	--	Inside and outside Chinese Restaurant	Indoor air quality			5	Modified TO-14 A	14

Notes:
1. All test methods are specified from U.S. EPA SW-846 test methods.
2. VOCs refer to volatile organic compounds analyzed by EPA Method 8260.
3. Holding time for VOCs for preserved aqueous samples is 10 days from verified time of sample receipt (VSTR) by laboratory.
4. Groundwater probe sampling intervals area approximate and are subject to change. The ultimate number of samples will be based on previous investigation data and observations during implementation of RI field program.

Figure



SOURCE: Map created with TOPO! ® ©2001 National Geographic (www.nationalgeographic.com/topo)"

0 2000 4000

SCALE, FEET

CARILLON CLEANERS 327 MAIN STREET HUNTINGTON, NEW YORK	GEI Consultants	SITE LOCATION MAP
CARILLON CLEANERS	Project 041880-1001	September 2007 Figure 1

CARILLON\041880\FIGS\CARILLON-LOCATION.CDR

Plates

LEGEND

MW-1, PIEZ.1	MONITORING WELL/PIEZOMETER LOCATION NOT FOUND DURING RECENT SITE VISIT
GP-19	PROPOSED GROUNDWATER SCREENING LOCATION
SG-1	PROPOSED SOIL GAS SAMPLING/POTENTIAL SOIL SAMPLING LOCATION
MW-2	MONITORING WELL LOCATION
C.C. #1	S,C,D,H, MONITORING WELL
GP-1	GEOPROBE GROUNDWATER SAMPLE LOCATION
B-1	GROUNDWATER SAMPLING LOCATION (6/2/97)
A	SOIL BORING LOCATION (9/4/98)
SS-1	SOIL SAMPLE LOCATION (6/30-7/1/97)
SB-1	SOIL BORING LOCATION (4/25-5/5/97)
PIEZ.2	PIEZOMETER SOIL SAMPLE LOCATION (5/19/97)
SVES#3	SVES SOIL SAMPLE LOCATION (4-28-98)
CB	CATCH BASIN
C.I.	CURB INLET
E	ELECTRIC MANHOLE
D	DRAIN MANHOLE
S	SEWER MANHOLE
T	TELEPHONE MANHOLE
LP	LIGHT POLE
UP	UTILITY POLE
MH	MANHOLE
HYD	HYDRANT
WV	WATER VALVE
GV	GAS VALVE
WM	WATER METER
EB	ELECTRIC BOX
E	APPROXIMATE LOCATION OF UNDERGROUND ELECTRIC SERVICE
G	APPROXIMATE LOCATION OF UNDERGROUND GAS SERVICE
T	APPROXIMATE LOCATION OF UNDERGROUND TELEPHONE SERVICE
D	APPROXIMATE LOCATION OF UNDERGROUND DRAINAGE SERVICE
S	APPROXIMATE LOCATION OF UNDERGROUND SEWER SERVICE

N
W E
S

1-STORY MASONRY BUILDING (U.S. POST OFFICE)
ROOF OVER
ROOF OVER
CONC. TERRACE
CONC. STEPS
CONC. TERRACE
8" MASONRY RETAINING WALL
8" MASONRY RETAINING WALL
CONC. SIDEWALK
GP-22
WM
WM
CONC. CURB
GERARD STREET
GP-9
MW-5
GP-8
CONC. CURB
ASPHALT & CONC. ISLAND
GP-7
CONC. CURB
ASPHALT PARKING AREA
CLINTON AVENUE
ASPHALT ISLAND
LP
GP-6
GP-5
LP
CONC. CURB
GP-4
ASPHALT PARKING AREA
EB
GV
WV
ASPHALT PARKING AREA
CONC. CURB
ASPHALT DRIVEWAY
ASPHALT ISLAND
MW-4
GV
ASPHALT ISLAND
CONC. CURB
MH
ASPHALT PARKING AREA
MH
ASPHALT ISLAND
GP-21
GP-3
GP-2
MH
B-6
B-7
CONC. CURB
ASPHALT DRIVEWAY
CONC. CURB
UP
HYD
CB
MH
CURB CUT
CONC. WALK
GP-11
ASPHALT PARKING AREA
UP
MW-3
ASPHALT DRIVEWAY
MW-2
B-3/B-4
B-5
GP-20
CONC. PAD
BRICK TERRACE
BRICK TERRACE
C.C. #1
1-STORY MASONRY BUILDING
CONC. SIDEWALK
ASPHALT PARKING AREA
B-2
MH
SEE INSET FOR DETAIL OF THIS AREA
ROOF OVER
B-1
GP-19
GP-1
MW-1
MW-T
SG-6
GP-23
FORMER 1,000-gallon GASOLINE UST (TANK B)
FORMER 2,000-gallon NO. 2 OIL UST (TANK A)
2-STORY MASONRY BUILDING
SG-3
SLAB
SG-1
SG-2
BASEMENT
1-STORY MASONRY BUILDING
#327 1-STORY MASONRY BUILDING
FORMER 150-gallon PERCHLOROETHYLENE STORAGE TANK
SG-4
CONC. SIDEWALK
SG-5
GP-15
GP-16
GP-14
GP-13
GP-12
GP-10
GP-17
GP-18 LOCATED 72' SOUTHWEST OF GP-17
MAIN STREET (NYS RT. 25A)

30 15 0 30 60
GRAPHIC SCALE IN FEET

MW-2
B-5
GP-20
SS-8
B-3/B-4
CONC. PAD
C.C. #1
CONC. SIDEWALK
1-STORY MASONRY BUILDING
ASPHALT PARKING AREA
SS-6
B-2
SS-7
SS-5
C
SVES#1
SS-4
SS-3
2-STORY MASONRY BUILDING
SB-5
SB-4
SS-9
B-1
SS-2
B
SB-6
SB-7
SVES#2
SS-1
PIEZ.3
GP-1
SB-2
SB-3
GP-19
MW-1
ROOF OVER
SVES#3
PIEZ.2
PIEZ.1
A
MW-T
SB-8
FORMER 1,000-GALLON GASOLINE UST (TANK B)
FORMER 2,000-gallon NO. 2 OIL UST (TANK A)
SB-1
GP-23
SG-6
1-STORY MASONRY BUILDING
#327 1-STORY MASONRY BUILDING

INSET

10 5 0
GRAPHIC SCALE IN FEET

NOTE:
ALL SAMPLE LOCATIONS ARE APPROXIMATED BASED ON DRAWINGS LISTED IN SOURCES.

SOURCES:

1. MONITORING WELL DETAIL, PROJECT: CARILLON CLEANERS, 327 MAIN STREET, HUNTINGTON, SUFFOLK CO., N.Y., PROJECT NO, 1649433; SCALE: 1"=40'; DATE DRAWN: 4-24-00; PREPARED BY THE SEAR-BROWN GROUP, 229 SEVENTH STREET, GARDEN CITY, N.Y., 11530,
2. MONITORING WELL SURVEY, CARILLON CLEANERS, 327 MAIN STREET, HUNTINGTON, L.I., N.Y., SCALE: 1"=30', DATED: 7/17/97; PREPARED BY WELSH ENGINEERING & LAND SURVEYING, P.C., 343 MANVILLE ROAD, PLEASANTVILLE, N.Y, 10570.

CARILLON CLEANERS
327 MAIN STREET
HUNTINGTON, NEW YORK

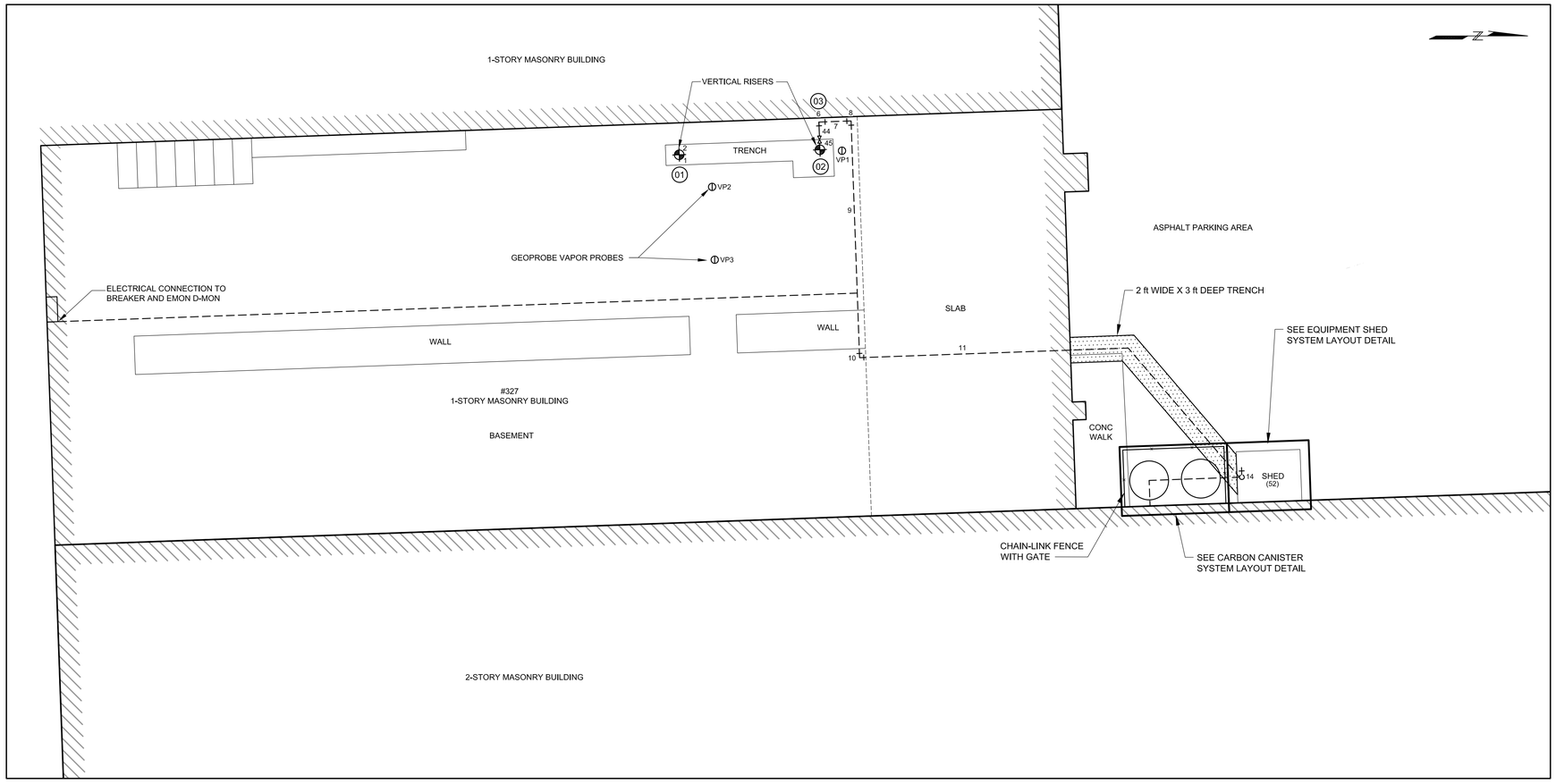
PROJECT 041880-1001

GEI Consultants
SUITE 201
455 WINDING BROOK DRIVE
GLASTONBURY, CONNECTICUT 06033

SITE PLAN

September 2007 PLATE 1

CARILLON CLEANERS\041880\PLATE\CARILLON-SPLAN



0 5 10

SCALE, FEET

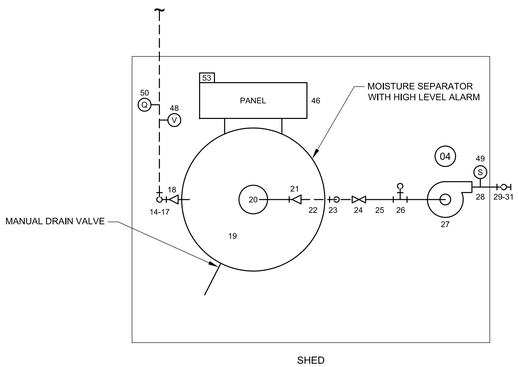
LEGEND

- EXTRACTION WELL
- BUTTERFLY VALVE
- GATE VALVE
- DIFFUSER (EXPANSION)
- BLOWER
- EXIT
- 90° ELBOW
- CONVERGING TEE
- ELBOW TURNED DOWN
- ELBOW TURNED UP
- (01) NODE NUMBER
- 2" DIAMETER PVC PIPE
- 3" DIAMETER PVC PIPE
- 3 COMPONENT NUMBER
- (P) PRESSURE GAUGE
- (S) SAMPLING PORT
- (T) TEMPERATURE GAUGE
- (V) VACUUM GAUGE
- (Q) VELOCITY PORT

COMPONENT NUMBER(S)	COMPONENT DESCRIPTION	QUANTITY	MANUFACTURER'S MODEL
2, 44	BALL VALVE	2	2-INCH SCHEDULE 40 PVC
3,5,7,9,11,13,15, 17,31,32,33,36,40, 42, AND 45	PIPE	117 LINEAR FEET	2-INCH SCHEDULE 40 PVC
4,8,10,12,14,16,29, 33,35,37,39, AND 41	90 ELBOW	12	2-INCH SCHEDULE 40 PVC
6 AND 43	TEE	2	2-INCH SCHEDULE 40 PVC
18	DIFFUSER	1	2-INCH TO 3-INCH SCHEDULE 40 PVC
19	MOISTURE SEPARATOR WITH HIGH LEVEL ALARM	–	PREFABRICATED/SKID MOUNTED SYSTEM TO BE DETERMINED BY VENDOR
20	FILTER	–	PREFABRICATED/SKID MOUNTED SYSTEM TO BE DETERMINED BY VENDOR
21	DIFFUSER	–	PREFABRICATED/SKID MOUNTED SYSTEM TO BE DETERMINED BY VENDOR
22	PIPE	–	PREFABRICATED/SKID MOUNTED SYSTEM TO BE DETERMINED BY VENDOR
23	90 ELBOW	–	PREFABRICATED/SKID MOUNTED SYSTEM TO BE DETERMINED BY VENDOR
24	VALVE	–	PREFABRICATED/SKID MOUNTED SYSTEM TO BE DETERMINED BY VENDOR
25	PIPE	–	PREFABRICATED/SKID MOUNTED SYSTEM TO BE DETERMINED BY VENDOR
26	TEE	–	PREFABRICATED/SKID MOUNTED SYSTEM TO BE DETERMINED BY VENDOR
27	BLOWER	–	SIEMENS REGENERATIVE VACUUM BLOWER -2,3 HP, TEFC, 1 PHASE , 230 VOLTS, 60 HZ 150 SCFM AT 70 INCHES OF H20 MODEL NUMBER:2BH1500-7AV35
46	CONTROL PANEL	–	SIMPLEX NEMA 3R CONTROL PANEL INCLUDED IN PREFABRICATED/SKID MOUNTED SYSTEM TO BE DETERMINED BY VENDOR
34 AN 38	CARBON #1	2	TIGG CORPORATION 200 LB CARBON DRUM RATED FOR 100 CFM (TIGG MODEL ECONOSORB-V)
47	PRESSURE GAUGE	1	0-80 INCHES OF WATER PRESSURE
48	VACUUM GAUGE	1	0-80 INCHES OF WATER VACUUM
49	SAMPLING PORTS	3	1/4 INCH DIAMETER VALVE TAPPED INTO PIPE
50	VELOCITY PORT	2	1/4 INCH DIAMETER BUSHING WITH CAP TAPPED INTO PIPE
51	TEMPERATURE GAUGE	2	0-200 DEGREES FAHRENHEIT
52	SHED	1	SUNCAST MODEL GS8000
53	ELECTRIC METER	1	EMON D-MON CLASS 1000, 230 VOLTS MODEL NUMBER:320825-SA

NOTES:

SHED MUST HAVE AT LEAST THE FOLLOWING MINIMUM DIMENSIONS:
LENGTH = 52 INCHES
DEPTH = 40 INCHES
HEIGHT = 6 FEET
MINIMUM DOORWAY OPENING = 50 INCHES

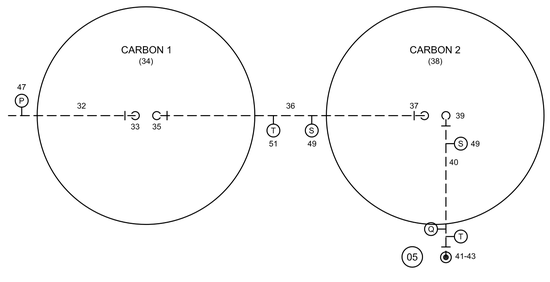


SHED

EQUIPMENT SHED SYSTEM LAYOUT DETAIL

0 1 2

SCALE, FEET



CARBON CANISTER SYSTEM LAYOUT DETAIL

0 1 2

SCALE, FEET

CARILLON CLEANERS
327 MAIN STREET
HUNTINGTON, NEW YORK

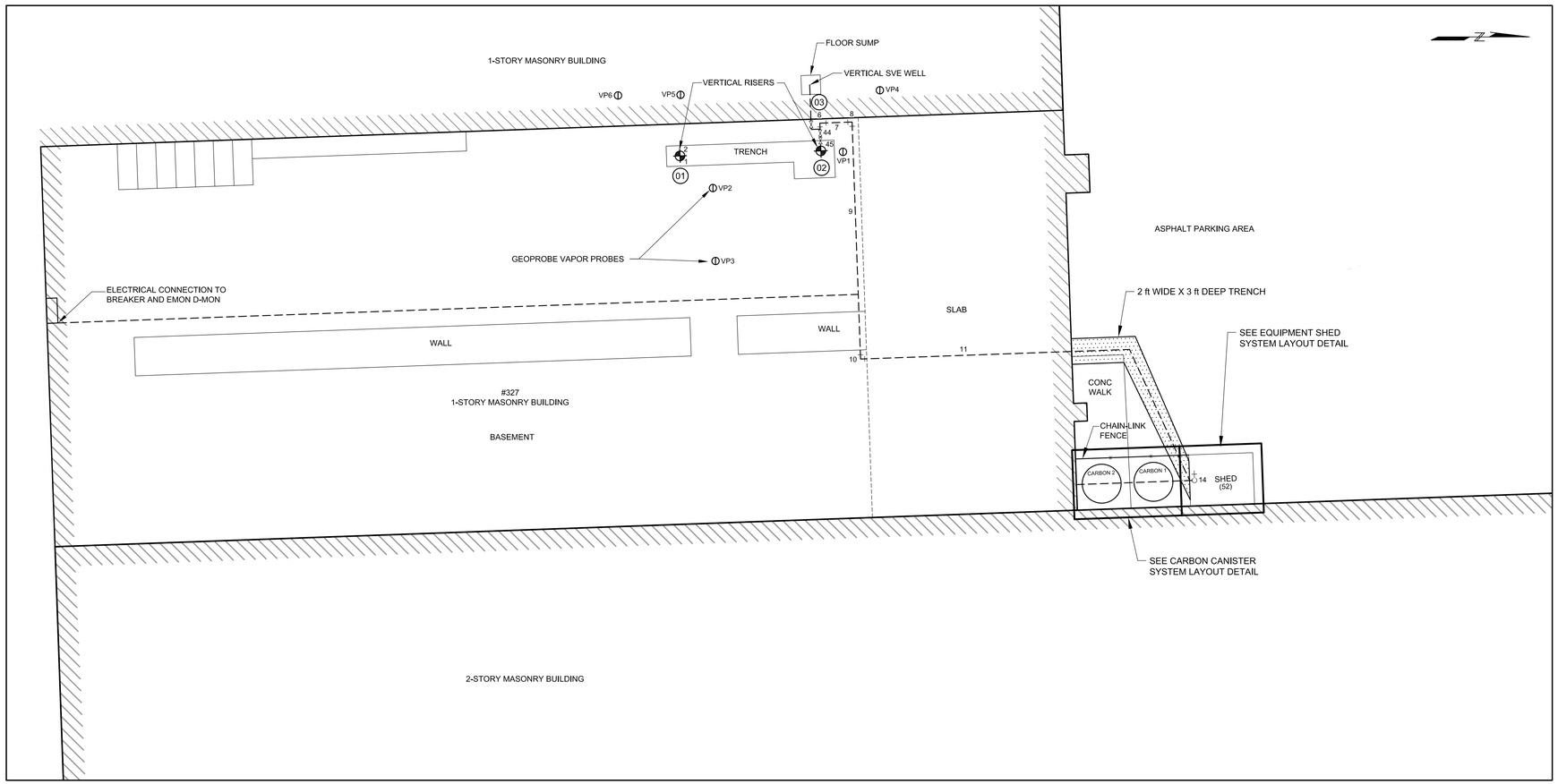
CARILLON CLEANERS

PROJECT NO.: 041880-1001

GEI Consultants
455 WINDING BROOK DRIVE
SUITE 201
GLASTONBURY, CONNECTICUT 06033

PROPOSED SOIL VAPOR EXTRACTION SYSTEM PIPING LAYOUT

September 2007 Plate 2



LEGEND

- EXTRACTION WELL
- BUTTERFLY VALVE
- GATE VALVE
- DIFFUSER (EXPANSION)
- BLOWER
- EXIT
- 90° ELBOW
- CONVERGING TEE
- ELBOW TURNED DOWN
- ELBOW TURNED UP
- NODE NUMBER
- 2" DIAMETER PVC PIPE
- 3" DIAMETER PVC PIPE
- COMPONENT NUMBER
- PRESSURE GAUGE
- SAMPLING PORT
- TEMPERATURE GAUGE
- VACUUM GAUGE
- VELOCITY PORT

COMPONENT NUMBER(S)	COMPONENT DESCRIPTION	QUANTITY	MANUFACTURER'S MODEL
2, 44	BALL VALVE	2	2-INCH SCHEDULE 40 PVC
3,5,7,9,11,13,15, 17,31,32,33,36,40, 42, AND 45	PIPE	117 LINEAR FEET	2-INCH SCHEDULE 40 PVC
4,8,10,12,14,16,29, 33,35,37,39, AND 41	90 ELBOW	12	2-INCH SCHEDULE 40 PVC
6 AND 43	TEE	2	2-INCH SCHEDULE 40 PVC
18	DIFFUSER	1	2-INCH TO 3-INCH SCHEDULE 40 PVC
19	MOISTURE SEPARATOR WITH HIGH LEVEL ALARM	–	PREFABRICATED/SKID MOUNTED SYSTEM TO BE DETERMINED BY VENDOR
20	FILTER	–	PREFABRICATED/SKID MOUNTED SYSTEM TO BE DETERMINED BY VENDOR
21	DIFFUSER	–	PREFABRICATED/SKID MOUNTED SYSTEM TO BE DETERMINED BY VENDOR
22	PIPE	–	PREFABRICATED/SKID MOUNTED SYSTEM TO BE DETERMINED BY VENDOR
23	90 ELBOW	–	PREFABRICATED/SKID MOUNTED SYSTEM TO BE DETERMINED BY VENDOR
24	VALVE	–	PREFABRICATED/SKID MOUNTED SYSTEM TO BE DETERMINED BY VENDOR
25	PIPE	–	PREFABRICATED/SKID MOUNTED SYSTEM TO BE DETERMINED BY VENDOR
26	TEE	–	PREFABRICATED/SKID MOUNTED SYSTEM TO BE DETERMINED BY VENDOR
27	BLOWER	–	SIEMENS REGENERATIVE VACUUM BLOWER -2.3 HP, TEFC, 1 PHASE , 230 VOLTS, 60 HZ 150 SCFM AT 70 INCHES OF H20 MODEL NUMBER:2BH1500-7AV35
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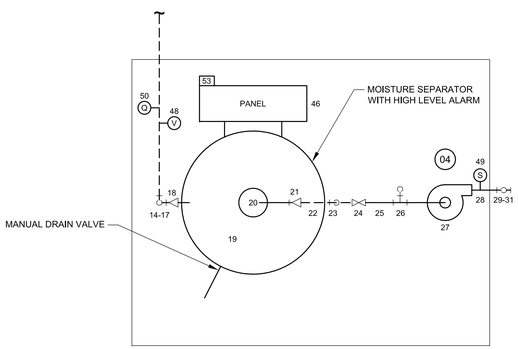
34 AN 38	CARBON #1	2	TIGG CORPORATION 200 LB CARBON DRUM RATED FOR 100 CFM (TIGG MODEL ECONOSORB-V)
47	PRESSURE GAUGE	1	0-80 INCHES OF WATER PRESSURE
48	VACUUM GAUGE	1	0-80 INCHES OF WATER VACUUM
49	SAMPLING PORTS	3	1/4 INCH DIAMETER VALVE TAPPED INTO PIPE
50	VELOCITY PORT	2	1/4 INCH DIAMETER BUSHING WITH CAP TAPPED INTO PIPE
51	TEMPERATURE GAUGE	2	0-200 DEGREES FAHRENHEIT
52	SHED	1	SUNCAST MODEL GS8000
53	ELECTRIC METER	1	EMON D-MON CLASS 1000, 230 VOLTS MODEL NUMBER:320825-SA

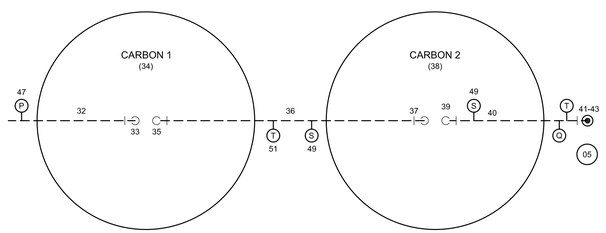
NOTES:

SHED MUST HAVE AT LEAST THE FOLLOWING MINIMUM DIMENSIONS:
LENGTH = 52 INCHES
DEPTH = 40 INCHES
HEIGHT = 6 FEET
MINIMUM DOORWAY OPENING = 50 INCHES



EQUIPMENT SHED SYSTEM LAYOUT DETAIL

0 1 2
SCALE, FEET



CARBON CANISTER SYSTEM LAYOUT DETAIL

0 1 2
SCALE, FEET

CARILLON CLEANERS
327 MAIN STREET
HUNTINGTON, NEW YORK

CARILLON CLEANERS

PROJECT NO.: 041880-1001

GEI Consultants
455 WINDING BROOK DRIVE
SUITE 201
GLASTONBURY, CONNECTICUT 06033

PROPOSED SOIL VAPOR EXTRACTION SYSTEM MODIFICATION LAYOUT

September 2007 Plate 3

CARILLON CLEANERS\041880\PLATE\CARILLON-PIPING SYSTEM 6-07.dwg

Appendix A

Community Air Monitoring Plan

Community Air Monitoring Plan
Carillon Cleaners

In accordance with NYSDEC and NYSDOH requirements for a Community Air Monitoring Plan (CAMP), a perimeter air-monitoring plan will be implemented at the site during ground-intrusive field activities, such as drilling. The perimeter air-monitoring plan will not be implemented during direct-push sampling. The objective of the perimeter air-monitoring plan is to provide a measure of protection for the downwind community (i.e., off-site receptors, including residences and businesses and on-site workers not involved with the site field activities) from potential airborne contaminant releases as a direct result of field activities. The perimeter air-monitoring plan is a stand-alone document and will be available on site. The VOC Monitoring, Response Levels, and Actions are presented as follows.

Air Monitoring Response Levels and Actions

VOCs	
Response Level	**Actions**
>5 ppm above background for 15-minute average	▪ Temporarily halt work activities ▪ Continue monitoring ▪ If VOC levels decrease (per instantaneous readings) below 5 ppm over background, work activities can resume
Persistent levels >5 ppm over background <25 ppm	▪ Halt work activities ▪ Identify source of vapors ▪ Corrective action to abate emissions ▪ Continue monitoring ▪ Resume work activities if VOC levels 200 feet downwind of the property boundary or half the distance to the nearest potential receptor is <5 ppm for a 15-minute average ▪ If VOC levels are >25 ppm at the perimeter of the work area, activities must be shutdown
Particulate	
>100 mcg/m3 above background for 15-minute average or visual dust observed leaving the site	▪ Apply dust suppression ▪ Continue monitoring ▪ Continue work if downwind PM-10 particulate levels are <150 mcg/m3 above upwind levels and no visual dust leaving site
>150 mcg/m3 above background for 15-minute average	▪ Stop work ▪ Re-evaluate activities ▪ Continue monitoring ▪ Continue work if downwind PM-10 particulate levels are <150 mcg/m3 above upwind levels and no visual dust leaving site

Sources:

New York State Department of Health Community Air Monitoring Plan, June 20, 2000.

New York State Department of Environmental Conservation Division Technical and Administrative Guidance Memorandum - Fugitive Dust Suppression and Particulate Monitoring Program at Inactive Hazardous Waste Sites, October 27, 1989.

During excavating and materials handling operations, the air in work areas will also be sampled periodically for the presence of contaminants. A portable PID will be utilized to periodically monitor the levels of organic vapors in the ambient air and a Mini RAM™ PM-10 (or equivalent) particle detector will be used to count inhalable particles (0.1-10 micrometer range) of dust during the fieldwork. PID and Mini RAM readings will be taken hourly during excavation or more frequently if air quality measurements approach action levels as defined herein. Measurements will be monitored from the breathing zone (4 to 5 feet above ground level) at worker locations to determine working conditions (and whether there is a need to change levels of worker protection).

In order to make a conservative assessment of when different levels of respiratory protection are needed during the fieldwork, it will be assumed that the organic vapors detected by the air monitoring instruments consist of the most toxic volatile compounds expected to be found on the site. Preliminary evaluation of the risks expected at the site indicates that the most toxic volatiles that are probably present are VOCs. Based on data published by the Occupational Safety and Health Administration (OSHA), the American Conference of Government Industrial Hygienists (ACGIH), and GEI's experience with chlorinated solvents, the following personal protective equipment will be employed when the given concentrations of organic vapor are detected in the breathing zone.

Compound of Concern	Level D	Level C	Level B
Chemical Name	M<X	X<M<Y	M>Y
Chlorinated Solvents	M <10 ppm	10 ppm <M <50 ppm	M >50 ppm
Where: M = concentration of sustained organic vapor measured in the field X,Y = concentrations at which different levels of respiratory protection are necessary.			

The PPE requirements may be modified based on compound-specific monitoring results information, with the written approval of the Corporate Health and Safety Specialist (CHSS).

Respiratory protection from dusts will be required when inhalable particulate concentrations from potentially contaminated sources exceed 150 $\mu g/m^3$.

Odors or dusts derived from site contaminants may cause nausea in some site workers, even though the contaminants are at levels well below the safety limits as defined above. Workers may use dust masks or respirators to mitigate nuisance odors with the approval of the site safety officer.

Whenever practical, work areas should be positioned upwind of organic vapor and dust sources to reduce the potential for worker exposure.

Appendix B

Quality Assurance Project Plan

GEI Consultants, Inc.
Quality Assurance/Quality Control Program Plan

Carillon Cleaners Site
Huntington, New York

MAY 2004

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1.0 INTRODUCTION

This Quality Assurance/Quality Control Program Plan presents the organization, objectives, planned activities, and specific quality assurance/quality control (QA/QC) procedures associated with investigation and remediation Work Plans for the Carillon Cleaners site project in Huntington, New York. Task-specific addenda to this plan may be provided for future investigations or remediation elements at these sites as needed.

The plan describes specific protocols for field sampling, sample handling and storage, chain-of-custody, laboratory analysis, and data handling and management. Preparation of the plan was based on US EPA Quality Assurance Project Plan (QAPP) and New York State Department of Environmental Conservation (NYSDEC) guidance documents, including:

- *US EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations (EPA QA/R-5, October 1998), and*
- *Guidance for Quality Assurance Project Plans (EPA QA/G-5, February 1998)*, and
- *Draft DER-10, Technical Guidance for Site Investigation and Remediation (NYSDEC, December, 2002).*

Task-specific plan addendum may accompany a task-specific work plan if this document does not completely cover the tasks in the work plan. The addendum will provide a description of the site and will list the project quality objectives and outline the proposed samples and analytical parameters. The data generated from the analysis of samples will be used to determine the extent of contamination, identify impacted targets, and to compare the results of the remedial actions to site-specific cleanup goals. A list of the potential parameters to be analyzed, including their respective quantitation limits (QLs), and data quality levels (DQLs), is shown in Tables 1a and 1b.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITY

GEI will coordinate and manage the sampling and analysis program, data reduction, QA/QC, data validation, analysis, and reporting. **GEI** will direct the sampling activities and coordinate laboratory and drilling activities.

GEIs Quality Assurance Officer (QAO) will insure that the QA/QC plan is implemented and will oversee data validation. They will provide oversight and technical support for the sampling and analytical procedures followed in this project. The oversight personnel have the broad authority to approve or disapprove project plans, specific analyses, and final reports. They are independent from the data generation activities. In general, the QA personnel will be responsible for reviewing and advising on all QA/QC aspects of this program.

The QAO will have qualifications that meet the minimum requirements as specified in the NYSDEC guidance document DER-10, Appendix 2A. Specifically:

- The project QAO will not have another position on the project, such as a project or task manager, that involves project productivity or profitability as a job performance criteria;
- The project QAO must have a minimum of a bachelors degree in chemistry or natural science with a minimum of 20 hours in chemistry;
- The project QAO must be proficient in analytical methodology, data interpretation and validation, the development of sampling plans, quality control procedures, and auditing techniques; and
- The project QAO will assist the project manager in the development of the sampling and analytical portion of the QAPP. The QAO or their designee shall conduct periodic field and sampling audits, interface with the analytical laboratory to make requests and resolve problems, interface with the data validator and develop a project specific data usability report. Because on-site work may be necessary, verification of completion of the 40-hour OSHA safety training course and 8-hour refresher is required.

The laboratory will be H2M Labs, Inc. of Melville, New York. H2M is a New York State Department of Health ELAP certified laboratory. The laboratory will communicate directly with **GEI** regarding the analytical results and reporting. H2M will be responsible for providing all labels, sample jars, field blank water, trip blanks, shipping coolers, and laboratory documentation.

3.0 QA OBJECTIVES FOR DATA MANAGEMENT

All analytical data will be provided by the laboratory using the New York State Analytical Services Protocol (ASP) Category B deliverable format.

All analytical measurements will be made so that the results are representative of the media sampled (soil, groundwater and waste characterization) and the conditions measured. Data will be reported in consistent dry weight units for solid samples (i.e mg/kg) and in µg/L or mg/L for aqueous samples. Table 2 presents the proposed samples, sampling and analytical parameters, analytical methods, sample preservation requirements and containers for the Carillon Site project.

Quantitation Limits (QLs) are laboratory-specific and reflect those values achievable by the laboratory performing the analyses. Data Quality Levels (DQLs) are those reporting limits required to meet the objectives of the program (i.e., program action levels, cleanup standards, etc.). Data Quality Objectives (DQOs) define the quality of data and documentation required to support decisions made in the various phases of the data collection activities. The DQOs are dependent on the end uses of the data to be collected and are also expressed in terms of objectives for precision, accuracy, representativeness, completeness, and comparability.

The analytical methods to be used at this site provide the highest level of data quality and can be used for purposes of risk assessment, evaluation of remedial alternatives and verification that cleanup standards have been met. However, in order to ensure that the analytical methodologies are capable of achieving the DQOs, measurement performance criteria have been set for the analytical measurements in terms of accuracy, precision, and completeness.

The overall QA objective is to develop and implement procedures for field sampling, chain-of-custody, laboratory analysis, and reporting which will provide results that are scientifically valid, and the levels of which are sufficient to meet DQOs. Specific procedures for sampling, chain of custody, laboratory instruments calibration, laboratory analysis, reporting of data, internal quality control, and corrective action are described in other sections of this Plan.

Tables 3a and 3b present the precision and accuracy requirements for each parameter to be analyzed. For quantitation limits for soil parameters, the laboratory will be required to attempt to meet or surpass the parameter-specific limits listed in the STARS and/or TAGM guidance, whichever is lower. Note, however, that NYSDEC is in the process of consolidating the STARS and TAGM guidance levels into one guidance document that largely reflects the TAGM standards. Given this development, **GEI** intends to interpret the analytical results primarily using the TAGM criteria.

In certain instances, if the STARS or TAGM criteria are not achievable due to analytical limitations, the laboratory will report the lowest possible quantitation limit (See Table 1a for affected analytes). For quantitation limits for groundwater parameters, the laboratory will be required to attempt to meet or surpass the parameter-specific limits for groundwater from the Division of Water Technical and Operational Guidance Series (1.1.1), June 1998 (TOGS) Ambient Water Quality Standards and Guidance Values or the TAGM Recommended Groundwater Standards/Criteria. It should be noted that the TOGS standards were first used to develop DQLs for groundwater. When TOGS standards did not exist for an analyte of interest, the TAGM groundwater standards were used. In certain

instances, if the TOGS or TAGM criteria are not achievable due to analytical limitations, the laboratory will report the lowest possible quantitation limit (See Table 1b for affected analytes). The QA objectives are defined as follows:

- ***Accuracy*** is the closeness of agreement between an observed value and an accepted reference value. The difference between the observed value and the reference value includes components of both systematic error (bias) and random error.

  Accuracy in the field is assessed through the adherence to all field instrument calibration procedures, sample handling, preservation, and holding time requirements, and through the collection of equipment blanks prior to the collection of samples for each type of equipment being used (e.g., split spoons, groundwater sampling pumps).

  The laboratory will assess the overall accuracy of their instruments and analytical methods (independent of sample or matrix effects) through the measurement of "standards," materials of accepted reference value. Accuracy will vary from analysis to analysis because of individual sample and matrix effects. In an individual analysis, accuracy will be measured in terms of blank results, the percent recovery (%R) of surrogate compounds in organic analyses, or %R of spiked compounds in matrix spikes (MSs), matrix spike duplicates (MSDs) and/or laboratory control samples (LCSs). This gives an indication of expected recovery for analytes tending to behave chemically like the spiked or surrogate compounds. Tables 4a and 4b summarize the laboratory accuracy requirements.

- ***Precision*** is the agreement among a set of replicate measurements without consideration of the "true" or accurate value: i.e., variability between measurements of the same material for the same analyte. Precision is measured in a variety of ways including statistically, such as calculating variance or standard deviation.

  Precision in the field is assessed through the collection and measurement of field duplicates (one extra sample in addition to the original field sample). Field duplicates will be collected at a frequency of one per twenty investigative samples per matrix per analytical parameter, with the exception of the TCLP parameters. Precision will be measured through the calculation of relative percent differences (RPDs). The resulting information will be used to assess sampling and analytical variability. Field duplicate RPDs must be less than 50% for soil samples and less than 30% for aqueous samples. These criteria apply only if the sample and/or duplicate results are >5x the quantitation limit; if both results are <5x the quantitation limit, the criterion will be doubled.

  Precision in the laboratory is assessed through the calculation of RPD for duplicate samples. For organic analyses, laboratory precision will be assessed through the analysis of MS/MSD samples and field duplicates. For the inorganic analyses, laboratory precision will be assessed through the analysis of matrix duplicate pairs and field duplicate pairs. MS/MSD samples or matrix duplicate pairs will be performed at a frequency of one per twenty investigative samples per matrix per parameter. Tables 4a and 4b summarize the laboratory precision requirements.

- ***Completeness*** is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions. "Normal conditions" are defined as the conditions expected if the sampling plan was implemented as planned.

  Field completeness is a measure of the amount of (1) valid measurements obtained from all the measurements taken in the project and (2) valid samples collected. The field completeness objective is greater than 90 percent.

  Laboratory completeness is a measure of the amount of valid measurements obtained from all valid samples submitted to the laboratory. The laboratory completeness objective is greater than 95 percent.

- ***Representativeness*** is a qualitative parameter that expresses the degree to which data accurately and precisely represent either a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition within a defined spatial and/or temporal boundary. To ensure representativeness, the sampling locations have been selected to provide coverage over a wide area and to highlight potential trends in the data.

  Representativeness is dependent upon the proper design of the sampling program and will be satisfied by ensuring that the Work Plans and Plan are followed and that proper sampling, sample handling, and sample preservation techniques are used.

  Representativeness in the laboratory is ensured by using the proper analytical procedures, appropriate methods, and meeting sample-holding times.

- ***Comparability*** expresses the confidence with which one data set can be compared to another. Comparability is dependent upon the proper design of the sampling program and will be satisfied by ensuring that the Work Plans and Plan are followed and that proper sampling techniques are used. Maximization of comparability with previous data sets is expected because the sampling design and field protocols are consistent with those previously used.

  Comparability is dependent on the use of recognized EPA or equivalent analytical methods and the reporting of data in standardized units. Laboratory procedures are consistent with those used for previous sampling efforts.

Table 1a
Chemical Parameters, Quantitation Limits and Data Quality Levels for Soil Samples

Parameter	QL	DQL[1]
Volatile Organic Compounds (mg/kg) –STARS/TAGM[3]		
Acetone	0.005	0.2
Benzene	0.002	0.06
2-Butanone	0.005	0.3
Carbon Disulfide	0.005	2.7
Carbon Tetrachloride	0.005	0.6
Chlorobenzene	0.005	1.7
Chloroethane	0.005	1.9
Chloroform	0.005	0.3
Dibromochloromethane	0.005	NS
1,2-Dichlorobenzene	0.005	7.9
1,3-Dichlorobenzene	0.005	1.6
1,4-Dichlorobenzene	0.005	8.5
1,1-Dichloroethane	0.005	0.2
1,2-Dichloroethane	0.005	0.1
1,1-Dichloroethene	0.005	0.4
trans-1,2-Dichloroethene	0.005	0.3
1,3-Dichloropropane	0.005	0.3
Ethylbenzene	0.005	5.5
Freon 113	0.005	6.0
Methylene chloride	0.005	0.1
4-Methyl-2-pentanone	0.005	1.0
Tetrachloroethene	0.005	1.4
1,1,1-Trichloroethane	0.005	0.8
1,1,2,2-Tetrachloroethane	0.005	0.6
1,2,3-Trichloropropane	0.005	0.4
1,2,4-Trichlorobenzene	0.005	3.4
Toluene	0.005	1.5
Trichloroethene	0.005	0.7
Vinyl chloride	0.005	0.2
Xylenes	0.005	1.2
Isopropylbenzene	0.005	5.0
n-Propylbenzene	0.005	14
p-Isopropyltoluene	0.005	11
1,2,4-Trimethylbenzene	0.005	13
1,3,5-Trimethylbenzene	0.005	3.3
n-Butylbenzene	0.005	18
sec-Butylbenzene	0.005	25
t-Butylbenzene	0.005	0.1[2]
MTBE	0.005	0.12

Table 1a
Chemical Parameters, Quantitation Limits and Data Quality Levels for Soil Samples

Parameter	QL	DQL[1]
Polynuclear Aromatic Hydrocarbons (mg/kg) –STARS/TAGM		
Acenaphthene	0.066	50
Acenaphthylene	0.066	41
Anthracene	0.066	50
Benzo(a)anthracene	0.066	0.224
Benzo(a)pyrene	0.066	0.061
Benzo(b)fluoranthene	0.066	1.1
Benzo(g,h,i)perylene	0.066	50
Benzo(k)fluoranthene	0.066	1.1
Chrysene	0.066	0.4
Dibenzo(a,h)anthracene	0.066	0.014
Fluoranthene	0.066	50
Fluorene	0.066	50
Indeno(1,2,3-cd)pyrene	0.066	3.2
2-Methylnaphthalene	0.066	36.4
Naphthalene	0.066	13
Phenanthrene	0.066	50
Pyrene	0.066	50
Semivolatile Organic Compounds (mg/kg) –STARS/TAGM		
Acenaphthene	0.066	50
Acenaphthylene	0.066	41
Aniline	0.066	0.1
Anthracene	0.066	50
Benzo(a)anthracene	0.066	0.224
Benzo(a)pyrene	0.066	0.061
Benzo(b)fluoranthene	0.066	1.1
Benzo(g,h,i)perylene	0.066	50
Benzo(k)fluoranthene	0.066	1.1
Bis(2-ethylhexyl)phthalate	0.066	50
Butylbenzylphthalate	0.066	50
Chrysene	0.066	0.4
4-Chloroaniline	0.16	0.22
4-Chloro-3-methylphenol	0.16	0.24
2-Chlorophenol	0.16	0.8
Dibenzofuran	0.066	6.2
Dibenz(a,h)anthracene	0.066	0.014
3,3'-Dichlorobenzidine	0.16	NS
2,4-Dichlorophenol	0.16	0.4
2,4-Dinitrophenol	0.66	0.2
2,6-Dinitrotoluene	0.66	1
Diethylphthalate	0.66	7.1

Table 1a
Chemical Parameters, Quantitation Limits and Data Quality Levels for Soil Samples

Parameter	QL	DQL[1]
Dimethylphthalate	0.066	2
Di-n-butylphthalate	0.066	8.1
Di-n-octylphthalate	0.066	50
Fluoranthene	0.066	50
Fluorene	0.066	50
Hexachlorobenzene	0.066	0.41
Indeno(1,2,3-cd)pyrene	0.066	3.2
Isophorone	0.066	4.4
2-Methylnaphthalene	0.066	36.4
2-Methylphenol	0.16	0.1
4-Methylphenol	0.16	0.9
Naphthalene	0.066	13
Nitrobenzene	0.066	0.2
2-Nitroaniline	0.16	0.43
2-Nitrophenol	0.16	0.33
4-Nitrophenol	0.66	0.1
3-Nitroaniline	0.16	0.5
Pentachlorophenol	0.66	1
Phenanthrene	0.066	50
Phenol	0.16	0.03
Pyrene	0.066	50
2,4,5-Trichlorophenol	0.16	0.1
Metals (mg/kg) – TAGM		
Aluminum	20	NS
Antimony	1.0	NS
Arsenic	1.0	8.0
Barium	20	300
Beryllium	0.5	0.16
Cadmium	0.5	1.0
Calcium	500	NS
Chromium	1.0	10
Cobalt	5.0	30
Copper	2.5	25
Iron	10	2000
Lead	1.0	NS (background)
Magnesium	500	NS
Manganese	1.5	NS
Mercury	0.04	0.1
Nickel	4	13
Potassium	500	NS
Selenium	1	2

Table 1a
Chemical Parameters, Quantitation Limits and Data Quality Levels for Soil Samples

Parameter	QL	DQL[1]
Silver	1	NS
Sodium	500	NS
Thallium	1	NS
Vanadium	5	150
Zinc	2	20
PCBs (mg/kg)[4]		
Aroclor 1016	0.330	1 Surface/ 10 Subsurface
Aroclor 1221	0.330	1 Surface/ 10 Subsurface
Aroclor 1232	0.330	1 Surface/ 10 Subsurface
Aroclor 1242	0.330	1 Surface/ 10 Subsurface
Aroclor 1248	0.330	1 Surface/ 10 Subsurface
Aroclor 1254	0.330	1 Surface/ 10 Subsurface
Aroclor 1260	0.330	1 Surface/ 10 Subsurface
TCLP VOCs (µg/L) – STARS/TAGM[7]		
Benzene	5	0.7[5]
2-Butanone	25	200,000[6]
Carbon Tetrachloride	5	500[6]
Chlorobenzene	10	100,000[6]
Chloroform	25	6000[6]
1,4-Dichlorobenzene	25	7500[6]
1,2-Dichloroethane	10	500[6]
1,1-Dichloroethene	10	700[6]
Ethylbenzene	5	5[5]
Tetrachloroethene	5	700[6]
Toluene	5	5[5]
Trichloroethene	5	500[6]
Vinyl chloride	5	200[6]
Xylenes	25	5[5]
Isopropylbenzene	10	5[5]
n-Propylbenzene	25	5[5]
p-Isopropyltoluene	25	5[5]
1,2,4-Trimethylbenzene	25	5[5]
1,3,5-Trimethylbenzene	25	5[5]
n-Butylbenzene	25	5[5]
sec-Butylbenzene	25	5[5]
t-Butylbenzene	25	5[5]
MTBE	5	50[5]
TCLP PAHs (µg/L) – STARS/TAGM[7]		
Acenaphthene	2	20[5]
Anthracene	2	50[5]

Table 1a
Chemical Parameters, Quantitation Limits and Data Quality Levels for Soil Samples

Parameter	QL	DQL[1]
Benzo(a)anthracene	2	0.002[5]
Benzo(a)pyrene	2	0.002[5]
Benzo(b)fluoranthene	2	0.002[5]
Benzo(g,h,i)perylene	2	0.002[5]
Benzo(k)fluoranthene	2	0.002[5]
Chrysene	2	0.002[5]
Dibenzo(a,h)anthracene	2	50[5]
Fluoranthene	2	50[5]
Fluorene	2	50[5]
Indeno(1,2,3-cd)pyrene	2	0.002[5]
Naphthalene	2	10[5]
Phenanthrene	2	50[5]
Pyrene	2	50[5]
TCLP Metals (µg/L) –PP[8]		
Arsenic	5	5,000[6]
Barium	200	100,000[6]
Cadmium	4	1,000[6]
Chromium	10	5,000[6]
Lead	3	5,000[6]
Mercury	0.2	200[6]
Selenium	5	1,000[6]
Silver	10	5,000[6]

[1] DQL based on TAGM Recommended Soil Cleanup Objectives (January 24, 1994) unless otherwise specified
[2] DQL based on STARS TCLP Alternative Guidance Values (August 1992)
[3] Include QL's and DQL's for BTEX and MTBE when required individually for a particular sample
[4] DQL is 0.1 for total PCBs
[5] DQL based on STARS TCLP Extraction Guidance Values (August 1992)
[6] DQL based on TCLP Standards (SW-846 Chapter 7, Table 7-1)
[7] Analyte list based on STARS/TAGM compounds but only those compounds which exhibit TCLP standards based on the STARS document or SW-846
[8] Analyte list based on PP metals and barium but only for those metals which exhibit TCLP standards based on SW-846
QL - Quantitation Limit
DQL - Data Quality Level
NS - None specified
Compounds which will not achieve the DQL are highlighted.

Table 1b
Chemical Parameters, Quantitation Limits and Data Quality Levels for Groundwater Samples

Parameter	QL	DQL[1]
Volatile Organic Compounds (µg/L) –STARS/TAGM[2]		
Acetone	5	50
Benzene	1	1
2-Butanone	5	50
Carbon Disulfide	5	50[3]
Carbon Tetrachloride	1	5
Chlorobenzene	2	5
Chloroethane	5	5
Chloroform	5	7
Dibromochloromethane	5	50
1,2-Dichlorobenzene	2	3
1,3-Dichlorobenzene	2	3
1,4-Dichlorobenzene	2	3
1,1-Dichloroethane	5	5
1,2-Dichloroethane	2	0.6
1,1-Dichloroethene	2	5
trans-1,2-Dichloroethene	5	5
1,3-Dichloropropane	5	5
Ethylbenzene	1	5
Freon 113	5	5
Methylene chloride	2	5
4-Methyl-2-pentanone	5	50[3]
Tetrachloroethene	1	5
1,1,1-Trichloroethane	5	5
1,1,2,2-Tetrachloroethane	2	5
1,2,3-Trichloropropane	5	0.04
1,2,4-Trichlorobenzene	5	5
Toluene	1	5
Trichloroethene	1	5
Vinyl chloride	1	2
Xylenes	5	5
Isopropylbenzene	2	5
n-Propylbenzene	5	5
p-Isopropyltoluene	5	5
1,2,4-Trimethylbenzene	5	5
1,3,5-Trimethylbenzene	5	5
n-Butylbenzene	5	5
sec-Butylbenzene	5	5

Table 1b
Chemical Parameters, Quantitation Limits and Data Quality Levels for Groundwater Samples

Parameter	QL	DQL[1]
t-Butylbenzene	5	5
MTBE	1	10
Polynuclear Aromatic Hydrocarbons (µg/L) –STARS/TAGM		
Acenaphthene	2	20
Acenaphthylene	2	20[3]
Anthracene	2	50
Benzo(a)anthracene	2	0.002
Benzo(a)pyrene	2	ND
Benzo(b)fluoranthene	2	0.002
Benzo(g,h,i)perylene	2	5[3]
Benzo(k)fluoranthene	2	0.002
Chrysene	2	0.002
Dibenzo(a,h)anthracene	2	50[3]
Fluoranthene	2	50
Fluorene	2	50
Indeno(1,2,3-cd)pyrene	2	0.002
2-Methylnaphthalene	2	4.7
Naphthalene	2	10
Phenanthrene	2	50
Pyrene	2	50
Pesticides (µg/L) - TAGM		
Aldrin	0.02	ND
alpha-BHC	0.02	0.01
beta-BHC	0.02	0.04
delta-BHC	0.02	0.04
Chlordane	0.5	0.05
4,4'-DDD	0.02	0.3
4,4'-DDE	0.02	0.2
4,4'-DDT	0.02	0.2
Dieldrin	0.02	0.004
Endosulfan I	0.02	0.1[3]
Endosulfan II	0.02	0.1[3]
Endosulfan sulfate	0.02	0.1[3]
Endrin	0.02	ND
Endrin ketone	0.05	5
gamma-BHC (Lindane)	0.02	0.05
gamma-Chlordane	0.02	0.1[3]
Heptachlor	0.02	0.04
Heptachlor epoxide	0.02	0.03
Methoxychlor	0.05	35

Table 1b
Chemical Parameters, Quantitation Limits and Data Quality Levels for Groundwater Samples

Parameter	QL	DQL[1]
2,4'-DDD	0.02	NS
Semivolatile Organic Compounds (µg/L) –STARS/TAGM		
Acenaphthene	2	20
Acenaphthylene	2	20[3]
Aniline	2	5
Anthracene	2	50
Benzo(a)anthracene	2	0.002
Benzo(a)pyrene	2	ND
Benzo(b)fluoranthene	2	0.002
Benzo(g,h,i)perylene	2	5[3]
Benzo(k)fluoranthene	2	0.002
Bis(2-ethylhexyl)phthalate	2	5
Butylbenzylphthalate	2	50
Chrysene	2	0.002
4-Chloroaniline	5	5
4-Chloro-3-methylphenol	5	1
2-Chlorophenol	5	1
Dibenzofuran	5	5[3]
Dibenz(a,h)anthracene	2	50[3]
3,3'-Dichlorobenzidine	5	5
2,4-Dichlorophenol	5	5
2,4-Dinitrophenol	20	10
2,6-Dinitrotoluene	2	5
Diethylphthalate	2	50
Dimethylphthalate	2	50
Di-n-butylphthalate	2	50
Di-n-octylphthalate	2	50
Fluoranthene	2	50
Fluorene	2	50
Hexachlorobenzene	2	0.04
Indeno(1,2,3-cd)pyrene	2	0.002
Isophorone	2	50
2-Methylnaphthalene	2	50[3]
2-Methylphenol	5	1
4-Methylphenol	5	1
Naphthalene	2	10
Nitrobenzene	2	0.4
2-Nitroaniline	5	5
2-Nitrophenol	5	1
4-Nitrophenol	20	1

Table 1b
Chemical Parameters, Quantitation Limits and Data Quality Levels for Groundwater Samples

Parameter	QL	DQL[3]
3-Nitroaniline	5	5
Pentachlorophenol	20	1
Phenanthrene	2	50
Phenol	5	1
Pyrene	2	50
2,4,5-Trichlorophenol	5	1
Metals (µg/L) – TAGM		
Aluminum	200	NS
Antimony	5	3
Arsenic	5	25
Barium	200	1000
Beryllium	3	3
Cadmium	4	5
Calcium	5000	NS
Chromium	10	50
Cobalt	50	NS
Copper	25	200
Iron	100	300
Lead	3	25
Magnesium	5000	35,000
Manganese	15	300
Mercury	0.2	0.7
Nickel	40	100
Potassium	5000	NS
Selenium	5	10
Silver	10	50
Sodium	5000	20,000
Thallium	5	0.5
Vanadium	50	NS
Zinc	20	2000
PCBs (µg/L)[4]		
Aroclor 1016	0.5	0.09
Aroclor 1221	0.5	0.09
Aroclor 1232	0.5	0.09
Aroclor 1242	0.5	0.09
Aroclor 1248	0.5	0.09
Aroclor 1254	0.5	0.09
Aroclor 1260	0.5	0.09

Table 1b
Chemical Parameters, Quantitation Limits and Data Quality Levels for Groundwater Samples

Parameter	QL	DQL[1]
Wet Chemistry (µg/L)		
Ammonia	100	2000
Nitrate	100	10,000
Nitrite	10	10,000
Carbonate	5000	NS
Bicarbonate	5000	NS
Sulfate	20,000	250,000
Cyanide	10	200
Total Dissolved Solids	10,000	NS
Chloride	20,000	250,000

[1] DQL based on TOGS Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations (June 1998) unless otherwise specified.
[2] Include QL's and DQL's for BTEX and MTBE when required individually for a particular sample
[3] DQL based on TAGM Recommended Groundwater Standards/Criteria (January 24, 1994)
[4] DQL based on for total PCB
QL = Quantitation Limit
DQL = Data Quality Level
NS = None specified
ND = Not detected when analyzed by method listed in Table 2
Compounds which will not achieve the DQL are highlighted.

Table 2
Analytical Parameters, Methods, Preservation and Container Requirements

Sample Matrix	Analytical Parameter	Sample Type[1]	No. of Samples[2]	EPA Analytical Method	Sample Preservation	Holding Time[3]	Sample Container[4,5]
Soil/Solid Waste	VOCs (TCL or STARS/TAGM)	Grab	TBD	SW 846 Method 8260B	Cool to 4^0 C; no headspace	14 days to analysis	(2) 2-oz. glass jars
Soil	BTEX	Grab	TBD	SW-846 Method 8260B	Cool to 4^0 C; no headspace	14 days to analysis	(2) 2-oz. glass jars
Soil	BTEX/MTBE	Grab	TBD	SW-846 Method 8260B	Cool to 4^0 C; no headspace	14 days to analysis	(2) 2-oz. glass jars
Soil/Solid Waste	PCBs	Grab	TBD	SW 846 Method 8082	Cool to 4^0 C	14 days to extraction; 40 days from extraction to analysis	(1) 300 mL amber glass jar
Solid Waste	Pesticides (TCL)	Grab	TBD	SW-846 Method 8081A	Cool to 4^0 C	14 days to extraction; 40 days from extraction to analysis	(1) 300 mL amber glass jar
Solid Waste	SVOCs (TCL)	Grab	TBD	SW-846 Method 8270C	Cool to 4^0 C	14 days to extraction; 40 days from extraction to analysis	(1) 300 mL amber glass jar
Soil	PAHs or SVOCs (STARS/TAGM)	Grab	TBD	SW 846 Method 8270C	Cool to 4^0 C	14 days to extraction; 40 days from extraction to analysis	(1) 300 mL amber glass jar
Soil	Lead	Grab	TBD	SW 846 Method 6010B	Cool to 4^0 C	6 months to analysis	(1) 300 mL amber glass jar
Soil	Metals (TAGM)	Grab	TBD	SW-846 Method 6010B/7000 Series	Cool to 4^0 C	28 days to analysis for Hg; 6 months to analysis for other metals	(1) 300 mL amber glass jar
Solid Waste	Metals (PP)	Grab	TBD	SW-846 Method 6010B/7000 Series	Cool to 4^0 C	28 days to analysis for Hg; 6 months to analysis for other metals	(1) 300 mL amber glass jar

Table 2
Analytical Parameters, Methods, Preservation and Container Requirements

Sample Matrix	Analytical Parameter	Sample Type[1]	No. of Samples	EPA Analytical Method	Sample Preservation	Holding Time	Sample Container[2,3]
Soil	GRO	Grab	TBD	SW-846 Method 8015B	Cool to 4^0 C; no headspace	14 days to analysis	(2) 2-oz. glass jars
Soil	DRO	Grab	TBD	SW-846 Method 8015B	Cool to 4^0 C	14 days to extraction; 40 days from extraction to analysis	(1) 300 mL amber glass jar
Soil/Solid Waste/Liquid Waste	TCLP VOC (STARS/TAGM or RCRA)	Grab	TBD	SW 846 Methods 1311/8260B	Cool to 4^0 C; no headspace	14 days to TCLP extraction; 14 days from TCLP extraction to analysis	(1) 60 ml VOC vial
Soil/Solid Waste	TCLP SVOC or PAHs (STARS/TAGM or RCRA)	Grab	TBD	SW 846 Methods 1311/ 8270C	Cool to 4^0 C	14 days to TCLP extraction; 7 days from TCLP extraction to SVOC extraction; 40 days from SVOC extraction to analysis	(1) 950 mL amber glass jar
Liquid Waste	TCLP SVOC (RCRA)	Grab	TBD	SW 846 Methods 1311/ 8270C	Cool to 4^0 C	7 days to TCLP extraction; 7 days from TCLP extraction to SVOC extraction; 40 days from SVOC extraction to analysis	(1) 950 mL amber glass jar
Solid Waste	TCLP Pesticides (RCRA)	Grab	TBD	SW-846 Methods 1311/8081A	Cool to 4°C	14 days to TCLP extraction; 7 days from TCLP extraction to pesticide extraction; 40 days from pesticide extraction to analysis	(1) 950 mL amber glass jar

Table 2
Analytical Parameters, Methods, Preservation and Container Requirements

Sample Matrix	Analytical Parameter	Sample Type[1]	No. of Samples[2]	EPA Analytical Method	Sample Preservation	Holding Time	Sample Container[3]
Liquid Waste	TCLP Pesticides (RCRA)	Grab	TBD	SW-846 Methods 1311/8081A	Cool to 4°C	7 days to TCLP extraction; 7 days from TCLP extraction to pesticide extraction; 40 days from pesticide extraction to analysis	(1) 950 mL amber glass jar
Solid Waste	TCLP Herbicides (RCRA)	Grab	TBD	SW-846 Methods 1311/8151A	Cool to 4°C	14 days to TCLP extraction; 7 days from TCLP extraction to herbicide extraction; 40 days from herbicide extraction to analysis	(1) 950 mL amber glass jar
Liquid Waste	TCLP Herbicides (RCRA)	Grab	TBD	SW-846 Methods 1311/8151A	Cool to 4°C	7 days to TCLP extraction; 7 days from TCLP extraction to herbicide extraction; 40 days from herbicide extraction to analysis	(1) 950 mL amber glass jar
Soil/Solid Waste/Liquid Waste	TCLP Metals (PP or RCRA)	Grab	TBD	SW 846 Methods 1311/ 6010B/7000 Series	Cool to 4^0 C	Hg: 28 days to TCLP extraction; 28 days from TCLP extraction to analysis Other Metals: 6 months to TCLP extraction; 6 months from TCLP extraction to analysis	(1) 500 mL amber glass jar
Soil	TCLP Lead	Grab	TBD	SW 846 Methods 1311/ 6010B	Cool to 4^0 C	6 months to TCLP extraction; 6 months from TCLP extraction to analysis	(1) 500 mL amber glass jar

Table 2
Analytical Parameters, Methods, Preservation and Container Requirements

Sample Matrix	Analytical Parameter	Sample Type[1]	No. of Samples[2]	EPA Analytical Method	Sample Preservation	Holding Time	Sample Container[4,5]
Soil/Solid Waste/Liquid Waste	Ignitability	Grab	TBD	SW-846 Method 1010	Cool to 4^0 C	None specified	(1) 500 mL amber glass jar
Soil/Solid Waste/Liquid Waste	Corrosivity	Grab	TBD	SW-846 Method 9045C	Cool to 4^0 C	As soon as possible (within 3 days of collection)	(1) 500 mL amber glass jar
Soil/Solid Waste/Liquid Waste	Reactive cyanide	Grab	TBD	SW-846 Chapter 7, Section 7.3.3	Cool to 4^0 C; no headspace	As soon as possible (within 3 days of collection)	(1) 500 mL amber glass jar
Soil/Solid Waste/Liquid Waste	Reactive sulfide	Grab	TBD	SW-846 Chapter 7, Section 7.3.4	Cool to 4^0 C; no headspace	As soon as possible (within 3 days of collection)	(1) 500 mL amber glass jar
Groundwater	VOCs (STARS/TAGM)	Grab	TBD	SW-846 Method 8260B	pH<2 with HCl Cool to 4^0 C; no headspace	14 days to analysis	(2) 40 mL VOA vials
Groundwater	BTEX	Grab	TBD	SW-846 Method 8260B	pH<2 with HCl Cool to 4^0 C; no headspace	14 days to analysis	(2) 40 mL VOA vials
Groundwater	BTEX/MTBE	Grab	TBD	SW-846 Method 8260B	pH<2 with HCl Cool to 4^0 C; no headspace	14 days to analysis	(2) 40 mL VOA vials
Groundwater	PCBs	Grab	TBD	SW-846 Method 8082	Cool to 4^0 C; no headspace	7 days to extraction; 40 days from extraction to analysis	(2) 1 L amber glass jar

Table 2
Analytical Parameters, Methods, Preservation and Container Requirements

Sample Matrix	Analytical Parameter	Sample Type	No. of Samples	EPA Analytical Method	Sample Preservation	Holding Time	Sample Container
Groundwater	PAHs (STARS/TAGM)	Grab	TBD	SW-846 Method 8270C	Cool to 4^0 C; no headspace	7 days to extraction; 40 days from extraction to analysis	(2) 1 L amber glass jar
Groundwater	SVOCs (STARS/TAGM)	Grab	TBD	SW-846 Method 8270C	Cool to 4^0 C; no headspace	7 days to extraction; 40 days from extraction to analysis	(2) 1 L amber glass jar
Groundwater	Pesticides (TAGM)	Grab	TBD	SW-846 Method 8081A	Cool to 4^0 C; no headspace	7 days to extraction; 40 days from extraction to analysis	(2) 1 L amber glass jar
Groundwater	Lead	Grab	TBD	SW-846 Method 6010B	pH<2 with HNO_3; Cool to 4^0 C	6 months to analysis	(1) 1L polyethylene container
Groundwater	Metals (TAGM)	Grab	TBD	SW-846 Method 6010B/7000 Series	pH<2 with HNO_3; Cool to 4^0 C	28 days to analysis for Hg; 6 months to analysis for other metals	(1) 1L polyethylene container
Groundwater	Ammonia	Grab	TBD	EPA Method 350.1 (350.2 for distillation)	pH<2 with H_2SO_4; Cool to 4^0 C	28 days to analysis	(1) 250 mL polyethylene container
Groundwater	Nitrate	Grab	TBD	EPA Method 353.2/SM 4500-NO_2B (18^{th} edition)	pH<2 with H_2SO_4; Cool to 4^0 C	28 days to analysis	(1) 100 mL polyethylene container
Groundwater	Nitrite	Grab	TBD	SM 4500-NO_2B (18^{th} edition)	Cool to 4^0 C	48 hours to analysis	(1) 100 mL polyethylene container
Groundwater	Sulfate	Grab	TBD	SW-846 9056	Cool to 4^0 C	As soon as possible (within 3 days of collection)	(1) 100 mL polyethylene container
Groundwater	Carbonate	Grab	TBD	SM 4500-CO_2D (18^{th} edition)	Cool to 4^0 C	14 days to analysis	(1) 250 mL polyethylene container

Table 2
Analytical Parameters, Methods, Preservation and Container Requirements

Sample Matrix	Analytical Parameter	Sample Type[1]	No. of Samples[2]	EPA Analytical Method	Sample Preservation	Holding Time[3]	Sample Container[4,5]
Groundwater	Bicarbonate	Grab	TBD	SM 4500-CO_2D (18^{th} edition)	Cool to 4^0 C	14 days to analysis	(1) 250 mL polyethylene container
Groundwater	Total Cyanide	Grab	TBD	EPA Method 335.3	pH>12 with NaOH; Cool to 4°C	14 days to analysis	(1) 250 mL polyethylene container
Groundwater	Total Dissolved Solids	Grab	TBD	EPA Method 160.1	Cool to 4°C	7 days to analysis	(1) 100 mL polyethylene container
Groundwater	Chloride	Grab	TBD	EPA Method 300.0	Cool to 4°C	28 days to analysis	(1) 100 mL polyethylene container

[1] For soil samples, a six-inch sampling interval is the preferred sample size; however, sample volume recovery, analytical method requirements, and field conditions can affect the actual sample interval size. For these reasons, the actual sampling interval may change in order to obtain adequate volume.
[2] Actual number of samples may vary depending on field conditions, sample material availability, and field observations
[3] From date of sample collection
[4] I-Chem Series 300 bottles
[5] MS/MSDs require duplicate volume for all parameters for solid matrices. MS/MSDs require triplicate volume for organic parameters for aqueous matrices and duplicate volume for inorganic parameters for aqueous matrices
TBD = To Be Determined

Table 3a
Data Quality Objectives: Precision and Accuracy: Soil and Solid Waste Samples

Parameter	Method	Matrix	Accuracy Control Limits		Accuracy Frequency Requirements	Precision (RPD) Control Limits		Precision Frequency Requirements
VOCs (TCL or STARS/TAGM)	SW-846 Method 8260B	Soil/Solid Waste	Surrogates	% Rec.	Surrogates: All samples, standards, QC samples	Field Duplicates RPD ≤50		Field Duplicates: One per 20 per soils
			1,2-Dichloroethane-d4	54-129				
			4-Bromofluorobenzene	58-137				
			Dibromofluoromethane	55-132				
			Toluene-d8	65-133				
			Matrix Spikes		Matrix Spikes: One per 20 per matrix type	MS/MSDs	RPD	MS/MSDs: One per 20 per matrix type
			1,1-Dichloroethene	60-130		1,1-Dichloroethene	19	
			Trichloroethene	59-146		Trichloroethene	18	
			Benzene	64-132		Benzene	15	
			Toluene	48-145		Toluene	16	
			Chlorobenzene	56-137		Chlorobenzene	17	
BTEX and BTEX/MTBE	SW-846 Method 8260B	Soil	Surrogates	% Rec.	Surrogates: All samples, standards, QC samples	Field Duplicates RPD ≤50		Field Duplicates: One per 20
			1,2-Dichloroethane-d4	54-129				
			4-Bromofluorobenzene	58-137				
			Dibromofluoromethane	55-132				
			Toluene-d8	65-133				
			Matrix Spikes		Matrix Spikes: One per 20	MS/MSDs	RPD	MS/MSDs: One per 20
			Benzene	64-132		Benzene	15	
			Toluene	48-145		Toluene	16	
			Ethyl Benzene	49-143		Ethyl Benzene	20	
			Xylenes (total)	45-146		Xylenes (total)	17	
			MTBE	60-132		MTBE	15	

Table 3a
Data Quality Objectives: Precision and Accuracy: Soil and Solid Waste Samples

Parameter	Method	Matrix	Accuracy Control Limits		Accuracy Frequency Requirements	Precision (RPD) Control Limits		Precision Frequency Requirements
PCBs	SW-846 Method 8082	Soil/Solid Waste	Surrogates	% Rec.	Surrogates: All samples, standards, QC samples	Field Duplicates		Field Duplicates: One per 20 per soils
			Decachlorobiphenyl	23-149		RPD ≤50		
			Tetrachloro-m-xylene	26-126				
			Matrix Spikes		Matrix Spikes: One per 20 per matrix type	MS/MSDs	RPD	MS/MSDs: One per 20 per matrix type
			Aroclor 1016	60-130		Aroclor 1016	26	
			Aroclor 1260	40-146		Aroclor 1260	27	
PAHs (STARS/TAGM)	SW-846 Method 8270C	Soil	Surrogates	% Rec.	Surrogates: All samples, standards, QC samples	Field Duplicates		Field Duplicates: One per 20
			Nitrobenzene-d5	27-124		RPD ≤50		
			2-Fluorobiphenyl	27-127				
			Terphenyl-d14	29-157				
			Matrix Spikes		Matrix Spikes: One per 20	MS/MSDs	RPD	MS/MSDs: One per 20
			Naphthalene	30-120		Naphthalene	28	
			2-Methylnaphthalene	36-126		2-Methylnaphthalene	28	
			Acenaphthylene	38-110		Acenaphthylene	31	
			Acenaphthene	32-122		Acenaphthene	30	
			Fluorene	31-133		Fluorene	29	
			Fluoranthene	35-128		Fluoranthene	27	
			Pyrene	25-139		Pyrene	33	
			Phenanthrene	24-135		Phenanthrene	29	
			Anthracene	28-132		Anthracene	29	
			Benzo(a)anthracene	32-129		Benzo(a)anthracene	24	
			Chrysene	29-128		Chrysene	30	
			Benzo(b)fluoranthene	34-139		Benzo(b)fluoranthene	31	
			Benzo(k)fluoranthene	24-137		Benzo(k)fluoranthene	30	
			Benzo(a)pyrene	35-126		Benzo(a)pyrene	29	
			Indeno(1,2,3-cd)pyrene	12-133		Indeno(1,2,3-cd)pyrene	35	
			Dibenzo(a,h)anthracene	18-139		Dibenzo(a,h)anthracene	33	
			Benzo(g,h,i)perylene	10-135		Benzo(g,h,i)perylene	33	

Table 3a
Data Quality Objectives: Precision and Accuracy: Soil and Solid Waste Samples

Parameter	Method	Matrix	Accuracy Control Limits	Accuracy Frequency Requirements	Precision (RPD) Control Limits	Precision Frequency Requirements
SVOCs (TCL or STARS/TAGM)	SW-846 Method 8270C	Solid Waste	Surrogates / % Rec. Phenol-d5 24-123 2-Fluorophenol 21-127 2,4,6-Tribromophenol 14-156 Nitrobenzene-d5 27-124 2-Fluorobiphenyl 27-127 Terphenyl-d14 29-157 Matrix Spikes Phenol 22-115 n-Nitroso-di-n-propyl-amine 34-122 2-Chlorophenol 29-114 4-Chloro-3-methylphenol 36-121 Acenaphthene 32-122 4-Nitrophenol 13-136 Pentachlorophenol 17-136 Pyrene 25-139 2,4-Dinitrotoluene 13-130	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20 per matrix type	MS/MSDs / RPD Phenol 28 n-Nitroso-di-n-propyl-amine 27 2-Chlorophenol 26 4-Chloro-3-methylphenol 22 Acenaphthene 30 4-Nitrophenol 34 Pentachlorophenol 23 Pyrene 33 2,4-Dinitrotoluene 33	MS/MSDs: One per 20 per matrix type
Pesticides (TCL)	SW-846 Method 8081A	Solid Waste	Surrogates / % Rec. Decachlorobiphenyl 27-158 Tetrachloro-m-xylene 35-145 Matrix Spikes gamma-BHC 42-157 Heptachlor 46-157 Aldrin 46-158 Dieldrin 43-158 Endrin 55-158 4,4'-DDT 37-158	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20 per matrix type	MS/MSDs / RPD Gamma-BHC 31 Heptachlor 30 Aldrin 32 Dieldrin 31 Endrin 35 4,4'-DDT 35	MS/MSDs: One per 20 per matrix type

Table 3a
Data Quality Objectives: Precision and Accuracy: Soil and Solid Waste Samples

Parameter	Method	Matrix	Accuracy Control Limits	Accuracy Frequency Requirements	Precision (RPD) Control Limits	Precision Frequency Requirements
GRO	SW-846 Method 8015B	Soil	Surrogates: % Rec. ααα-Trifluorotoluene 42-147 Matrix Spikes GRO (C_6-C_{10}) 18-139	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20	Field Duplicates RPD ≤50 MS/MSDs RPD GRO (C_6-C_{10}) 15	Field Duplicates: One per 20 MS/MSDs: One per 20
DRO	SW-846 Method 8015B	Soil	Surrogates: % Rec. 0-Terphenyl 33-145 Tetracosane-d50 42-145 52-Androstane 32-141 Matrix Spikes DRO 28-149	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20	Field Duplicates RPD ≤50 MS/MSDs RPD DRO 20	Field Duplicates: One per 20 MS/MSDs: One per 20
Metals (PP or TAGM)	SW-846 Methods 6010B/7000 Series	Soil/Solid Waste	Matrix Spikes 75-125% recovery	Matrix Spikes: One per 20 per matrix type	Field Duplicates RPD ≤50 Matrix Duplicates RPD ≤20	Field Duplicates: One per 20 per soils Matrix Duplicates: One per 20 per matrix type

Table 3a
Data Quality Objectives: Precision and Accuracy: Soil and Solid Waste Samples

Parameter	Method	Matrix	Accuracy Control Limits		Accuracy Frequency Requirements	Precision (RPD) Control Limits		Precision Frequency Requirements
TCLP VOCs (STARS/TAGM)	SW-846 Methods 1311/ 8260B	Soil	Surrogates	% Rec.	Surrogates: All samples, standards, QC samples			
			1,2-Dichloroethane-d4	68-124				
			4-Bromofluorobenzene	75-127				
			Dibromofluoromethane	81-118				
			Toluene-d8	85-119				
			Matrix Spikes		Matrix Spikes:	MS/MSDs	RPD	MS/MSDs:
			1,1-Dichloroethene	72-134	One per 20 per matrix	1,1-Dichloroethene	17	One per 20 per
			Trichloroethene	77-132	type	Trichloroethene	13	matrix type
			Benzene	61-138		Benzene	11	
			Toluene	55-147		Toluene	12	
			Chlorobenzene	83-124		Chlorobenzene	12	
TCLP VOCs (RCRA)	SW-846 Methods 1311/8260B	Solid Waste	Surrogates	% Rec.	Surrogates: All samples, standards, QC samples			
			1,2-Dichloroethane-d4	68-124				
			4-Bromofluorobenzene	75-127				
			Dibromofluoromethane	81-118				
			Toluene-d8	85-119				
			Matrix Spikes		Matrix Spikes:	MS/MSDs	RPD	MS/MSDs:
			1,1-Dichloroethene	72-134	One per 20 per matrix	1,1-Dichloroethene	17	One per 20 per
			1,2-Dichloroethane	67-138	type	1,2-Dichloroethane	12	matrix type
			2-Butanone	41-141		2-Butanone	29	
			Chloroform	76-128		Chloroform	12	
			Carbon Tetrachloride	69-143		Carbon Tetrachloride	17	
			Benzene	61-138		Benzene	11	
			Trichloroethene	77-132		Trichloroethene	13	
			Tetrachloroethene	55-149		Tetrachloroethene	13	
			Chlorobenzene	83-124		Chlorobenzene	12	
			Vinyl chloride	63-138		Vinyl chloride	18	
			1,4-Dichlorobenzene	75-121		1,4-Dichlorobenzene	13	

Table 3a
Data Quality Objectives: Precision and Accuracy: Soil and Solid Waste Samples

Parameter	Method	Matrix	Accuracy Control Limits		Accuracy Frequency Requirements	Precision (RPD) Control Limits		Precision Frequency Requirements
TCLP PAHs (STARS/TAGM)	SW-846 Methods 1311/ 8270C	Soil	Surrogates	% Rec.	Surrogates: All samples, standards, QC samples			
			Nitrobenzene-d5	42-127				
			2-Fluorobiphenyl	38-131				
			Terphenyl-d14	22-153				
			Matrix Spikes		Matrix Spikes:	MS/MSDs	RPD	MS/MSDs:
			Naphthalene	47-116	One per 20 per matrix	Naphthalene	16	One per 20 per
			Acenaphthene	51-116	type	Acenaphthene	15	matrix type
			Fluorene	47-129		Fluorene	16	
			Fluoranthene	54-125		Fluoranthene	18	
			Pyrene	53-124		Pyrene	17	
			Phenanthrene	52-119		Phenanthrene	16	
			Anthracene	51-122		Anthracene	17	
			Benzo(a)anthracene	55-121		Benzo(a)anthracene	16	
			Chrysene	53-119		Chrysene	16	
			Benzo(b)fluoranthene	52-133		Benzo(b)fluoranthene	25	
			Benzo(k)fluoranthene	47-123		Benzo(k)fluoranthene	24	
			Benzo(a)pyrene	52-122		Benzo(a)pyrene	17	
			Indeno(1,2,3-cd)pyrene	42-134		Indeno(1,2,3-cd)pyrene	25	
			Dibenzo(a,h)anthracene	51-135		Dibenzo(a,h)anthracene	20	
			Benzo(g,h,i)perylene	49-128		Benzo(g,h,i)perylene	24	

Table 3a
Data Quality Objectives: Precision and Accuracy: Soil and Solid Waste Samples

Parameter	Method	Matrix	Accuracy Control Limits		Accuracy Frequency Requirements	Precision (RPD) Control Limits		Precision Frequency Requirements
TCLP SVOCs (RCRA)	SW-846 Methods 1311/8270C	Solid Waste	Surrogates	% Rec.	Surrogates: All samples, standards, QC samples			
			Phenol-d5	10-93				
			2-Fluorophenol	10-112				
			2,4,6-Tribromophenol	37-159				
			Nitrobenzene-d5	42-127				
			2-Fluorobiphenyl	38-131				
			Terphenyl-d14	22-153				
			Matrix Spikes		Matrix Spikes: One per 20 per matrix type	MS/MSDs	RPD	MS/MSDs: One per 20 per matrix type
			Hexachloroethane	41-120		Hexachloroethane	19	
			Nitrobenzene	52-107		Nitrobenzene	17	
			Hexachlorobutadiene	46-128		Hexachlorobutadiene	18	
			2,4,6-Trichlorophenol	45-129		2,4,6-Trichlorophenol	15	
			2,4,5-Trichlorophenol	40-126		2,4,5-Trichlorophenol	16	
			2,4-Dinitrotoluene	52-114		2,4-Dinitrotoluene	17	
			Hexachlorobenzene	54-119		Hexachlorobenzene	18	
			Pentachlorophenol	33-139		Pentachlorophenol	19	
			Pyridine	25-97		Pyridine	27	
			2-Methylphenol	24-118		2-Methylphenol	15	
			3&4-Methylphenol	32-120		3&4-Methylphenol	16	
TCLP Pesticides	SW-846 Methods 1311/8081A	Solid Waste	Surrogates	% Rec.	Surrogates: All samples, standards, QC samples			
			Decachlorobiphenyl	22-147				
			Tetrachloro-m-xylene	48-136				
			Matrix Spikes		Matrix Spikes: One per 20 per matrix type	MS/MSDs	RPD	MS/MSDs: One per 20 per matrix type
			gamma-BHC	55-144		Gamma-BHC	35	
			Heptachlor	31-164		Heptachlor	35	
			Heptachlor epoxide	46-158		Heptachlor epoxide	28	
			Endrin	73-156		Endrin	34	
			Methoxychlor	55-166		Methoxychlor	35	
			Technical Chlordane	50-150		Chlordane		
			Toxaphene	50-150		Toxaphene		

Table 3a
Data Quality Objectives: Precision and Accuracy: Soil and Solid Waste Samples

Parameter	Method	Matrix	Accuracy Control Limits	Accuracy Frequency Requirements	Precision (RPD) Control Limits	Precision Frequency Requirements
TCLP Herbicides	SW-846 Methods 1311/8151A	Solid Waste	Surrogates / % Rec. 2,4-DCAA 57-158 Matrix Spikes 2,4-D 48-123 2,4,5-TP 54-143	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20 per matrix type	MS/MSDs / RPD 2,4-D 21 2,4,5-TP 20	MS/MSDs: One per 20 per matrix type
TCLP Metals	SW-846 Methods 1311/ 6010B/7000 Series	Soil/Solid Waste	Matrix Spikes 75-125% recovery	Matrix Spikes: One per 20 per matrix type	Matrix Duplicates RPD ≤20	Matrix Duplicates: One per 20 per matrix type
Ignitability	SW-846 Method 1010	Soil/Solid Waste	Not Applicable	Not Applicable	Matrix Duplicates RPD ≤20	Matrix Duplicates: One per 20 per matrix type
Corrosivity	SW-846 Method 9045C	Soil/Solid Waste	Not Applicable	Not Applicable	Matrix Duplicates RPD ≤5	Matrix Duplicates: One per 20 per matrix type
Reactive cyanide	SW-846 Chapter 7, Section 7.3.3	Soil/Solid Waste	Not Applicable	Not Applicable	Matrix Duplicates RPD ≤20	Matrix Duplicates: One per 20 per matrix type
Reactive sulfide	SW-846 Chapter 7, Section 7.3.4	Soil/Solid Waste	Not Applicable	Not Applicable	Matrix Duplicates RPD ≤20	Matrix Duplicates: One per 20 per matrix type

Recovery criteria for laboratory control samples must be at least as stringent as MS/MSD criteria.
Laboratory control limits are periodically updated. The latest control limits will be utilized at the time of sample analysis.

Table 3b
Data Quality Objectives: Precision and Accuracy: Groundwater Samples

Parameter	Method	Matrix	Accuracy Control Limits		Accuracy Frequency Requirements	Precision (RPD) Control Limits		Precision Frequency Requirements
VOCs (STARS/TAGM)	SW-846 Method 8260B	Groundwater	Surrogates	% Rec.	Surrogates: All samples, standards, QC samples	Field Duplicates		Field Duplicates: One per 20
			1,2-Dichloroethane-d4	68-124		RPD ≤30		
			4-Bromofluorobenzene	75-127				
			Dibromofluoromethane	81-118				
			Toluene-d8	85-119				
			Matrix Spikes		Matrix Spikes: One per 20	MS/MSDs	RPD	MS/MSDs: One per 20
			1,1-Dichloroethene	72-134		1,1-Dichloroethene	17	
			Trichloroethene	77-132		Trichloroethene	13	
			Benzene	61-138		Benzene	11	
			Toluene	55-147		Toluene	12	
			Chlorobenzene	83-124		Chlorobenzene	12	
BTEX and BTEX/MTBE	SW-846 Method 8260B	Groundwater	Surrogates	% Rec.	Surrogates: All samples, standards, QC samples	Field Duplicates		Field Duplicates: One per 20
			1,2-Dichloroethane-d4	68-124		RPD ≤30		
			4-Bromofluorobenzene	75-127				
			Dibromofluoromethane	81-118				
			Toluene-d8	85-119				
			Matrix Spikes		Matrix Spikes: One per 20	MS/MSDs	RPD	MS/MSDs: One per 20
			Benzene	61-138		Benzene	11	
			Toluene	55-147		Toluene	12	
			Ethyl Benzene	68-139		Ethyl Benzene	12	
			Xylenes (total)	57-146		Xylenes (total)	12	
			MTBE	35-151		MTBE	11	

Table 3b
Data Quality Objectives: Precision and Accuracy: Groundwater Samples

Parameter	Method	Matrix	Accuracy Control Limits		Accuracy Frequency Requirements	Precision (RPD) Control Limits		Precision Frequency Requirements
Pesticides (TAGM)	SW-846 Method 8081A	Groundwater	Surrogates	% Rec.	Surrogates: All samples, standards, QC samples	Field Duplicates		Field Duplicates: One per 20
			Decachlorobiphenyl	22-147				
			Tetrachloro-m-xylene	48-136		RPD ≤30		
			Matrix Spikes		Matrix Spikes: One per 20	MS/MSDs	RPD	MS/MSDs: One per 20
			gamma-BHC	55-144		gamma-BHC	35	
			Heptachlor	31-164		Heptachlor	35	
			Aldrin	32-158		Aldrin	35	
			Dieldrin	48-167		Dieldrin	35	
			Endrin	73-156		Endrin	34	
			4,4'-DDT	46-163		4,4'-DDT	35	
PCBs	SW-846 Method 8082	Groundwater	Surrogates	% Rec.	Surrogates: All samples, standards, QC samples	Field Duplicates		Field Duplicates: One per 20
			Decachlorobiphenyl	14-150				
			Tetrachloro-m-xylene	25-134		RPD ≤30		
			Matrix Spikes		Matrix Spikes: One per 20	MS/MSDs	RPD	MS/MSDs: One per 20
			Aroclor 1016	49-138		Aroclor 1016	21	
			Aroclor 1260	25-133		Aroclor 1260	35	

Table 3b
Data Quality Objectives: Precision and Accuracy: Groundwater Samples

Parameter	Method	Matrix	Accuracy Control Limits	Accuracy Frequency Requirements	Precision (RPD) Control Limits	Precision Frequency Requirements
SVOCs (STARS/TAGM)	SW-846 Method 8270C	Groundwater	Surrogates / % Rec. Phenol-d5 10-93 2-Fluorophenol 10-112 2,4,6-Tribromophenol 37-159 Nitrobenzene-d5 42-127 2-Fluorobiphenyl 38-131 Terphenyl-d14 22-153 Matrix Spikes Phenol 10-126 2-Chlorophenol 44-105 n-Nitroso-di-n-propylamine 50-120 4-Chloro-3-methylphenol 45-116 Acenaphthene 51-116 4-Nitrophenol 28-131 2,4-Dinitrotoluene 52-114 Pentachlorophenol 33-139 Pyrene 53-124	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20	Field Duplicates RPD ≤30 MS/MSDs / RPD Phenol 16 2-Chlorophenol 13 n-Nitroso-di-n-propylamine 16 4-Chloro-3-methylphenol 14 Acenaphthene 15 4-Nitrophenol 25 2,4-Dinitrotoluene 17 Pentachlorophenol 19 Pyrene 17	Field Duplicates: One per 20 MS/MSDs: One per 20

Table 3b
Data Quality Objectives: Precision and Accuracy: Groundwater Samples

Parameter	Method	Matrix	Accuracy Control Limits	Accuracy Frequency Requirements	Precision (RPD) Control Limits	Precision Frequency Requirements
PAHs (STARS/TAGM)	SW-846 Method 8270C	Groundwater	Surrogates / % Rec. Nitrobenzene-d5 42-127 2-Fluorobiphenyl 38-131 Terphenyl-d14 22-153 Matrix Spikes Naphthalene 47-116 2-Methylnaphthalene 47-125 Acenaphthylene 53-108 Acenaphthene 51-116 Fluorene 47-129 Fluoranthene 54-125 Pyrene 53-124 Phenanthrene 52-119 Anthracene 51-122 Benzo(a)anthracene 55-121 Chrysene 53-119 Benzo(b)fluoranthene 52-133 Benzo(k)fluoranthene 47-123 Benzo(a)pyrene 52-122 Indeno(1,2,3-cd)pyrene 42-134 Dibenzo(a,h)anthracene 51-135 Benzo(g,h,i)perylene 49-128	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20	Field Duplicates RPD ≤30 MS/MSDs / RPD Naphthalene 16 2-Methylnaphthalene 18 Acenaphthylene 16 Acenaphthene 15 Fluorene 16 Fluoranthene 18 Pyrene 17 Phenanthrene 16 Anthracene 17 Benzo(a)anthracene 16 Chrysene 16 Benzo(b)fluoranthene 25 Benzo(k)fluoranthene 24 Benzo(a)pyrene 17 Indeno(1,2,3-cd)pyrene 25 Dibenzo(a,h)anthracene 20 Benzo(g,h,i)perylene 24	Field Duplicates: One per 20 MS/MSDs: One per 20
Metals (TAGM)	SW-846 Methods 6010B/7000 Series	Groundwater	Matrix Spikes 75-125% recovery	Matrix Spikes: One per 20	Field Duplicates RPD ≤30 Matrix Duplicates RPD ≤20	Field Duplicates: One per 20 Matrix Duplicates: One per 20

Table 3b
Data Quality Objectives: Precision and Accuracy: Groundwater Samples

Parameter	Method	Matrix	Accuracy Control Limits	Accuracy Frequency Requirements	Precision (RPD) Control Limits	Precision Frequency Requirements
Ammonia	EPA Method 350.1 (350.2 for distillation)	Groundwater	Matrix Spikes 60-134% recovery	Matrix Spikes: One per 20	Field Duplicates RPD ≤30 Matrix Duplicates RPD ≤24	Field Duplicates: One per 20 Matrix Duplicates: One per 20
Nitrate	EPA Method 353.2/SM 4500-NO_2B (18^{th} edition)	Groundwater	Matrix Spikes 56-129% recovery	Matrix Spikes: One per 20	Field Duplicates RPD ≤30 Matrix Duplicates RPD ≤6	Field Duplicates: One per 20 Matrix Duplicates: One per 20
Nitrite	SM 4500-NO_2B (18^{th} edition)	Groundwater	Matrix Spikes 71-122% recovery	Matrix Spikes: One per 20	Field Duplicates RPD ≤30 Matrix Duplicates RPD ≤20	Field Duplicates: One per 20 Matrix Duplicates: One per 20
Sulfate	SW-846 9056	Groundwater	Matrix Spikes 80-120% recovery	Matrix Spikes: One per 20	Field Duplicates RPD ≤30 Matrix Duplicates RPD ≤20	Field Duplicates: One per 20 Matrix Duplicates: One per 20

Table 3b
Data Quality Objectives: Precision and Accuracy: Groundwater Samples

Parameter	Method	Matrix	Accuracy Control Limits	Accuracy Frequency Requirements	Precision (RPD) Control Limits	Precision Frequency Requirements
Carbonate	SM 4500-CO_2D (18th edition)	Groundwater	Matrix Spikes 80-120% recovery	Matrix Spikes: One per 20	Field Duplicates RPD ≤30 Matrix Duplicates RPD ≤20	Field Duplicates: One per 20 Matrix Duplicates: One per 20
Bicarbonate	SM 4500-CO_2D (18th edition)	Groundwater	Matrix Spikes 80-120% recovery	Matrix Spikes: One per 20	Field Duplicates RPD ≤30 Matrix Duplicates RPD ≤11	Field Duplicates: One per 20 Matrix Duplicates: One per 20
Cyanide	EPA Method 335.3	Groundwater	Matrix Spikes 75-125% recovery	Matrix Spikes: One per 20	Field Duplicates RPD ≤30 Matrix Duplicates RPD ≤20	Field Duplicates: One per 20 Matrix Duplicates: One per 20
Total Dissolved Solids	EPA Method 160.1	Groundwater	Not Applicable	Not Applicable	Field Duplicates RPD ≤30 Matrix Duplicates RPD ≤18	Field Duplicates: One per 20 Matrix Duplicates: One per 20

Table 3b
Data Quality Objectives: Precision and Accuracy: Groundwater Samples

Parameter	Method	Matrix	Accuracy Control Limits	Accuracy Frequency Requirements	Precision (RPD) Control Limits	Precision Frequency Requirements
Chloride	EPA Method 300.0	Groundwater	Matrix Spikes 80-120% recovery	Matrix Spikes: One per 20	Field Duplicates RPD ≤30 Matrix Duplicates RPD ≤20	Field Duplicates: One per 20 Matrix Duplicates: One per 20

Recovery criteria for laboratory control samples must be at least as stringent as MS/MSD criteria.
Laboratory control limits are periodically updated. The latest control limits will be utilized at the time of sample analysis.

4.0 SAMPLING PLAN

Environmental sampling for the Carillon Cleaners Site Project will include soil, soil vapor, groundwater, and waste characterization sampling. Direct push drilling (GeoProbe) and hollow-stem auger drilling will be the preferred methods for obtaining subsurface soil and groundwater samples; however, other drilling methods including mud rotary and drive and wash and rotosonic drilling methods may also be used if warranted by site conditions. Performing grab or composite sampling by appropriate hand-held sampling equipment will be the preferred method for waste characterization sampling.

4.1 Grab/Composite Sampling

Grab soil/solid samples will be collected from the material or interval in question by retrieving a volume for analysis using a clean stainless steel, aluminum, plastic, or mild steel scoop, trowel, spoon, or bucket auger. Samples may be collected from a discrete interval or by placing the soil in a cleaned stainless steel pan for homogenization before inserting into the sample container. The method of sampled collection for analytical parameters other than volatiles will be specified in the project Work Plan. Samples for volatile organics analysis will be placed directly into the sample container. Composite samples will be collected in the same manner described above, except that the discrete sample volumes will be placed in a clean stainless steel pan and mixed to form the composite. Composites for volatile organics analysis will have the discrete sample volumes placed directly into the sample container without mixing.

4.2 Soil Sampling (Direct Push Drilling)

Sampling will be performed using four-foot-long acetate sleeves that will be advanced continuously to the desired depth below the surface. Soil samples from each sleeve will be screened using an organic vapor monitor (OVM), a photoionization instrument, to detect possible organic vapors. Organic vapor screening will be performed by slicing open the acetate sleeve, making a small slice in the soil column with a clean knife or sampling tool, inserting the OVM probe. The sampler will then cover the open slice with the OVM probe tip inserted with their gloved hand and monitoring the soil for approximately 5 to 10 seconds. This procedure will be repeated at a minimum of 0.5-foot intervals along the soil column.

The samples will be examined for staining, discoloration, odors, and debris indicative of contamination (ash, coal fragments, wood chips, cinders, petroleum staining, etc.). Samples for laboratory analysis will be collected from the six-inch interval most likely to be contaminated, based on OVM readings, discoloration, staining, and the field geologist's judgment (field conditions may require a section longer than six inches to make sufficient sample; however this decision will be field-based). The samples will be collected by either removing a discrete interval or by cutting the soil in two places with a decontaminated steel, stainless steel, or aluminum trowel, spoon, or knife and homogenized in a decontaminated stainless steel pan before being placed in the sample bottles. VOC samples will go directly into the sample containers without homogenization. Samplers will wear phthalate-free gloves such as nitrile (no latex will be used) and will avoid contact of the gloves with the sample. Only clean metal instruments will be allowed to touch the sample. If there is insufficient soil volume in the spoon, then this will be made up by attempting a second direct push sleeve at the same depth, or by using the next immediate sample interval above or below this depth,

if appropriate. If there is no recovery, then the sample from this depth will be skipped, and drilling will progress to the next four-foot depth.

4.3 Soil Sampling (Hollow-Stem Auger)

Soil samples will be collected continuously utilizing 2-inch-diameter by 2-foot-long split spoon samplers driven ahead of a hollow stem auger. Three-inch-diameter split spoon samplers may also be used. Augers with a minimum inside diameter of 4¼ inches shall be used for drilling where wells are proposed. If soil sampling below the groundwater table is required, augers will be equipped with center plugs and/or inert "knock out" plates to control sub-water table sediments from rising inside the auger flights and hampering collection of representative soil samples.

Each split spoon sample will be screened using an OVM to detect possible organic vapors. Organic vapor screening will be performed by opening the split spoon, making a small slice in the soil column with a clean knife or sampling tool, inserting the OVM probe and pushing the slice closed, and monitoring the soil for approximately 5 to 10 seconds. This procedure will be repeated at intervals along the split spoon soil column at the field geologist's discretion.

The split spoons will be examined for staining, discoloration, odors, and debris indicative of contamination (ash, coal fragments, wood chips, cinders, petroleum staining, etc.). One sample will be collected from each split spoon, from the six-inch interval most likely to be contaminated, based on OVM readings, discoloration, staining, and the field geologist's judgment. Note that due to sample recovery or field conditions, sample intervals other than six inches may be necessary to collect sufficient sample.

The samples will be collected by either collecting a discrete interval or by cutting the soil in two places with a decontaminated steel, stainless steel, or aluminum trowel, spoon, or knife and homogenizing in a decontaminated stainless steel pan before being placed in the sample bottles (refer to Table 2). VOC and GRO samples will go directly into the sample containers without homogenization. Samplers will wear phthalate-free gloves such as nitrile (no latex will be used) and will avoid contact of the gloves with the sample. Only clean metal instruments will be allowed to touch the sample. If there is no recovery, then the sample from this depth will be skipped, and drilling will progress to the next sampling interval.

4.4 Drive and Wash/Mud Rotary

Borings will be advanced vertically by driving 4-inch-diameter steel casing with a 300-pound hammer falling freely for 24 inches. The casing will be cleaned with water using a tri-cone roller bit and/or chopping bit. A 2-inch-diameter by 2-foot-long split spoon sampler will be driven ahead of the tri-cone roller bit and samples will be collected as described in Section 4.3. Any drilling fluids used to advance the drill bit will be contained within a steel trough and re-circulated into the drill hole. Uncontaminated drilling fluids containing drilling mud will be mixed with cement to form a grout that will be used to backfill the borehole where required; otherwise the mud will be pumped into 55-gallon drums for on-site storage and subsequent off-site disposal. In Drive and Wash drilling where only potable water will be used as the drilling fluid, the water will be allowed to diffuse into the borehole. Samples will be collected in the same manner as with hollow stem auger

drilling. Where drilling mud is necessary, bentonite and/or Revert® will be used. Every effort will be made to collect samples for soil analysis before the addition of drilling mud. Only bentonite mixed with cement will be used to prepare grout for sealing the borehole.

4.5 Groundwater Sampling (Direct Push)

Groundwater samples will be collected utilizing dedicated screen point samplers, which utilize a screen with a slot size and length appropriate for the subsurface conditions. Polyethylene tubing, equipped with a check valve, is attached to the screen point sampler for retrieval of a groundwater sample to the surface. The screen point sampler is threaded onto a probe rod driven to the desired sampling interval. An O-ring on the screen head maintains a seal at the top of the screen during installation of the sampling unit. After reaching the desired sampling depth, the tubing and check valve will be introduced into the screen-point sampler and a tool string is inserted into the probe rod and retracted to open the screen point sampler. A peristaltic or vacuum pump attached to the polyethylene tubing is then utilized to collect a representative groundwater sample.

Field parameters which will be monitored include temperature, conductivity, pH, dissolved oxygen (DO), and turbidity. Field parameters should generally be within 10 percent for two consecutive readings, one minute apart, so that it may be determined when the parameters stabilize.

4.6 Groundwater Sampling (Permanent Well)

Groundwater sampling of permanent monitoring wells is described according to the following distinct phases of this work: well installation/construction, well development, well purging, and well sampling.

4.6.1 Well Installation/Construction

To collect representative groundwater samples, previously installed soil borings will be converted into permanent two-inch or four-inch diameter monitoring wells. Groundwater monitoring wells will be constructed of threaded two-inch or four-inch-diameter PVC well casing and 20-slot well screen, such that the well screen extends approximately 8 feet below the water table. A minimum of one foot of well screen will be installed above the water table, depth to water and surface elevation permitting; however, optimally, two to three feet of well screen will remain above the water table. Clean silica sand, Morie No. 2, or equivalent, shall be placed in the annular space around the well to a minimum of one foot above the top of the well screen, two feet being optimal. For a two-inch diameter well, the annular space for the filter pack should be between 2 to 4 inches thick. (The 4 ¼ inside diameter hollow stem augers will have to be retracted as the filter pack is installed to yield the required annular space.) A two-foot bentonite seal shall then be placed above the sand pack and wetted with potable water for a minimum of 15 minutes before backfilling the remaining space with a cement-bentonite grout. If warranted by depth, backfilling will be completed using a tremie pipe placed below the surface of the grout. Solid PVC riser, attached to the well screen, will extend approximately to grade. A flush-mount protective casing with a locking water-tight well cap will then be installed and a measuring point marked on each PVC well riser. Well construction diagrams will be prepared for each well. Modifications to the well installation/construction procedures may be warranted if subsurface conditions (presence of finer grained materials or DNAPL) indicate that they may be necessary. Any modifications must be approved by the Project Manager.

4.6.2 Well Development

Following their installation, the groundwater monitoring wells will be developed, using a two-inch diameter Grunfos submersible pump(s) (or equivalent) until the water is reasonably free of turbidity and field readings (pH, conductivity, temperature, and dissolved oxygen) sufficiently stabilize. Fifty nephelometric turbidity units (NTUs) or less will be the turbidity goal but not an absolute value. To minimize suspended material, the wells will be developed very carefully using low-flow submersible pump techniques. The wells will be developed gently at low pumping rates, on the order of 0.5 to one gpm. Bailers will not be used for developing these wells (nor will bailers be used for sampling except for VOC compounds). The wells will be allowed to equilibrate for 14 days prior to sampling. The volume of water removed, the well development time, and field instrument readings will be recorded in the logbook

4.6.3 Well Purging

The objective is to purge monitoring wells until turbidity stabilizes to a level as low as possible and this parameter will be given the greatest weight in determining when groundwater sampling may begin. The samples should have an absolute minimum amount of suspended material. This is to be achieved by slow and steady pumping. Fifty NTUs or less is the well purging goal, but not an absolute value before sampling. Other field parameters including temperature, conductivity, pH, and DO will also be monitored. As practical, all field measurements will be taken from the flow cell and will be recorded during and after purging, and before sampling. Field parameters should generally be within ±10 percent for two consecutive readings, one minute apart, so that it may be determined when the parameters stabilize.

Upon opening each monitoring well and point, the concentration of VOCs in the headspace will be measured using an OVM and water level measurements will be recorded using an electronic oil-water interface probe. The depth to product (if present), depth to water, and the total depth will be measured from the top of the marked PVC casings. Water level and free product (none anticipated) measurements will first be made and the volume of water in the well determined. The volume of water in the well will be calculated so that the number of well volumes purged and an estimate of the time required to purge the well can be made. Before sampling, the wells will be purged utilizing a low-flow submersible stainless steel pump (or equivalent pump able to achieve low-flow sampling rates) using dedicated polypropylene, tygon, and/or Teflon tubing connected to a flow cell. Very low purging rates are proposed, on the order of 100 ml/minute to 500 ml/minute, so as to minimize suspension of particulate matter in the well.

Purging will be done with the pump placed near the top of the water column to insure that all stagnant water in the well is removed, while not stirring sediment that may have accumulated on the bottom of the well. Equipment will be lowered into the well very carefully so as to prevent suspension of bottom sediment and subsequent entrainment onto sampling equipment. Surging will be avoided. Pumps must be carefully cleaned between wells according to the procedures specified in Section 4.10. It is anticipated that no more than three well volumes will be purged in order for turbidity to reach a minimum and the other parameters to stabilize. During purging, **GEI** will actively monitor and track the volume of water purged and the field parameter readings. Data will be

recorded in the field logbook. For example, **GEI** will record the running total volume purged from each well and note the readings for the corresponding field parameters.

4.6.4 Well Sampling

Once groundwater conditions have stabilized and groundwater levels have recovered, all samples except those slated for VOC analysis will be collected from the flow cell outlet (connected to the low-flow submersible pump). Samples for VOC analysis will be sampled using a micro stainless steel and/or Teflon bailer or some other appropriate VOC sampling method. All sampling equipment will be cleaned according to the procedures specified in Section 4.8.

Sampling will be performed by suspending the bottom of the pump and/or bailer a minimum of 15 inches above the bottom of the well and a minimum of 0.5 feet from the top of the water level, in order to minimize the amount of suspended sediment in the sample. Pumping rates for withdrawing the samples will be similar to those followed for well purging, 100 ml/minute to 500 ml/minute.

The samples will be collected in sample bottles (pre-preserved, if appropriate), placed in iced coolers and removed from light immediately after collection. In addition, all samples bottles must be filled to the top so that no aeration of the samples occurs during transport. All bottles will be filled so as to avoid cascading and aeration of the samples, the goal being to minimize any precipitation of colloidal matter.

4.7 Waste Classification Sampling

Waste classification sampling will be conducted for the purpose of characterizing a waste for its proper off-site disposal. Specific methods for sampling liquid and solid wastes are listed in Table 4 and briefly discussed below.

4.7.1 Solid Waste

As indicated by Table 4, solid sampling methods include utilizing dedicated stainless steel or Teflon scoops/shovels, triers, and thiefs. Scoops and shovels is the preferred method for sampling solids from piles or containers. Stainless steel triers are similar to a scoop and are used for the collection of a core sample of a solid material. Thiefs are long hollow tubes, with an inner tube, and are used for sampling of dry free running solids (e.g. pile of fine sand). To sample solid material at varying depths, a hollow stem auger or a core sampler in conjunction with an auger can be utilized (See Soil Sampling Section).

4.7.2 Liquid Waste

As indicated by Table 4, liquid sampling methods include utilizing dedicated dippers, glass tube samplers, pump and tubing, kemmerer bottles, and Bacon Bomb samplers. Dippers are used to collect samples from the surface of the liquid, and are appropriate for wastes that are homogeneous. Glass tube samplers consist of glass tubes of varying length and diameter used to collect a full-depth liquid sample from a drum or similar container. Pump and tubing (e.g. bladder pump or peristaltic pump) are used to collect liquid samples from a depth (up to approximately 20 feet below grade), and are typically relied upon for sampling subsurface structures, such as underground storage tanks. To minimize the loss of volatile organic components in the liquid, the lowest achievable flow rate is

utilized for collecting the sample by this method. Kemmerer bottles and Bacon Bomb samplers are discrete-depth samplers. These samplers are lowered into the liquid and opened to collect a sample at a desired depth.

Table 4
Sampling Methods Summary For Waste Characterization

Waste Type/Unit Type	1 Scoops/ Shovels	2 Triers	3 Thief	4 Sample Core	5 Auger	6 Core Samplers	7 Glass Tubes	8 Dipper	9 Pump/ Tubing	10 Kemmerer Bottle	11 Bacon Bomb
Solid Wastes											
Waste Piles	X	X	X	X	X						
Drums	X		X	X							
Sacks/Bags	X	X	X								
Trucks	X	X	X			X					
Sludge Wastes											
Waste Piles	X	X		X		X					
Drums	X					X	X				
Tanks	X							X			
Surface Impoundment	X							X			
Trucks	X	X				X		X			
Liquid Wastes											
Drums							X	X	X		
Tanks									X	X	X
Surface Impoundment								X	X	X	X
Trucks								X	X	X	X

* Core sampler modified to serve as air-tight container for retention of volatile fraction

4.7.3 Grab versus Composite Sampling

Waste characterization of a liquid or a solid can involve grab or composite sampling depending upon the homogeneity and the volume of the waste. Grab sampling consists of collecting discrete sample or samples of a material, and submitting each sample for separate analysis. Grab sampling is appropriate for characterizing small quantities of waste as well as waste streams of varying content (e.g. drums of different contents). Composite sampling consists of taking discrete grab samples of a material and combining them into a smaller number of samples for analysis. Composite sampling generally is appropriate for large volumes of a homogenous waste material, such a pile of soil or construction debris. The specific number of composite and grab samples largely will depend upon the size and nature of the waste pile (i.e. cubic yards) as well as the analysis required for characterization of the waste.

4.8 QC Sample Collection

QC samples will include equipment blanks, trip blanks, field duplicates and MS/MSDs.

Equipment blanks will consist of distilled water and will be used to check for potential contamination of the equipment which may cause sample contamination. Equipment blanks will be collected by routing the distilled water through the sampling equipment prior to sample collection. Equipment blanks will be submitted to the laboratory at a frequency of one per 20 samples per matrix per type of equipment being used per parameter, with the exception of TCLP parameters; equipment blanks will not be submitted for the TCLP parameters.

Trip blanks will consist of distilled water (supplied by the laboratory) and will be used to assess the potential for volatile organic compound contamination of groundwater samples due to contaminant migration during sample shipment and storage. Trip blanks will be transported to the site unopened, stored with the investigative samples, and kept closed until analyzed by the laboratory. Trip blanks will be submitted to the laboratory at a frequency of one per cooler, which contains VOC groundwater samples.

Field duplicates are an additional aliquot of the same sample submitted for the same parameters as the original sample. Field duplicates will be used to assess the sampling and analytical reproducibility. Field duplicates will be collected by alternately filling sample bottles from the source being sampled. Field duplicates will be submitted at a frequency of one per 20 samples for all matrices and all parameters, with the exception of TCLP parameters; field duplicates will not be submitted for the TCLP parameters.

MSs and MSDs are two additional aliquots of the same sample submitted for the same parameters as the original sample. However, the additional aliquots are spiked with the compounds of concern. Matrix spikes provide information about the effect of the sample matrix on the measurement methodology. MS/MSDs will be submitted at a frequency of one per 20 investigative samples per matrix for organic parameters. MSs will be submitted at a frequency of one per 20 investigative samples per matrix for inorganic parameters.

Refer to Table 5 for a summary of QC sample preservation and container requirements.

4.9 Sample Preservation and Containerization

The analytical laboratory will supply the sample containers for the chemical samples. These containers will be cleaned by the manufacturer to meet or exceed all analyte specifications established in the latest US EPA's Specifications and Guidance for Contaminant-Free Sample Containers. Certificates of analysis are provided with each bottle lot and maintained on file to document conformance to EPA specifications. The containers will be pre-preserved, where appropriate (See Table 2).

4.10 Equipment Decontamination

4.10.1 Sampling Equipment

Re-usable Teflon, stainless steel, and aluminum sampling equipment shall be cleaned between each use in the following manner:

- Wash/scrub with a biodegradable degreaser ("Simple Green") if there is oily residue on equipment surface
- Tap water rinse
- Wash and scrub with Alconox and water mixture
- Tap water rinse
- 10 percent HNO3 rinse for non-dedicated groundwater sampling equipment for metals analysis only (excludes submersible pump and flow cell)
- Hexane rinse (optional, only if required to remove heavy petroleum coating)
- Distilled/deionized water rinse
- Air dry

Cleaned equipment shall be wrapped in aluminum foil if not used immediately after air-drying.

Groundwater sampling pumps will be cleaned by washing and scrubbing with an Alconox/water mixture, rinsing with tap water and irrigating with deionized water.

Table 5
QC Sample Preservation and Container Requirements

Sample Matrix	Analytical Parameter	Sample Type	No. of Samples	EPA Analytical Method	Sample Preservation	Holding Time	Sample Container
Soil	VOCs (TCL or STARS/TAGM)	Field Duplicate	TBD	SW-846 Method 8260B	Cool to 4° C; no headspace	14 days to analysis	(2) 2-oz. glass jars
Soil	BTEX/MTBE	Field Duplicate	TBD	SW-846 Method 8260B	Cool to 4^0 C; no headspace	14 days to analysis	(2) 2-oz. glass jars
Soil	PCBs	Field Duplicate	TBD	SW-846 Method 8082	Cool to 4^0 C	14 days to extraction; 40 days from extraction to analysis	(1) 300 mL amber glass jar
Soil	PAHs or SVOCs (STARS/TAGM)	Field Duplicate	TBD	SW-846 Method 8270C	Cool to 4^0 C	14 days to extraction; 40 days from extraction to analysis	(1) 300 mL amber glass jar
Soil	Lead	Field Duplicate	TBD	SW-846 Method 6010B	Cool to 4^0 C	6 months to analysis	(1) 300 mL amber glass jar
Soil	Metals (TAGM)	Field Duplicate	TBD	SW-846 Method 6010B/7000 Series	Cool to 4^0 C	28 days to analysis for Hg; 6 months to analysis for other metals	(1) 300 mL amber glass jar
Soil	GRO	Field Duplicate	TBD	SW-846 Method 8015B	Cool to 4^0 C; no headspace	14 days to analysis	(2) 2-oz. glass jars
Soil	DRO	Field Duplicate	TBD	SW-846 Method 8015B	Cool to 4^0 C	14 days to extraction; 40 days from extraction to analysis	(1) 300 mL amber glass jar
Groundwater	VOCs (STARS/TAGM)	Field Duplicate	TBD	SW-846 Method 8260B	pH<2 with HCl Cool to 4^0 C; no headspace	14 days to analysis	(2) 40 mL VOA vials
Groundwater	BTEX/MTBE	Field Duplicate	TBD	SW-846 Method 8260B	pH<2 with HCl Cool to 4^0 C; no headspace	14 days to analysis	(2) 40 mL VOA vials

Table 5
QC Sample Preservation and Container Requirements

Sample Matrix	Analytical Parameter	Sample Type	No. of Samples	EPA Analytical Method	Sample Preservation	Holding Time	Sample Container[2,3]
Groundwater	Pesticides (TAGM)	Field Duplicate	TBD	SW-846 Method 8081A	Cool to 4^0 C	7 days to extraction; 40 days from extraction to analysis	(2) 1 L amber glass jars
Groundwater	PCBs	Field Duplicate	TBD	SW-846 Method 8082	Cool to 4^0 C	7 days to extraction; 40 days from extraction to analysis	(2) 1 L amber glass jars
Groundwater	SVOCs (STARS/TAGM)	Field Duplicate	TBD	SW-846 Method 8270C	Cool to 4^0 C	7 days to extraction; 40 days from extraction to analysis	(2) 1 L amber glass jars
Groundwater	PAHs (STARS/TAGM)	Field Duplicate	TBD	SW-846 Method 8270C	Cool to 4^0 C	7 days to extraction; 40 days from extraction to analysis	(2) 1 L amber glass jars
Groundwater	Lead	Field Duplicate	TBD	SW-846 Method 6010B	pH<2 with HNO_3; Cool to 4^0 C	6 months to analysis	(1) 1L polyethylene container
Groundwater	Metals (TAGM)	Field Duplicate	TBD	SW-846 Method 6010B/7000 Series	pH<2 with HNO_3; Cool to 4^0 C	28 days to analysis for Hg; 6 months to analysis for other metals	(1) 1L polyethylene container
Groundwater	Ammonia	Field Duplicate	TBD	EPA Method 350.1 (350.2 for distillation)	pH<2 with H_2SO_4; Cool to 4^0 C	28 days to analysis	(1) 250 mL polyethylene container
Groundwater	Nitrate	Field Duplicate	TBD	EPA Method 353.2/SM 4500-NO_2B (18^{th} edition)	pH<2 with H_2SO_4; Cool to 4^0 C	28 days to analysis	(1) 100 mL polyethylene container
Groundwater	Nitrite	Field Duplicate	TBD	SM 4500-NO_2B (18^{th} edition)	Cool to 4^0 C	48 hours to analysis	(1) 100 mL polyethylene container
Groundwater	Sulfate	Field Duplicate	TBD	SW-846 9056	Cool to 4^0 C	As soon as possible (within 3 days of collection)	(1) 100 mL polyethylene container

Table 5
QC Sample Preservation and Container Requirements

Sample Matrix	Analytical Parameter	Sample Type	No. of Samples	EPA Analytical Method	Sample Preservation	Holding Time	Sample Container
Groundwater	Carbonate	Field Duplicate	TBD	SM 4500-CO_2D (18th edition)	Cool to 4° C	14 days to analysis	(1) 250 mL polyethylene container
Groundwater	Bicarbonate	Field Duplicate	TBD	SM 4500-CO_2D (18th edition)	Cool to 4° C	14 days to analysis	(1) 250 mL polyethylene container
Groundwater	Cyanide	Field Duplicate	TBD	EPA Method 335.3	pH>12 with NaOH; Cool to 4°C	14 days to analysis	(1) 250 mL polyethylene container
Groundwater	Chloride	Field Duplicate	TBD	EPA Method 300.0	Cool to 4°C	28 days to analysis	(1) 100 mL polyethylene container
Groundwater	Total Dissolved Solids	Field Duplicate	TBD	EPA Method 160.1	Cool to 4°C	7 days to analysis	(1) 100 mL polyethylene container
Aqueous	Ammonia	Equipment Blank	TBD	EPA Method 350.1 (350.2 for distillation)	pH<2 with H_2SO_4; Cool to 4° C	28 days to analysis	(1) 250 mL polyethylene container
Aqueous	Nitrate	Equipment Blank	TBD	EPA Method 353.2/SM 4500-NO_2B (18th edition)	pH<2 with H_2SO_4; Cool to 4° C	28 days to analysis	(1) 100 mL polyethylene container
Aqueous	Nitrite	Equipment Blank	TBD	SM 4500-NO_2B (18th edition)	Cool to 4° C	48 hours to analysis	(1) 100 mL polyethylene container
Aqueous	Sulfate	Equipment Blank	TBD	SW-846 9056	Cool to 4° C	As soon as possible (within 3 days of collection)	(1) 100 mL polyethylene container
Aqueous	Carbonate	Equipment Blank	TBD	SM 4500-CO_2D (18th edition)	Cool to 4° C	14 days to analysis	(1) 250 mL polyethylene container

Table 5
QC Sample Preservation and Container Requirements

Sample Matrix	Analytical Parameter	Sample Type	No. of Samples	EPA Analytical Method	Sample Preservation	Holding Time	Sample Container
Aqueous	Bicarbonate	Equipment Blank	TBD	SM 4500-CO_2D (18^{th} edition)	Cool to 4^0 C	14 days to analysis	(1) 250 mL polyethylene container
Aqueous	Cyanide	Equipment Blank	TBD	SW-846 Method 9010B	pH>12 with NaOH; Cool to 4°C	14 days to analysis	(1) 250 mL polyethylene container
Aqueous	Chloride	Equipment Blank	TBD	SW-846 Method 9250	Cool to 4°C	28 days to analysis	(1) 100 mL polyethylene container
Aqueous	Total Dissolved Solids	Equipment Blank	TBD	EPA Method 160.1	Cool to 4°C	7 days to analysis	(1) 100 mL polyethylene container
Aqueous	VOCs (TCL or STARS/TAGM)	Equipment Blank	TBD	SW-846 Method 8260B	pH<2 with HCl Cool to 4^0 C; no headspace	14 days to analysis	(2) 40 mL VOA vials
Aqueous	BTEX/MTBE	Equipment Blank	TBD	SW-846 Method 8260B	pH<2 with HCl Cool to 4^0 C; no headspace	14 days to analysis	(2) 40 mL VOA vials
Aqueous	Pesticides (TAGM)	Equipment Blank	TBD	SW-846 Method 8081A	Cool to 4^0 C	7 days to extraction; 40 days from extraction to analysis	(2) 1 L amber glass jars
Aqueous	PCBs	Equipment Blank	TBD	SW-846 Method 8082	Cool to 4^0 C	7 days to extraction; 40 days from extraction to analysis	(2) 1 L amber glass jars
Aqueous	SVOCs (STARS/TAGM)	Equipment Blank	TBD	SW-846 Method 8270C	Cool to 4^0 C	7 days to extraction; 40 days from extraction to analysis	(2) 1 L amber glass jars

Table 5
QC Sample Preservation and Container Requirements

Sample Matrix	Analytical Parameter	Sample Type	No. of Samples	EPA Analytical Method	Sample Preservation	Holding Time[1]	Sample Container[2]
Aqueous	PAHs (STARS/TAGM)	Equipment Blank	TBD	SW-846 Method 8270C	Cool to 4^0 C	7 days to extraction; 40 days from extraction to analysis	(2) 1 L amber glass jars
Aqueous	Lead	Equipment Blank	TBD	SW-846 Method 6010B	pH<2 with HNO_3; Cool to 4^0 C	6 months to analysis	(1) 1L polyethylene container
Aqueous	Metals (TAGM)	Equipment Blank	TBD	SW-846 Method 6010B/7000 Series	pH<2 with HNO_3; Cool to 4^0 C	28 days to analysis for Hg; 6 months to analysis for other metals	(1) 1L polyethylene container
Aqueous	GRO	Equipment Blank	TBD	SW-846 Method 8015B	pH<2 with HCl; Cool to 4^0 C; no headspace	14 days to analysis	(2) 40 mL VOA vials
Aqueous	DRO	Equipment Blank	TBD	SW-846 Method 8015B	Cool to 4^0 C	7 days to extraction; 40 days from extraction to analysis	(2) 1L amber glass bottles
Aqueous	VOCs (TCL or STARS/TAGM)	Trip Blank	TBD	SW-846 Method 8260B	pH<2 with HCl Cool to 4^0 C; no headspace	14 days to analysis	(2) 40 mL VOA vials
Aqueous	BTEX/MTBE	Trip Blank	TBD	SW-846 Method 8260B	pH<2 with HCl Cool to 4^0 C; no headspace	14 days to analysis	(2) 40 mL VOA vials

[1] From date of sample collection
[2] I-Chem Series 300 bottles
[3] MS/MSDs require duplicate volume for all parameters for solid matrices; MS/MSDs require triplicate volume for organic parameters for aqueous matrices and duplicate volume for inorganic parameters for aqueous matrices
TBD = To Be Determined

5.0 DOCUMENTATION AND CHAIN-OF-CUSTODY

5.1 Sample Collection Documentation

5.1.1 Field Notes

Field team members will keep a field logbook to document all field activities. Field logbooks will provide the means of recording the chronology of data collection activities performed during the investigation. As such, entries will be described in as much detail as possible so that a particular situation could be reconstructed without reliance on memory.

The logbook will be a bound notebook with water-resistant pages. Logbook entries will be dated, legible, and contain accurate and inclusive documentation of the activity. The title page of each logbook will contain the following:

- Person to whom the logbook is assigned,
- The logbook number,
- Project name and number,
- Site name and location,
- Project start date, and
- End date.

Entries into the logbook will contain a variety of information. At the beginning of each entry, the date, start time, weather, and names of all sampling team members present will be entered. Each page of the logbook will be signed and dated by the person making the entry. All entries will be made in permanent ink, signed, and dated and no erasures or obliterations will be made. If an incorrect entry is made, the information will be crossed out with a single strike mark which is signed and dated by the sampler. The correction shall be written adjacent to the error.

Field activities will be fully documented. Information included in the logbook will include, but may not be limited to the following:

- Chronology of activities, including entry and exit times,
- Names of all people involved in sampling activities,
- Level of personal protection used,
- Any changes made to planned protocol,
- Names of visitors to the site during sampling and reason for their visit,
- Sample location and identification,
- Changes in weather conditions,
- Dates (month/day/year) and times (military) of sample collection,
- Measurement equipment identification (model/manufacturer) and calibration information,
- Sample collection methods and equipment,
- Sample depths,
- Whether grab or composite sample collected,
- How sample composited, if applicable,
- Sample description (color, odor, texture, etc.)

- Sample identification code.
- Tests or analyses to be performed,
- Sample preservation and storage conditions,
- Equipment decontamination procedures,
- QC sample collection,
- Unusual observations,
- Record of photographs,
- Sketches or diagrams, and
- Signature of person recording the information

Field logbooks will be reviewed on a daily basis by the Field Team Leader. Logbooks will be supported by standardized forms.

5.1.2 Chain-of-Custody Records

Sample custody is discussed in detail in Section 5.2 of this Plan. Chain-of-custody records are initiated by the samplers in the field. The field portion of the custody documentation should include: (1) the project name; (2) signatures of samplers; (3) the sample number, date and time of collection, and whether the sample is grab or composite; (4) signatures of individuals involved in sampling; and (5) if applicable, air bill or other shipping number. Sample receipt and log-in procedures at the laboratory are described in Section 5.2.2 of this Plan.

On a regular basis (daily or on such a basis that all holding times will be met), samples will be transferred to the custody of the respective laboratories, via third-party commercial carriers or via laboratory courier service. Sample packaging and shipping procedures, and field chain-of-custody procedures are described in Section 5.2.1 of this Plan.

5.1.3 Sample Labeling

Immediately upon collection, each sample will be labeled with a pre-printed adhesive label, which includes the date and time of collection, sampler's initials, tests to be performed, preservative (if applicable), and a unique identifier. The following identification scheme will be used:

A. The sample ID number will include the soil sampling, soil boring, or monitoring well location, along with the sample depth, sample interval, and the depth interval at which it was collected.

Example:

Sample "B22, 5.0 - 5.5' indicates the sample was taken at boring location B-22, from the 6-inch interval in the spoon beginning at 5.0 feet below grade and ending at 5.5 feet below grade. Duplicate samples will be labeled as blind duplicates by giving them sample numbers indistinguishable from a normal sample.

Blanks should be spelled out and identify the associated matrix, e.g. Equipment Blank, Soil

MS/MSDs will be noted in the Comments column of the COC.

B. The job number will be the number assigned to the particular site.

Example: 28410-KB03-2210T

C. The analysis required will be indicated for each sample.

Example: SVOC

D. Date taken will be the date the sample was collected, using the format: MM-DD-YY.

Example: 3-22-01

E. Time will be the time the sample was collected, using military time.

Example: 1335

F. The sampler's name will be printed in the "Sampled By" section.

G. Other information relevant to the sample.

Example: Equipment Blank

An example sample label is presented below:

Job No:	28410-KB03-2210T
Client:	CARILLON
Sample No:	"B-22, 5.0 - 5.5'
Matrix:	Soil
Date Taken:	3/22/04
Time Taken:	14:30
Sampler:	M. Burke
Analysis:	SVOC

Job No. _____
Client: _____
Sample Number _____
Date _____ Sample Time _____
Sample Matrix _____
Grab or Composite (explain) _____
Preservatives _____
Analyses _____
Sampler Signature _____

This sample label contains the authoritative information for the sample. Inconsistencies with other documents will be settled in favor of the vial or container label unless otherwise corrected in writing from the field personnel collecting samples or the **GEI** Project QA Officer.

5.2 Sample Custody

Custody is one of several factors that are necessary for the admissibility of environmental data as evidence in a court of law. Custody procedures help to satisfy the two major requirements for admissibility: relevance and authenticity. Sample custody is addressed in three parts: field sample collection, laboratory analysis, and final evidence files.

A sample or evidence file is considered to be under a person's custody if

- the item is in the actual possession of a person;
- the item is in the view of the person after being in actual possession of the person;
- the item was in the actual physical possession of the person but is locked up to prevent tampering;
- the item is in a designated and identified secure area.

5.2.1 Field Custody Procedures

Samples will be collected following the sampling procedures documented in Section 4.0 of this Plan. Documentation of sample collection is described in Section 5.1 of this Plan. Sample chain-of-custody and packaging procedures are summarized below. These procedures will ensure that the samples will arrive at the laboratory with the chain-of-custody intact.

- The field sampler is personally responsible for the care and custody of the samples until they are transferred or dispatched properly. Field procedures have been designed such that as few people as possible will handle the samples.
- All bottles will be identified by the use of sample labels with sample numbers, sampling locations, date/time of collection, and type of analysis. The sample numbering system is presented in Section 5.1.3 of this Plan.
- Sample labels will be completed for each sample using waterproof ink unless prohibited by weather conditions. For example, a logbook notation would explain that a pencil was used to fill out the sample label because the pen would not function in wet weather.
- Samples will be accompanied by a properly completed chain-of-custody form. The sample numbers and locations will be listed on the chain-of-custody form. When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the record. This record documents the transfer of custody of samples from the sampler to another person, to a mobile laboratory, to the permanent laboratory, or to/from a secure storage location.
- All shipments will be accompanied by the chain-of-custody record identifying the contents. The original record will accompany the shipment, and copies will be retained by the sampler and placed in the project files.

- Samples will be properly packaged for shipment and dispatched to the appropriate laboratory for analysis, with a separate signed custody record enclosed in and secured to the inside top of each sample box or cooler. Shipping containers will be secured with strapping tape and custody seals for shipment to the laboratory. The custody seals will be attached to the front right and back left of the cooler and covered with clear plastic tape after being signed by field personnel. The cooler will be strapped shut with strapping tape in at least two locations.
- If the samples are sent by common carrier, the air bill will be used. Air bills will be retained as part of the permanent documentation. Commercial carriers are not required to sign off on the custody forms since the custody forms will be sealed inside the sample cooler and the custody seals will remain intact.
- Samples remain in the custody of the sampler until transfer of custody is completed. This consists of delivery of samples to the laboratory sample custodian, and signature of the laboratory sample custodian on chain-of-custody document as receiving the samples and signature of sampler as relinquishing samples.

5.2.2 Laboratory Custody Procedures

Samples will be received and logged in by a designated sample custodian or his/her designee. Upon sample receipt, the sample custodian will

- Examine the shipping containers to verify that the custody tape is intact,
- Examine all sample containers for damage,
- Determine if the temperature required for the requested testing program has been maintained during shipment and document the temperature on the chain-of-custody records,
- Compare samples received against those listed on the chain-of-custody,
- Verify that sample holding times have not been exceeded,
- Examine all shipping records for accuracy and completeness,
- Determine sample pH (if applicable) and record on chain-of-custody forms,
- Sign and date the chain-of-custody immediately (if shipment is accepted) and attach the air bill,
- Note any problems associated with the coolers and/or samples on the cooler receipt form and notify the Laboratory Project Manager, who will be responsible for contacting the **GEI** Project QA Officer,
- Attach laboratory sample container labels with unique laboratory identification and test, and
- Place the samples in the proper laboratory storage.

Following receipt, samples will be logged in according to the following procedure:

- The samples will be entered into the laboratory tracking system. At a minimum, the following information will be entered: project name or identification, unique sample numbers (both client and internal laboratory), type of sample, required tests, date and time of laboratory receipt of samples, and field ID provided by field personnel.
- The Laboratory Project Manager will be notified of sample arrival.
- The completed chain-of-custody, air bills, and any additional documentation will be placed in the final evidence file.

6.0 CALIBRATION PROCEDURES

6.1 Field Instruments

Field instruments will be calibrated according to the manufacturer's specifications. All calibration procedures performed will be documented in the field logbook and will include the date/time of calibration, name of person performing the calibration, reference standard used, temperature at which the readings were taken, and the readings.

6.2 Laboratory Instruments

Calibration procedures for a specific laboratory instrument will consist of initial calibrations, initial calibration verifications, and/or continuing calibration verification. Detailed descriptions of the calibration procedures for a specific laboratory instrument are included in the laboratory's standard operating procedures (SOPs), which describe the calibration procedures, their frequency, acceptance criteria, and the conditions that will require recalibration. These procedures are as required in the respective analytical methodologies (summarized in Table 2 of this Plan). The initial calibration associated with all analyses must contain a low-level calibration standard which is less than or equal to the quantitation limit.

7.0 SAMPLE PREPARATION AND ANALYTICAL PROCEDURES

No field analyses are anticipated for the Carillon Site project Work Plan. If site conditions were to warrant field analysis, **GEI** will prepare an addendum establishing the field analytical procedures. Analyses of all soil, groundwater and waste classification samples will be performed by H2M Labs, Inc, Melleville, New York. Table 2 summarizes the analytical methods to be used during this investigation.

8.0 DATA REDUCTION, VALIDATION, AND REPORTING

Appropriate QC measures will be used to ensure the generation of reliable data from sampling and analysis activities. Proper collection and organization of accurate information followed by clear and concise reporting of the data is a primary goal in this project. Complete data packages suitable for data validation to support the generation of a Data Usability Summary Report (DUSR) according to NYSDEC requirements will be provided by the analytical laboratory.

For all analyses, the laboratory will report results which are below the laboratory's reporting limit; these results will be qualified as estimated (J) by the laboratory. The laboratory may be required to report tentatively identified compounds (TICs) for the VOC and SVOC analyses; this will be requested by GEI on an as-needed basis.

8.1 Data Evaluation/Validation

8.1.1 Field Data Evaluation

Measurements and sample collection information will be transcribed directly into the field logbook or onto standardized forms. If errors are made, results will be legibly crossed out, initialed and dated by the person recording the data, and corrected in a space adjacent to the original (erroneous) entry. Daily reviews of the field records by the Field Team Leader will ensure that:

- Logbooks and standardized forms have been filled out completely and that the information recorded accurately reflects the activities that were performed.
- Records are legible and in accordance with good record keeping procedures, i.e., entries are signed and dated, data are not obliterated, changes are initialed, dated, and explained.
- Sample collection, handling, preservation, and storage procedures were conducted in accordance with the protocols described in the Plan, and that any deviations were documented and approved by the appropriate personnel.

8.1.2 Analytical Data Validation

GEI will be responsible for performing an independent validation of the analytical data. Project-specific procedures will be used to validate analytical laboratory data. The basis for the validation will be the USEPA CLP National Functional Guidelines for Organic Data Review (October 1999) and the USEPA CLP National Functional Guidelines for Inorganic Data Review (February 1994), modified to accommodate the criteria in the analytical methods used in this program, and Region II Standard Operating Procedures (SOPs) for CLP Organic Data review (Revision 11, June 1996) and Evaluation of Metals for the CLP Program (Revision 11, January 1992). Tables 1, 2, 3a, 3b and 5 highlight the QC criteria and holding time requirements for all analyses conducted under this program. These criteria will be used to evaluate and qualify the data during validation.

GEI will validate an appropriate number of soil samples collected for the purpose of characterizing the subsurface and/or delineating impacted areas to ensure that verifiable data are used to support decision making and endpoint documentation. Likewise, an appropriate number of groundwater samples will be validated to ensure that cleanup criteria have been achieved. Samples collected for waste classification will not be validated. Validation will include all technical holding times, as well

as QC sample results (blanks, surrogate spikes, laboratory duplicates, MS/MSDs, and LCSs), tunes, internal standards, calibrations, target compound identification, and results calculations.

The overall completeness of the data package will also be evaluated by the data validator. Completeness checks will be administered on all data to determine whether full data deliverables were provided. The reviewer will determine whether all required items are present and request copies of missing deliverables.

Upon completion of the validation, a report will be prepared. This report will summarize the samples reviewed, elements reviewed, any nonconformances with the established criteria, and validation actions. Data qualifiers will be consistent with EPA National Functional Guidelines. This report will be in a format consistent with NYSDEC's Data Usability Summary Report (DUSR),

8.2 Identification and Treatment of Outliers

Any data point which deviates markedly from others in its set of measurements will be investigated; however, the suspected outlier will be recorded and retained in the data set. One or both of the following tests will be used to identify outliers.

Dixon's test for extreme observations is an easily computed procedure for determining whether a single very large or very small value is consistent with the remaining data. The one-tailed t-test for difference may also be used in this case. It should be noted that these tests are designed for testing a single value. If more than one outlier is suspected in the same data set, other statistical sources may be consulted and the most appropriate test of hypothesis will be used and documented, if warranted.

Since an outlier may result from unique circumstances at the time of sample analysis or data collection, those persons involved in the analysis and data reduction will be consulted. This may provide an experimental reason for the outlier. Further statistical analysis may be performed with and without the outlier to determine its effect on the conclusions. In many cases, two data sets may be reported, one including, and one excluding the outlier.

In summary, every effort will be made to include the outlying values in the reported data. If the value is rejected, it will be identified as an outlier, reported with its data set and its omission noted.

9.0 INTERNAL QUALITY CONTROL

The subcontracting laboratory Quality Assurance Project Plan will identify the supplemental internal analytical quality control procedures to be used. At a minimum, this will include:

- Matrix spike and/or matrix spike duplicate samples
- Matrix duplicate analyses
- Laboratory control spike samples
- Instrument calibrations
- Instrument tunes for SW-846 8260B and 8270C analyses
- Method and/or instrument blanks
- Surrogate spikes for organic analyses
- Internal standard spikes for SW-846 8260B and 8270C analyses
- Detection limit determination and confirmation by analysis of low-level calibration standard

Field quality control samples will include:

- Equipment blanks as outlined in Table 5
- Field duplicate samples as outlined in Table 5
- Trip blanks as outlined in Table 5
- MS/MSDs described in Section 4.8

10.0 CORRECTIVE ACTION

The entire sampling program will be under the direction of **GEI's** Project QA officer. The emphasis in this program is on preventing problems by identifying potential errors, discrepancies, and gaps in the data-collection-laboratory-analysis-interpretation process. Any problems identified will be promptly resolved. Likewise, follow-up corrective action is always an option in the event that preventative corrective actions are not totally effective.

The acceptance limits for the sampling and analyses to be conducted in this program will be those stated in the method or defined by other means in the Plan. Corrective actions are likely to be immediate in nature and most often will be implemented by the contracted laboratory analyst or the **GEI** Program Manager. The corrective action will usually involve recalculation, reanalysis, or repeating a sample run.

10.1 Immediate Corrective Action

Corrective action in the field may be needed when the sample network is changed (i.e., more/less samples, sampling locations other than those specified in the Plan), or when sampling procedures and/or field analytical procedures require modification, etc. due to unexpected conditions. The field team may identify the need for corrective action. The Field Team Leader will approve the corrective action and notify the **GEI** Program Manager. The **GEI** Program Manager will approve the corrective measure. The Field Team Leader will ensure that the corrective measure is implemented by the field team.

Corrective actions will be implemented and documented in the field record book. Documentation will include:

- A description of the circumstances that initiated the corrective action,
- The action taken in response,
- The final resolution, and
- Any necessary approvals.

No staff member will initiate corrective action without prior communication of findings through the proper channels.

Corrective action in the laboratory may occur prior to, during, and after initial analyses. A number of conditions such as broken sample containers, omissions or discrepancies with chain-of-custody documentation, low/high pH readings, and potentially high concentration samples may be identified during sample log-in or just prior to analysis. Following consultation with laboratory analysts and Laboratory Section Leaders, it may be necessary for the Laboratory QA Manager to approve the implementation of corrective action. The laboratory SOPs specify some conditions during or after analysis that may automatically trigger corrective action or optional procedures. These conditions may include dilution of samples, additional sample extract cleanup, automatic reinjection/reanalysis when certain QC criteria are not met, loss of sample through breakage or spillage, etc.

The analyst may identify the need for corrective action. The Laboratory Section Leader, in consultation with the staff, will approve the required corrective action to be implemented by the laboratory staff. The Laboratory QA Manager will ensure implementation and documentation of the corrective action. If the nonconformance causes project objectives not to be achieved, the **GEI** Project QA Officer will be notified. The **GEI** Project QA Officer will notify the **GEI** Program Manager, who in turn will contact all levels of project management for concurrence with the proposed corrective action.

These corrective actions are performed prior to release of the data from the laboratory. The corrective action will be documented in both the laboratory's corrective action files, and the narrative data report sent from the laboratory to the **GEI** Program Manager. If the corrective action does not rectify the situation, the laboratory will contact the **GEI** Program Manager, who will determine the action to be taken and inform the appropriate personnel.

If potential problems are not solved as an immediate corrective action, the contractor will apply formalized long-term corrective action if necessary.

Appendix C

Health and Safety Plan (provided under separate cover)

Appendix D

Resume of Lorie Mackinnon - Data Validator

LORIE MACKINNON
DATA VALIDATOR

EDUCATION B.A., Boston University, Chemistry, 1987

EXPERIENCE **Self-Employed Contractor, Data Validator.** Performing data validation in accordance with the United States Environmental Protection Agency (EPA) Region I and Region II, EPA National Functional Guidelines, and New Jersey Department of Environmental Protection (DEP) Guidelines for environmental consulting firms. Responsible for producing data validation reports and data spreadsheets.

Data Validator, GEI Consultants, Inc. Performing data validation in accordance with EPA Region I and Region II, EPA National Functional Guidelines, and New Jersey DEP Guidelines. Responsible for in-house review of all project data.

Inorganic Contract Laboratory Protocol (CLP) Coordinator. Responsible for CLP data management and data package review for the inorganic laboratory to ensure a high level of data quality.

Jacobs Engineering Group Inc., Performing data validation in accordance with Jacobs' modified Region I guidelines.

Quality Assurance Coordinator. Responsible for developing and overseeing the laboratory quality assurance and quality control practices to ensure that a high level of data quality is achieved. Responsible for the submission of performance evaluation samples from external regulating agencies and managing a program of internal performance evaluation audits for the Cambridge Division and subcontract laboratories. Acted as the primary contact for state and program-specific certification programs and, as such, was responsible for communicating all audit and PE sample results and corrective action responses.

Independent Consultant. Performed methods development and validation for EPA Method 218.6, Hexavalent Chromium Analysis by High Performance Liquid Chromatography, and EPA Method 610, Polynuclear Aromatic Hydrocarbon Analysis by High Performance Liquid Chromatography. Developed standard operating procedures for both methods, allowing NET to offer these analytical procedures as routine services.

Supervisor, Wet Chemistry Laboratory. Responsible for training and performance of all laboratory technicians, as well as troubleshooting and instrument maintenance. Duties also included the scheduling of inorganic work in house, and reviewing and reporting all analytical results. Responsible for the preparation, analysis, and reporting of cyanide under EPA CLP protocol.

Project Manager. Responsibilities included defining the scope of work with a variety of industrial, engineering and governmental clients, developing price quotations, outlining the required quality control/quality assurance, arranging sampling and analytical schedules with the laboratory director and managers, and monitoring the project to its completion, including data review and report production.

Lead Project Chemist. Performed method development, validation, and residue analysis for several pesticide registration studies. Analyses included the use of gas chromatography and high-performance liquid chromatography.

Associate Scientist. Performed inorganic analyses on environmental and industrial samples. Analytical skills included quantitation of analytes by inductively coupled argon emission spectroscopy and atomic absorption spectroscopy under EPA CLP protocols.

Appendix E

Soil Disposal Waste Manifest

NYG0662157

HAZARDOUS WASTE MANIFEST

P.O. Box 12820, Albany, New York 12212

Please type or print. Do not staple. (Rev. 3/97)

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA No.: NYD047660576 | Manifest Doc. No.: 00001

2. Page 1 of: 1 | Information within heavy bold line is not required by Federal Law.

3. Generator's Name and Mailing Address
NEW CARILLON DRY CLEANERS
327 MAIN STREET
HUNTINGTON, NY 11743-6914
4. Generator's Telephone Number: (631)261-9559

A. NYG0662157

B. Generator's ID: SAME

5. Transporter 1 (Company Name): Horwith Trucking Inc.
6. US EPA ID Number: PAD981671478

C. State Transporter's ID: AAL3762PA

D. Transporter's Telephone: 610 261-2220

7. Transporter 2 (Company Name)
8. US EPA ID Number

E. State Transporter's ID

F. Transporter's Telephone ( )

9. Designated Facility Name and Site Address
CWM CHEMICAL SERVICES, L.L.C.
1550 BALMER RD.
MODEL CITY, NY 14107
10. US EPA ID Number: NYD049836579

G. State Facility ID

H. Facility Telephone ( ): 716-754-8231

11. US DOT Description (Including Proper Shipping Name, Hazard Class and ID Number)	12. Containers Number	Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste No.
a. HAZARDOUS WASTE SOLID, N.O.S., 9, NA3077, III, (TETRACHLOROETHYLENE)	XX1	CM	XXX14	T	EPA F001 / STATE
b.					EPA / STATE
c.					EPA / STATE
d.					EPA / STATE

J. Additional Descriptions for Materials listed Above
a. VB4040-TETRACHLOROETHYLENE
c. METHYLENE CHLORIDE
b.
d.

K. Handling Codes for Wastes Listed Above
a. D
c.
b.
d.

15. Special Handling Instructions and Additional Information
CENTREC Emergency response number (800)424-9300 WMI COntact
QTY IS ESTIMATED
SR# 795637 4-20-06 5:45 AM

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations and state laws and regulations.
If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR if I am a small generator, I have made a good faith effort to minimize my waste and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name	Signature	Mo.	Day	Year
Richard Silva AS AGENT		04	18	06

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Mo.	Day	Year
William T Boatwright		04	18	06

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Mo.	Day	Year

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.

Printed/Typed Name	Signature	Mo.	Day	Year

GENERATOR

Response Center (800) 424-8802 and the NYS Department of Environmental Conservation (518) 457-7362

American Analytical Laboratories, LLC.

Date: *13-Feb-06*

CLIENT:	Coastal Environmental Group, Inc.	**Client Sample ID:**	Solid Waste
Lab Order:	0602017	**Tag Number:**	3756
Project:	Carrillian Cleaners Huntington, N.Y.	**Collection Date:**	2/1/2006
Lab ID:	0602017-01B **Date Received:** 2/1/2006	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
TCLP MERCURY		**SW1311/7471B**		**(SW1311)**		Analyst: **BK**
Mercury	U	0.0200		mg/L	1	2/9/2006
TCLP METALS		**SW1311/6010B**		**(SW1311)**		Analyst: **JP**
Arsenic	U	0.0500		mg/L	1	2/3/2006 4:15:42 PM
Barium	0.638	0.0500		mg/L	1	2/3/2006 4:15:42 PM
Cadmium	0.00746	0.0500	J	mg/L	1	2/3/2006 4:15:42 PM
Chromium	0.0557	0.0500		mg/L	1	2/3/2006 4:15:42 PM
Lead	0.774	0.0500		mg/L	1	2/3/2006 4:15:42 PM
Selenium	0.0171	0.0500	J	mg/L	1	2/3/2006 4:15:42 PM
Silver	0.0285	0.0500	J	mg/L	1	2/3/2006 4:15:42 PM
TCLP SEMIVOLATILES SW-846 8270		**SW8270D**		**(SW3510)**		Analyst: **RN**
2,4,5-Trichlorophenol	U	80		mg/L	2	2/9/2006 8:10:00 PM
2,4,6-Trichlorophenol	U	0.40		mg/L	2	2/9/2006 8:10:00 PM
2,4-Dinitrotoluene	U	0.026		mg/L	2	2/9/2006 8:10:00 PM
2-Methylphenol	U	40		mg/L	2	2/9/2006 8:10:00 PM
3+4-Methylphenol	U	80		mg/L	2	2/9/2006 8:10:00 PM
Hexachlorobenzene	U	0.026		mg/L	2	2/9/2006 8:10:00 PM
Hexachlorobutadiene	U	0.10		mg/L	2	2/9/2006 8:10:00 PM
Hexachloroethane	U	0.60		mg/L	2	2/9/2006 8:10:00 PM
Nitrobenzene	U	0.40		mg/L	2	2/9/2006 8:10:00 PM
Pentachlorophenol	U	20		mg/L	2	2/9/2006 8:10:00 PM
Pyridine	U	1.0		mg/L	2	2/9/2006 8:10:00 PM
TCLP VOLATILE ANALYSIS		**SW8260B**		**(SW1311)**		Analyst: **SB**
1,1-Dichloroethene	U	0.070		mg/L	1	2/3/2006 5:24:00 PM
1,2-Dichloroethane	U	0.050		mg/L	1	2/3/2006 5:24:00 PM
1,4-Dichlorobenzene	U	0.75		mg/L	1	2/3/2006 5:24:00 PM
2-Butanone	U	20		mg/L	1	2/3/2006 5:24:00 PM
Benzene	U	0.050		mg/L	1	2/3/2006 5:24:00 PM
Carbon tetrachloride	U	0.050		mg/L	1	2/3/2006 5:24:00 PM
Chlorobenzene	U	10		mg/L	1	2/3/2006 5:24:00 PM
Chloroform	U	0.60		mg/L	1	2/3/2006 5:24:00 PM
Tetrachloroethene	0.013	0.070	J	mg/L	1	2/3/2006 5:24:00 PM
Trichloroethene	U	0.050		mg/L	1	2/3/2006 5:24:00 PM
Vinyl chloride	U	0.020		mg/L	1	2/3/2006 5:24:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits	U	Indicates the compound was analyzed for but not detecte

American Analytical Laboratories, LLC.

Date: *13-Feb-06*

CLIENT:	Coastal Environmental Group, Inc.	**Client Sample ID:**	Solid Waste
Lab Order:	0602017	**Tag Number:**	3756
Project:	Carrillian Cleaners Huntington, N.Y.	**Collection Date:**	2/1/2006
Lab ID:	0602017-01A **Date Received:** 2/1/2006	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
trans-1,2-Dichloroethene	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
trans-1,3-Dichloropropene	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
Trichloroethene	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
Trichlorofluoromethane	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
Vinyl acetate	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
Vinyl chloride	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
IGNITABILITY/FLASHPOINT SW-846 1010		**SW1010**				Analyst: **WN**
Ignitability	>	140		°F	1	2/10/2006
CORROSIVITY		**SW9045C**				Analyst: **VP**
pH	7.40	0		pH Units	1	2/6/2006
REACTIVE CYANIDE		**SW7.3.3.2**				Analyst: **VP**
Reactive Cyanide	U	0.100		mg/Kg-dry	1	2/3/2006
REACTIVE SULFIDE		**SW7.3.4.2**				Analyst: **VP**
Reactive Sulfide	U	2.00		mg/Kg-dry	1	2/3/2006

Qualifiers:

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E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
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Lab ID:	0602017-01A **Date Received:** 2/1/2006	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
Bromochloromethane	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
Bromodichloromethane	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
Bromoform	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
Bromomethane	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
Carbon disulfide	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
Carbon tetrachloride	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
Chlorobenzene	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
Chlorodifluoromethane	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
Chloroethane	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
Chloroform	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
Chloromethane	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
cis-1,2-Dichloroethene	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
cis-1,3-Dichloropropene	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
Dibromochloromethane	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
Dibromomethane	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
Dichlorodifluoromethane	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
Diisopropyl ether	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
Ethanol	U	26		µg/Kg-dry	1	2/4/2006 8:52:00 AM
Ethyl acetate	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
Ethylbenzene	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
Freon-114	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
Hexachlorobutadiene	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
Isopropyl acetate	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
Isopropylbenzene	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
m,p-Xylene	U	10		µg/Kg-dry	1	2/4/2006 8:52:00 AM
Methyl tert-butyl ether	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
Methylene chloride	8.7	5.2	B	µg/Kg-dry	1	2/4/2006 8:52:00 AM
Naphthalene	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
n-Butyl acetate	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
n-Butylbenzene	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
n-Propyl acetate	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
n-Propylbenzene	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
o-Xylene	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
p-Diethylbenzene	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
p-Ethyltoluene	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
sec-Butylbenzene	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
Styrene	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
t-Butyl alcohol	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
tert-Butylbenzene	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
Tetrachloroethene	550	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
Toluene	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
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Project:	Carrillian Cleaners Huntington, N.Y.	**Collection Date:**	2/1/2006
Lab ID:	0602017-01A **Date Received:** 2/1/2006	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PERCENT MOISTURE		**D2216**				Analyst: **VP**
Percent Moisture	4.56	0		wt%	1	2/3/2006
VOLATILES SW-846 METHOD 8260		**SW8260B**				Analyst: **SB**
1,1,1,2-Tetrachloroethane	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
1,1,1-Trichloroethane	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
1,1,2,2-Tetrachloroethane	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
1,1,2-Trichloro-1,2,2-trifluoroethane	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
1,1,2-Trichloroethane	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
1,1-Dichloroethane	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
1,1-Dichloroethene	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
1,1-Dichloropropene	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
1,2,3-Trichlorobenzene	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
1,2,3-Trichloropropane	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
1,2,4,5-Tetramethylbenzene	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
1,2,4-Trichlorobenzene	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
1,2,4-Trimethylbenzene	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
1,2-Dibromo-3-chloropropane	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
1,2-Dibromoethane	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
1,2-Dichlorobenzene	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
1,2-Dichloroethane	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
1,2-Dichloropropane	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
1,3,5-Trimethylbenzene	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
1,3-Dichlorobenzene	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
1,3-dichloropropane	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
1,4-Dichlorobenzene	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
2,2-Dichloropropane	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
2-Butanone	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
2-Chloroethyl vinyl ether	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
2-Chlorotoluene	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
2-Hexanone	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
2-Propanol	U	52		µg/Kg-dry	1	2/4/2006 8:52:00 AM
4-Chlorotoluene	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
4-Isopropyltoluene	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
4-Methyl-2-pentanone	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
Acetone	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
Acrolein	U	26		µg/Kg-dry	1	2/4/2006 8:52:00 AM
Acrylonitrile	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
Benzene	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM
Bromobenzene	U	5.2		µg/Kg-dry	1	2/4/2006 8:52:00 AM

Qualifiers:

*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits	U	Indicates the compound was analyzed for but not detecte

AMERICAN ANALYTICAL LABORATORIES, LLC
56 TOLEDO STREET
FARMINGDALE, NEW YORK 11735
TELEPHONE: (631) 454-6100 FAX: (631) 454-8027

DATA REPORTING QUALIFIERS

For reporting results, the following "Results Qualifiers" are used:

Value	If the result is greater than or equal to the detection limit, report the value
U	Indicates the compound was analyzed for but was not detected. Report the minimum detection limit for the sample with the U, i.e. "10U". This is not necessarily the instrument detection limit attainable for this particular sample based on any concentration or dilution that may have been required.
J	Indicates an estimated value. The flag is used: (1) When estimating a concentration for a tentatively identified compound (library search hits, where a 1:1 response is assumed.) (2) When the mass spectral data indicated the identification, however the result was less than the specified detection limit greater than zero. If the detection limit was 10ug/L and a concentration of 3ug/L was calculated report as 3J. This flag is used when similar situations arise on any organic parameter i.e. Pesticide, PCBs and others.
B	Indicates the analyte was found in the blank as well as the sample report "10B".
E	Indicates the analytes concentration exceeds the calibrated range of the instrument for that specific analysis.
D	This flag identifies all compounds identified in an analysis at a secondary dilution factor.
P	This flag is used for Pesticide / PCB target analyte when there is >25% difference for detected concentrations between the two GC Columns. The higher of the two values is reported on Form I and flagged with a "P".
N	This flag indicates presumptive evidence of a compound. This is only used for tentatively identified compounds (TICs), where the identification is based on a mass spectral library search. It applies to all TIC results. For generic characterization of a TIC, such as chlorinated hydrocarbon, the flag is not used.
H	Indicates sample was received and/or analyzed outside of The method allowable holding time

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TAG # / COC 3756

NYSDOH 11418
CTDOH PH-0205
NJDEP NY050
PADEP 68-573

CHAIN OF CUSTODY / REQUEST FOR ANALYSIS DOCUMENT

CLIENT NAME/ADDRESS
Coastal Environmental Group Inc.
PO Box 170
Islip NY 11751

CONTACT: R. Silva

SAMPLER (SIGNATURE): Jose Garcia

SAMPLER NAME (PRINT): Jose Garcia

SAMPLE(S) SEALED: YES / (NO)

CORRECT CONTAINER(S): (YES) / NO

PROJECT LOCATION:
Carillon Cleaners Huntington NY

LABORATORY ID #	MATRIX	# CONTAINERS	SAMPLING DATE/ TIME	SAMPLE # - LOCATION	TCLP metals	TCLP volatiles	TCLP semi-volatiles	Flash pt	Corrosivity	Reactivity	Total volatiles	FOR METHANOL PRESERVED SAMPLES [VOLATILE VIAL #]
01A 01B 0602017-01		2	2/1/06 1215	Solid Waste	X	X	X	X	X	X	X	

ANALYSIS REQUIRED

COOLER TEMPERATURE:

MATRIX S=SOIL; L=LIQUID; SL=SLUDGE; A-AIR; W=WIPE; P=PAINT CHIPS; B=BULK MATERIAL
TYPE G=GRAB; C=COMPOSITE, SS=SPLIT SPOON

TURNAROUND REQUIRED: NORMAL (X) STAT ( ) BY / /

COMMENTS / INSTRUCTIONS

RELINQUISHED BY (SIGNATURE)	DATE 2/1/06 TIME 1500	PRINTED NAME	RECEIVED BY LAB (SIGNATURE)	DATE 2-1-06 TIME 3:00PM	PRINTED NAME
Jose Garcia			P. Masi		P. MASI
RELINQUISHED BY (SIGNATURE)	DATE TIME	PRINTED NAME	RECEIVED BY LAB (SIGNATURE)	DATE TIME	PRINTED NAME

WHITE-OFFICE / CANARY-LAB / PINK-SAMPLE CUSTODIAN / GOLDENROD-CLIENT

Generator Name: NEW CARILLON DRY CLEANERS Manifest Doc. No.: 00001

Profile Number: VB4040 State Manifest No: NY6066215 7

1. Is this waste a non-wastewater or wastewater? (See 40 CFR 268.2) Check ONE: Nonwastewater X Wastewater
2. Identify ALL USEPA hazardous waste codes that apply to this waste shipment, as defined by 40 CFR 261. For each waste code, identify the corresponding subcategory, or check NONE if the waste code has no subcategory. Spent solvent treatment standards are listed on the following page. If F039, multi-source leachate applies, those constituents must be listed and attached by the generator. If D001-D043 requires treatment of the characteristic and meet 268.48 standards, then the underlying hazardous constituent(s) present in the waste must be listed and attached.

REF #	3. US EPA HAZARDOUS WASTE CODE(S)	4. SUBCATEGORY ENTER THE SUBCATEGORY DESCRIPTION. IF NOT APPLICABLE, SIMPLY CHECK NONE		5. HOW MUST THE WASTE BE MANAGED? ENTER LETTER FROM BELOW
		DESCRIPTION	NONE	
1	F001		X	D
2				
3				
4				

To identify F039 or D001-D043, underlying hazardous constituent(s), use the "F039/Underlying Hazardous Constituent Form" provided (CWM-2004) and check here:
If no UHCs are present in the waste upon its initial generation check here: X
To list additional USEPA waste code(s) and subcategorie(s), use the supplemental sheet provided (CWM-2005-D) and check here:
Disposal facility monitors for all UHCs check here
If waste will be managed in a system regulated under the CWA, or a Class 1 injection well under the SDWA check here

HOW MUST THE WASTE BE MANAGED? In column 5 above, enter the letter (A, B1, B3, B4, B5, B6, C, D or E) below that describes how the waste must be managed to comply with the land disposal regulations (40 CFR 268.7). Please understand that if you enter the letter B1, B3, B4, B5, B6, or D you are making the appropriate certification as provided below. (States authorized by EPA to manage the LDR program may have regulatory citations different from the 40 CFR citations listed below. Where these regulatory citations differ, your certification will be deemed to refer to those state citations instead of the 40 CFR citations.

A. RESTRICTED WASTE REQUIRES TREATMENT
This waste must be treated to the applicable treatment standards set forth in 40 CFR 268.40.
For Hazardous Debris: "This hazardous debris is subject to the alternative treatment standards of 40 CFR 268.45."

B.1 RESTRICTED WASTE TREATED TO PERFORMANCE STANDARDS
"I certify under penalty of law that I have personally examined and am familiar with the treatment technology and operation of the treatment process used to support this certification. Based on my inquiry of those individuals immediately responsible for obtaining this information, I believe that the treatment process has been operated and maintained properly so as to comply with the treatment standards specified in 40 CFR 268.40 without impermissible dilution of the prohibited waste. I am aware there are significant penalties for submitting a false certification, including the possibility of fine and imprisonment."

B.3 GOOD FAITH ANALYTICAL CERTIFICATION FOR INCINERATED ORGANICS
"I certify under penalty of law that I have personally examined and am familiar with the treatment technology and operation of the treatment process used to support this certification. Based on my inquiry of those individuals immediately responsible for obtaining this information, I believe that the nonwastewater organic constituents have been treated by combustion in units as specified in 268.42 Table 1. I have been unable to detect the nonwastewater organic constituents despite having used best good faith efforts to analyze for such constituents. I am aware that there are significant penalties for submitting a false certification, including the possibility of fine and imprisonment."

B.4 DECHARACTERIZED WASTE REQUIRES TREATMENT FOR UNDERLYING HAZARDOUS CONSTITUENTS
"I certify under penalty of law that the waste has been treated in accordance with the requirements of 40 CFR 268.40 or 268.49, to remove the hazardous characteristic. This decharacterized waste contains underlying hazardous constituents that require further treatment to meet treatment standards. I am aware that there are significant penalties for submitting a false certification, including the possibility of fine and imprisonment."

B.6 RESTRICTED DEBRIS TREATED TO ALTERNATE PERFORMANCE STANDARDS
"I certify under penalty of law that I have personally examined and am familiar with the treatment technology and operation of the treatment process used to support this certification and believe that it has been maintained and operated properly so as to comply with treatment standards specified in 40 CFR 268.45 without impermissible dilution of the prohibited wastes. I am aware that there are significant penalties for submitting a false certification, including the possibility of fine and imprisonment."

C. RESTRICTED WASTE SUBJECT TO A VARIANCE
This waste is subject to a national capacity variance, a treatability variance, or a case-by-case extension. Enter the effective date of prohibition in column 5 above.
For Hazardous Debris: "This hazardous debris is subject to the alternative treatment standards of 40 CFR Part 268.45."

D. RESTRICTED WASTE CAN BE LAND DISPOSED WITHOUT FURTHER TREATMENT
"I certify under penalty of law I have personally examined and am familiar with the waste through analysis and testing or through knowledge of the waste to support this certification that the waste complies with the treatment standards specified in 40 CFR Part 268 Subpart D. I believe that the information I submitted is true, accurate and complete. I am aware that there are significant penalties for submitting a false certification, including the possibility of fine and imprisonment."

E. WASTE IS NOT CURRENTLY SUBJECT TO PART 268 RESTRICTIONS
This waste is a newly identified waste that is not currently subject to any 40 CFR Part 268 restrictions.

I hereby certify that all information submitted in this and all associated documents is complete and accurate, to the best of my knowledge and information.

Signature DEC SA AS AGENT Title _____ Date 04/18/06

SOLVENT

If the waste identified on the first page of this form is described by any of the following USEPA hazardous waste codes: F001, F002, F003, F004, F005, and all solvent constituents will not be monitored by the treater, then each constituent MUST be identified below by checking the appropriate box, and this page must accompany the shipment, along with the previous page of this form. If the waste code F039 describes this waste, then the corresponding list of constituents must be attached. If D001-D043 require treatment to 268.48 standards, then the underlying hazardous constituent(s) must also be attached.

SOLVENT WASTE TREATMENT STANDARDS[2]

F001 through F005 spent solvent constituents and their associated USEPA hazardous waste code(s).	Treatment Standard[1]		F001 through F005 spent solvent constituents and their associated USEPA hazardous waste code(s).	Treatment Standard[1]	
	Wastewaters	Nonwastewaters		Wastewaters	Nonwastewaters

[1] All spent solvent treatment standards are measured through a total waste analysis (TCA), unless otherwise noted. Wastewater units are mg/l, nonwastewater are mg/kg.

[2] For contaminated soils using the alternative soil treatment standards, the treatment standards for F001-F005 spent solvents must be a 90% reduction of constituents or less than 10 x the standards listed.

SUBCATEGORY REFERENCE

D001:
A. Ignitable characteristic wastes, except for the 40 CFR 261.21(a)(1) High TOC subcategory.
B. High TOC Ignitable characteristic liquids subcategory based on 40 CFR 261.21(a)(1) - Greater than or equal to 10% total organic carbon.

Appendix F

GEI SVE Pilot Test Procedures

Soil Vapor Extraction (SVE) Test Procedure

Objective

The objective of this procedure is to provide guidance when conducting a soil vapor extraction pilot test. Below is the soil vapor extraction pilot test procedure.

This completed worksheet provides data collected during a soil vapor extraction (SVE) pilot test. Site specific conditions may prohibit gathering all of the data on this worksheet.

The following attachments will be used to tabulate, summarize, and present all data collected during the pilot test.

FIGURES

- Attach a site map showing locations of extraction and monitoring points.
- Attach geologic cross-sections of the site indicating major geologic features, distribution of contamination, and test extraction and monitoring points.
- Attach construction diagrams of the test extraction and monitoring points.

TABLES

- Complete the attached tables provided. Attach additional sheets if necessary. This data will be used to plot the graphs identified below.

PLOTTING DATA

The following graphs will aid in optimizing system design and will aid in evaluating the potential effectiveness and efficiency of the proposed design.

- Attach a graph of normalized vacuum (%) at the monitoring points vs. distance from the extraction point, plotted for each step in air flow rate. Normalized vacuum is defined as:

$$\text{Normalized vacuum} = \frac{\text{monitoring point vacuum}}{\text{extraction point vacuum}}$$

Plot this graph on semi-log paper using the log scale for the normalized vacuum data.

- Attach a graph of vacuum at extraction point (in. H2O), plotted or x-axis vs. flow rate (standard cubic feet/minute (SCFM), plotted on y-axis for each step conducted.

- Attach a graph of photoionization detector (PID) readings at the extraction point vs. time for each step conducted.

Procedure

The SVE pilot test may include, but is not limited to the following list of information to be collected.

1. Conduct the SVE pilot test as a step test. Increase the air flow rate in a series of steps to determine the most efficient design parameters. Conduct a minimum of three steps for each test. The duration of each test depends on the time it takes for the measured parameters at the monitoring points to reach equilibrium.

2. Measure vacuum and air flow rates at 5-10 minute intervals at the early part of the test and at each new step. All other measurements may be collected at greater time intervals based on site-specific conditions.

3. Conduct sampling at the vapor extraction point from a sampling port located between the well head and the blower.

4. Collect gas samples for field screening at each monitoring point.

    - Sampling point between the well hand and blower.
    - Sampling point between the blower and the first carbon.
    - Sampling point between the first carbon and second carbon.
    - Sampling point at the end of the second carbon.

5. Conduct field screening for contaminants of concern (COCs) with a PID.

6. During the pilot test collect two laboratory samples for each flow rate step. One from prior to the first carbon and the second from the exhaust. The samples should be collected and analyzed for COCs using U.S. Environmental Protection Agency (EPA) Method 15.

7. Review the step data to perform a constant rate test as the optimum well head flow and vacuum.

8. Conduct a constant rate test using flow and vacuum selected.

Follow steps 2 through 7. At the beginning and end of constant rate test, collect two laboratory samples at sampling locations discussioned in step 7.

TABLE 1: MONITORING POINT DATA

Monitoring point #
(Complete one table for each monitoring point)

Date:

Monitoring points may be monitoring wells or specially installed soil vapor monitoring points.

Static Data

Screened interval (feet) _____ to _____
Distance from extraction point (feet) _____
Static water level (to 0.01 feet) _____ feet
Static Vacuum (inches H_2O) _____ inches H_2O

Test Data

Time test started:

TIME	VACUUM (in H_2O)	WATER LEVEL (to 0.01 ft.)

Attach additional sheets if necessary

TABLE 2: VAPOR EXTRACTION POINT DATA

Vapor extraction point (prior at wall head) #

Static Data

Screened interval (feet) _____ to_____
Static water level (to 0.01 feet) _____
Diameter of exhaust pipe _____ (feet)
Blower Flow Rate _____ SCFM
Blower Vacuum _____ inch H_2O

Test data

Time test started:

Time	Velocity (feet permanent)	Air Flow Rate (Q)[1] (SCFM)	Vacuum (in H_2O)	Water Level (to 0.01 ft.)	PID (ppm)	Temp. (^oC)

Attach additional sheets if necessary

Precautions

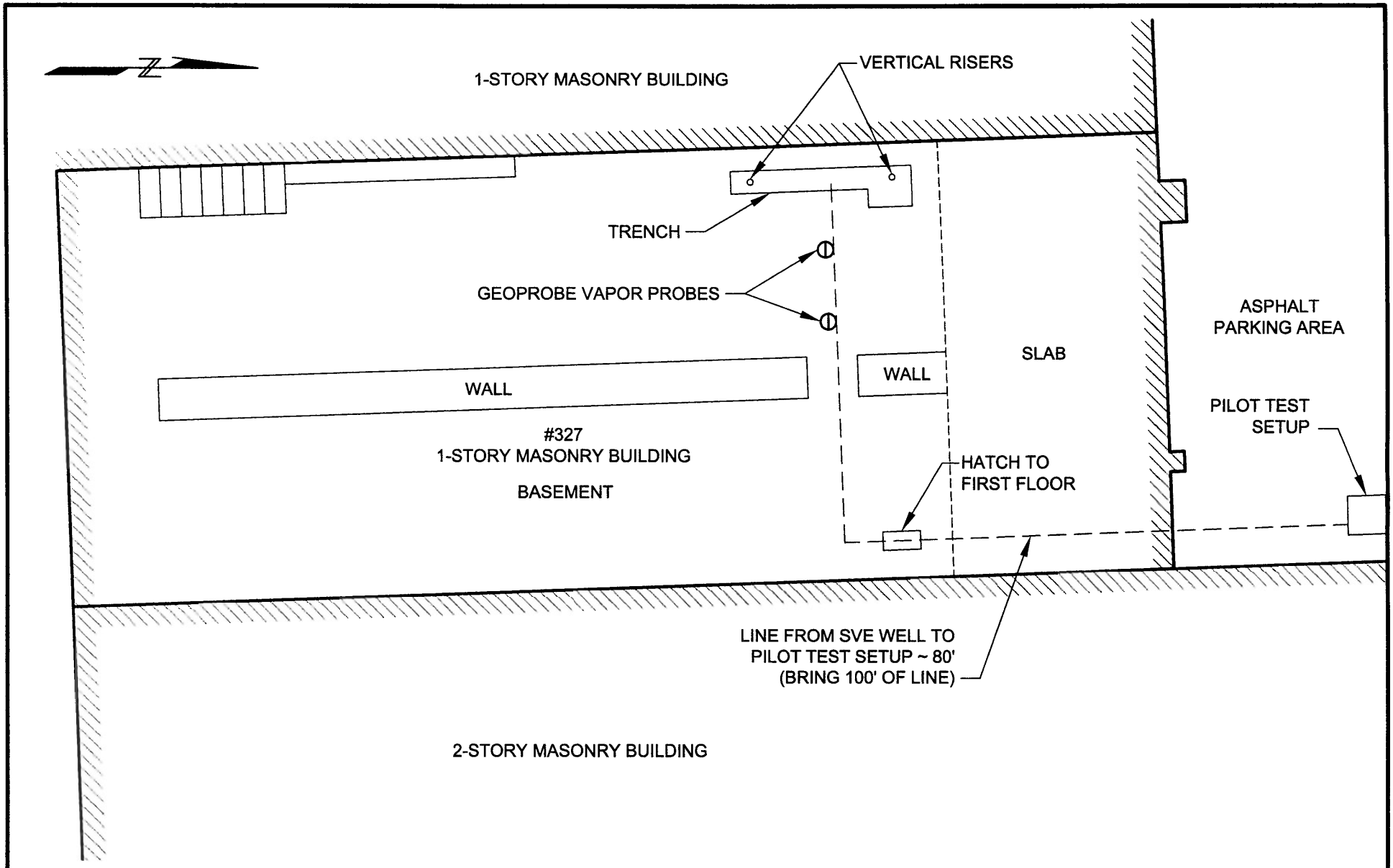
References

1. Petroleum Remediation Program - Minnesota Pollution Control Agency, http://www.pca.state.mn.us/programs/lust_p.html, Soil Venting Pilot Test Worksheet Guidance Document 4-12

[1] Air flow rate will be computed by multiplying the velocity by diameter of exhaust pipe. Where Q = VA; where A = (PI * D^2)/4, where D is the diameter of the exhaust or well head in feet.

TABLE 3: PID FIELD SCREENING FORM

Time	Before Carbon (ppm)	Between Carbon (ppm)	After Carbon (ppm)	Analytical Sample Collection	
				Sample ID	Location



CARILLON CLEANERS
327 MAIN STREET
HUNTINGTON, NEW YORK

CARILLON CLEANERS

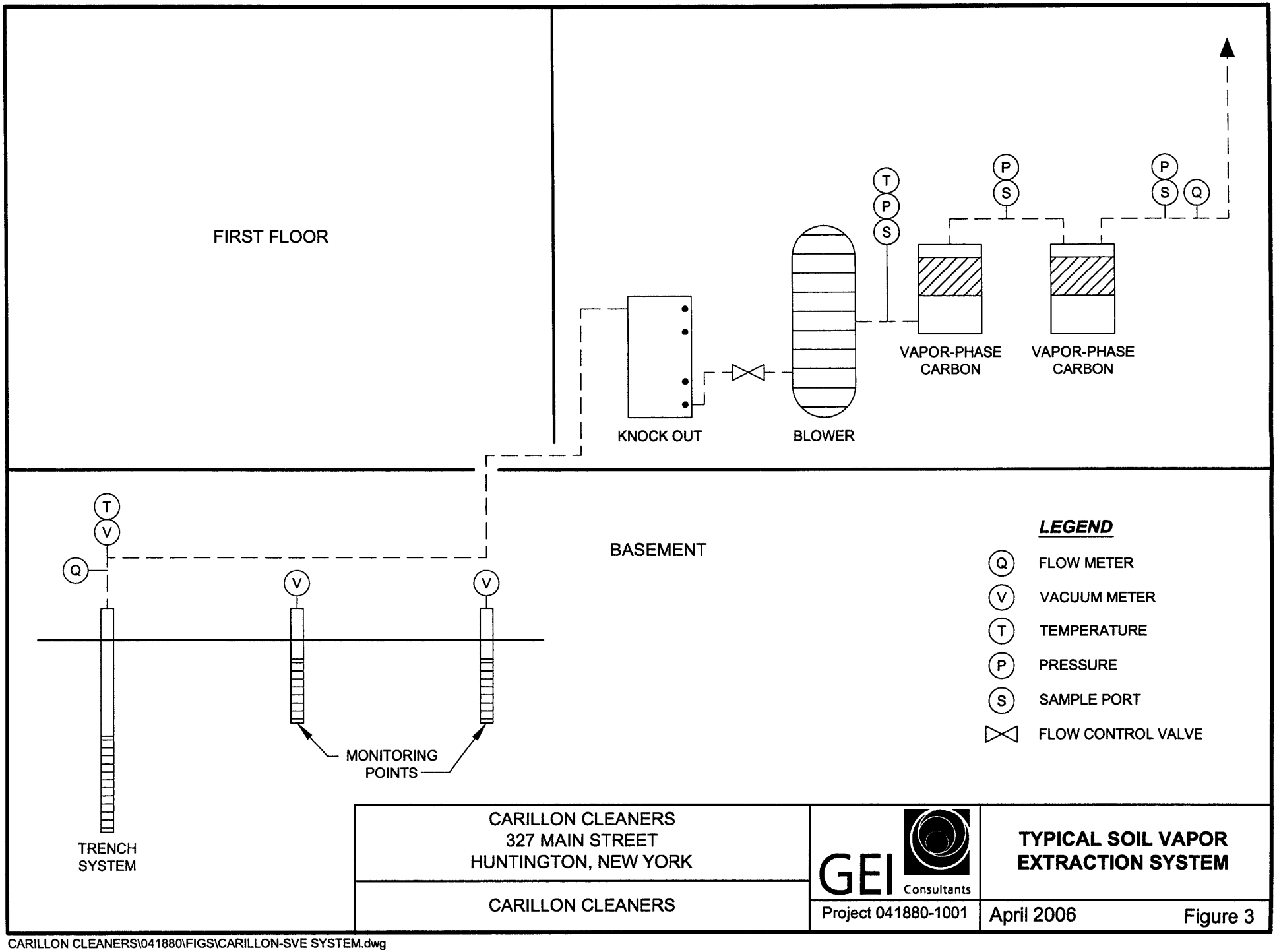
GEI Consultants

SOIL VAPOR EXTRACTION PILOT TEST SETUP

Project 041880-1001 | April 2006 | Figure 2

NOTE: NOT TO SCALE

CARILLON CLEANERS\041880\FIGS\CARILLON-SVE SYSTEM.dwg



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HUNTINGTON, NEW YORK

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TYPICAL SOIL VAPOR EXTRACTION SYSTEM

April 2006 Figure 3

CARILLON CLEANERS\041880\FIGS\CARILLON-SVE SYSTEM.dwg

Appendix G

SVE Pilot Test Results

Table 1
Carillon Cleaners
327 Main Street, Huntington, NY
Soil Vapor Extraction Pilot Test
First Step Test

Date: 4/17/06
Barometric Pressure: 29.76 in Hg
Outside Temp: 50°F (10°C)

Well Head Data
Diameter of Well Head pipe: 4 (inches)

Time	Velocity FT/min	Actual Air Flow Rate (Q) (CFM)	Standard Air Flow Rate (Q) (CFM)	Well Head Vacuum (in H_2O)	Blower Vacuum (in H_2O)	PID (ppm)	Exhaust Temperature (°F)	Well Head Temperature (°F)	MP-1 Vacuum (in H_2O)	MP-2 Vacuum (in H_2O)	MP-3 Vacuum (in H_2O)
9:15	450	39.29	40.20	1.15	4	>500	80	58	0.97	0.87	0.37
9:25	500	43.65	44.66	1.00	4	>500	80	58	0.93	0.86	0.40
9:35	500	43.65	44.66	1.06	4	>500	80	58	0.91	0.86	0.42
9:40	600	52.38	53.59	1.03	4	>500	80	58	0.90	0.85	0.40
9:50	600	52.38	53.59	1.06	4	>500	80	58	0.92	0.82	0.35
10:05	550	48.02	49.13	1.25	4	>500	80	58	0.95	0.80	0.40

Table 2
Carillon Cleaners
327 Main Street, Huntington, NY
Soil Vapor Extraction Pilot Test
Second Step Test

Date: 4/17/06
Barometric Pressure: 29.76 in Hg
Outside Temp: 53°F (11.7°C)

Well Head Data
Diameter of Well Head pipe: 4 (inches)

Time	Velocity FT/min	Actual Air Flow Rate (Q) (CFM)	Standard Air Flow Rate (Q) (CFM)	Well Head Vacuum (in H_2O)	Blower Vacuum (in H_2O)	PID (ppm)	Exhaust Temperature (°F)	Well Head Temperature (°F)	MP-1 Vacuum (in H_2O)	MP-2 Vacuum (in H_2O)	MP-3 Vacuum (in H_2O)
10:15	1200	104.76	107.19	3.40	18"	>9999	80	58	2.05	1.93	0.91
10:25	1200	104.76	107.19	3.35	18"	>9999	80	58	2.05	1.86	0.86
10:40	1100	96.03	98.25	3.29	18"	288	80	58	2.04	1.84	0.85
11:00	1100	96.03	98.25	3.26	18"	269	80	58	1.98	1.80	0.83
11:15	1100	96.03	98.25	3.22	18"	242	80	58	1.96	1.76	0.81

Table 3
Carillon Cleaners
327 Main Street, Huntington, NY
Soil Vapor Extraction Pilot Test
Third Step Test

Date: 4/17/06
Barometric Pressure: 29.76 (in Hg)
Outside Temp: 55°F (12.8°C)

Well Head Data
Diameter of Well Head pipe: 4 (inches)

Time	Velocity FT/min	Actual Air Flow Rate (Q) (CFM)	Standard Air Flow Rate (Q) (CFM)	Well Head Vacuum (in H_2O)	Blower Vacuum (in H_2O)	PID (ppm)	Exhaust Temperature (°F)	Well Head Temperature (°F)	MP-1 Vacuum (in H_2O)	MP-2 Vacuum (in H_2O)	MP-3 Vacuum (in H_2O)
11:20	1700	148.41	151.85	7.50	NC	223	80	58	3.84	3.53	1.65
11:40	1750	152.775	156.31	7.47	NC	199	80	58	3.84	3.53	1.61
11:55	1750	152.775	156.31	7.47	NC	151	80	58	3.78	3.57	1.57

Table 4
Carillon Cleaners
327 Main Street, Huntington, NY
Soil Vapor Extraction Pilot Test
Fourth Step Test

Date: 4/17/06
Barometric Pressure: 29.75 inch Hg
Outside Temp: 57°F (13.9°C)

Well Head Data
Diameter of Well Head pipe: 4 (inches)

Time	Velocity FT/min	Actual Air Flow Rate (Q) (CFM)	Standard Air Flow Rate (Q) (CFM)	Well Head Vacuum (in H_2O)	Blower Vacuum (in H_2O)	PID (ppm)	Exhaust Temperature (°F)	Well Head Temperature (°F)	MP-1 Vacuum (in H_2O)	MP-2 Vacuum (in H_2O)	MP-3 Vacuum (in H_2O)
12:05	2300	200.79	205.44	11.20	72	151	80	58	5.20	4.83	2.20
12:20	2200	192.06	196.51	11.16	72	120	80	58	5.16	4.71	2.12

Table 5
Carillon Cleaners
327 Main Street, Huntington, NY
Soil Vapor Extraction Pilot Test
Constant Rate Test

Date: 4/17/06
Barometric Pressure: 29.72
Blower Velocity: 4500 FT/min
Outside Temp: 60°F (15.5°C)

Static Data

Diameter of exhaust pipe: 2 inches
Actual Blower Flow Rate: 98.16 CFM
Diameter of Well Head: 4 inches

Time	Velocity (FT/min)	Actual Air Flow Rate (Q) (CFM)	Standard Air Flow Rate (Q) (CFM)	Well Head Vacuum (in H_2O)	Blower Vacuum (in H_2O)	PID (ppm)	Exhaust Temperature (°F)	Well Head Temperature (°F)	MP-1 Vacuum (in H_2O)	MP-2 Vacuum (in H_2O)	MP-3 Vacuum (in H_2O)
12:35	1250	109.125	111.65	4.10	20"	98.3	80	58	2.30	2.00	0.90
12:55	1250	109.125	111.65	4.02	20"	96.4	80	58	2.23	2.01	0.93
13:00	1250	109.125	111.65		20"	96.3	80	58			
13:30	1250	109.125	111.65	4.00	20"	87.0	80	58	2.15	1.96	0.89
14:05	1250	109.125	111.65	4.00	20"	77.8	80	58	2.12	1.89	0.88
14:30	1250	109.125	111.65	4.00	20"	74.4	80	58	2.08	1.88	0.86
15:00	1250	109.125	111.65	4.01	20"	67.9	80	58	2.06	1.83	0.84
15:30	1250	109.125	111.65	4.02	20"	63.8	80	58	2.04	1.81	0.83

Table 6
Carillon Cleaners
327 Main Street, Huntington, NY

Soil Vapor Extraction Pilot Test PID Readings

Date: 4/17/06

Time	Velocity (FT/min)	Actual Air Flow Rate (Q) (CFM)	Standard Air Flow Rate (Q) (CFM)	Before Carbon Sample Location	After Carbon Sample Location	Before Carbon Sample results (ppmv)	Before Carbon Sample results (ug/M3)	After Carbon Sample results (ppmv)	After Carbon Sample results (ug/M3)	Before Carbon PID (ppm)	Between Carbon PID (ppm)	After Carbon PID (ppm)
9:15	450	39.29	45.26	BC-1		770	5200000			>500	0	0
9:25	500	43.65	50.29							>500	0	0
9:35	500	43.65	50.29							>500	0	0
9:40	600	52.38	60.35							>500	0	0
9:50	600	52.38	60.35							>500	0	0
10:05	550	48.02	55.32	BC-2		620	4200000			>500	0	0
10:15	1200	104.76	120.70							>500	0	0
10:25	1200	104.76	120.70							>500	0	0
10:40	1100	96.03	110.64	BC-3		320	2200000			288	0	0
11:00	1100	96.03	110.64							269	0	0
11:15	1100	96.03	110.64							242	0	0
11:20	1700	148.41	170.99							223	0.1	0
11:40	1750	152.775	176.02	BC-4		180	1200000			199	0.1	0
11:55	1750	152.775	176.02							151	0	0
12:05	2300	200.79	231.35							151	0	0
12:20	2200	192.06	221.29	BC-5		120	780000			120	0	0
12:35	1250	109.125	125.73							98.3	0	0
12:55	1250	109.125	125.73							96.4	0	0
13:00	1250	109.125	125.73	BC-6		110	730000			96.3	0	0
13:30	1250	109.125	125.73							87.0	0	0
14:05	1250	109.125	125.73							77.8	0	0
14:30	1250	109.125	125.73							74.4	0	0
15:00	1250	109.125	125.73							67.9	0	0
15:30	1250	109.125	125.73	BC-7	AC-1	49	340000	0.027	180	63.8	0	0
15:30	1250	109.125	125.73	BC-7 Dup		34	230000					

Vacuum versus Time

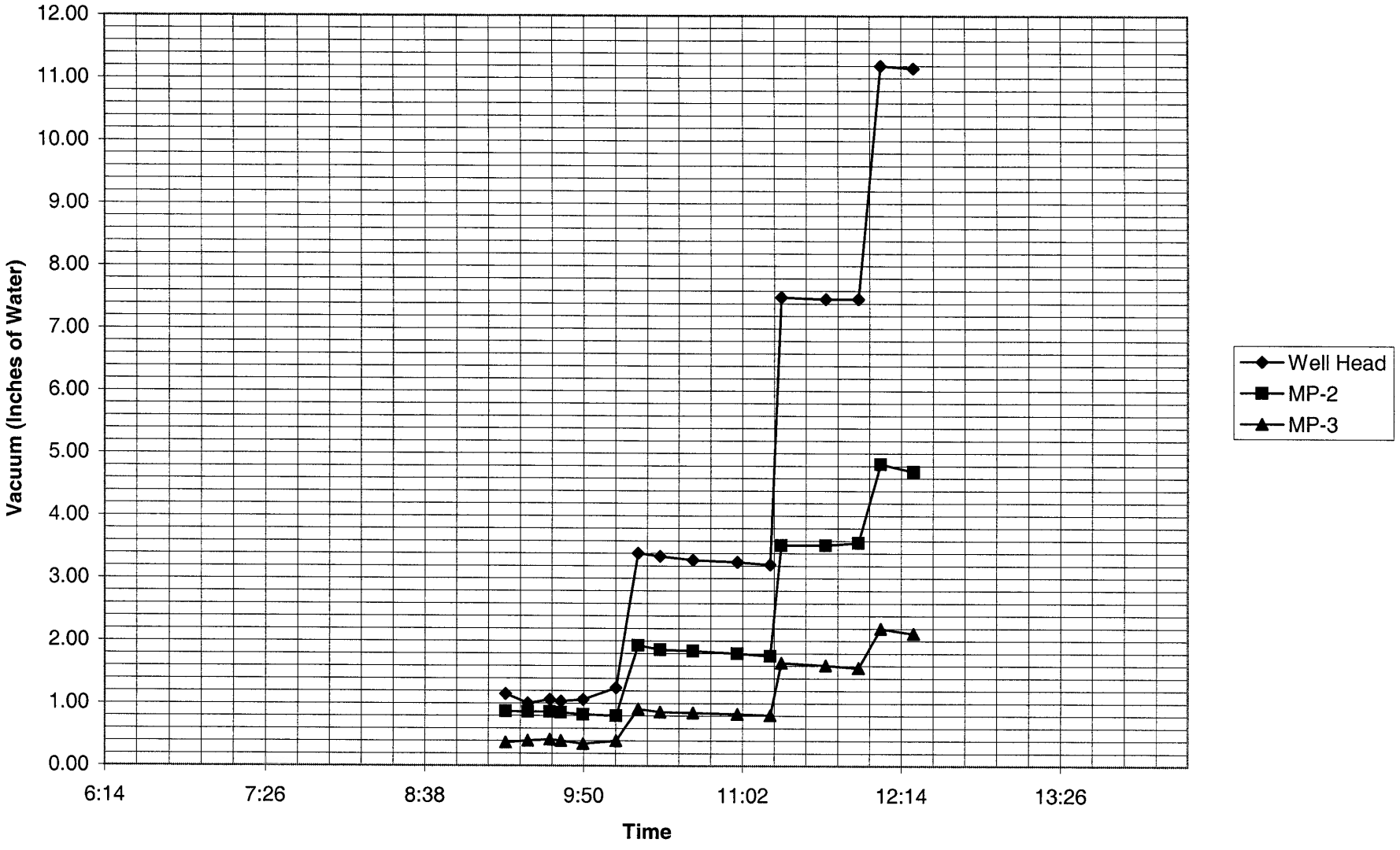


Table 6
Carillon Cleaners
327 Main Street, Huntington, NY
Soil Vapor Extraction Pilot Test
Summary of Results

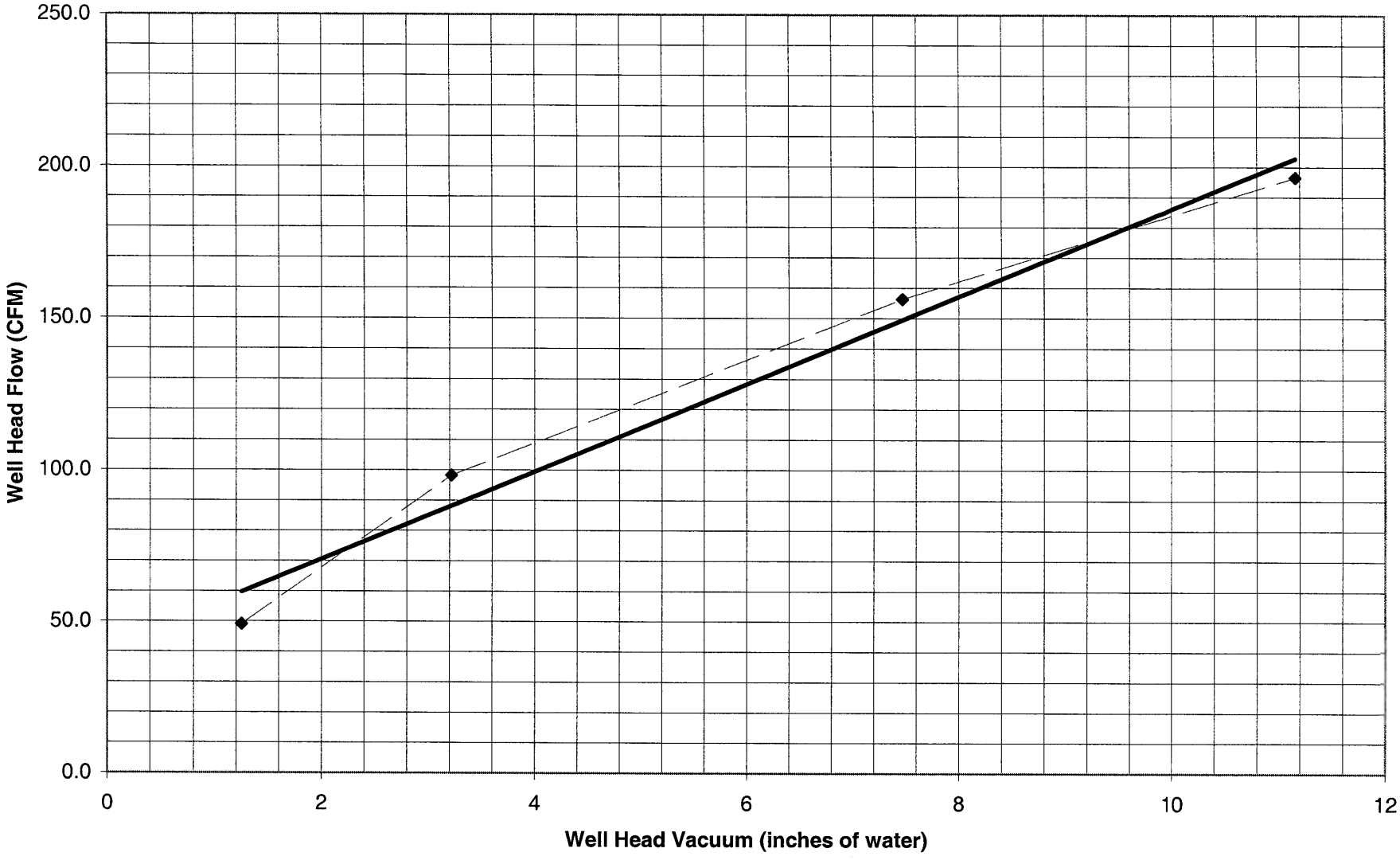
Standard Well Head Flow (SCFM)	Actual Vacuum (in H_2O)
49.1	1.25
98.3	3.22
156.3	7.47
196.5	11.16

Well ID	Radial Distance (feet)	Vaccum (in H_2O)					Normalized Vacuum Monitoring Point / Well Head				
		Step 1	Step 2	Step 3	Step 4	Constat Rate	Step 1	Step 2	Step 3	Step 4	Constant Rate
Well Head	0	1.25	3.22	7.47	11.16	4.02	1	1	1	1	1
MP-2	2.6	0.8	1.76	3.57	4.71	1.81	0.64	0.546584	0.477912	0.422043	0.450249
MP-3	8.3	0.4	0.81	1.57	2.12	0.83	0.32	0.251553	0.210174	0.189964	0.206468

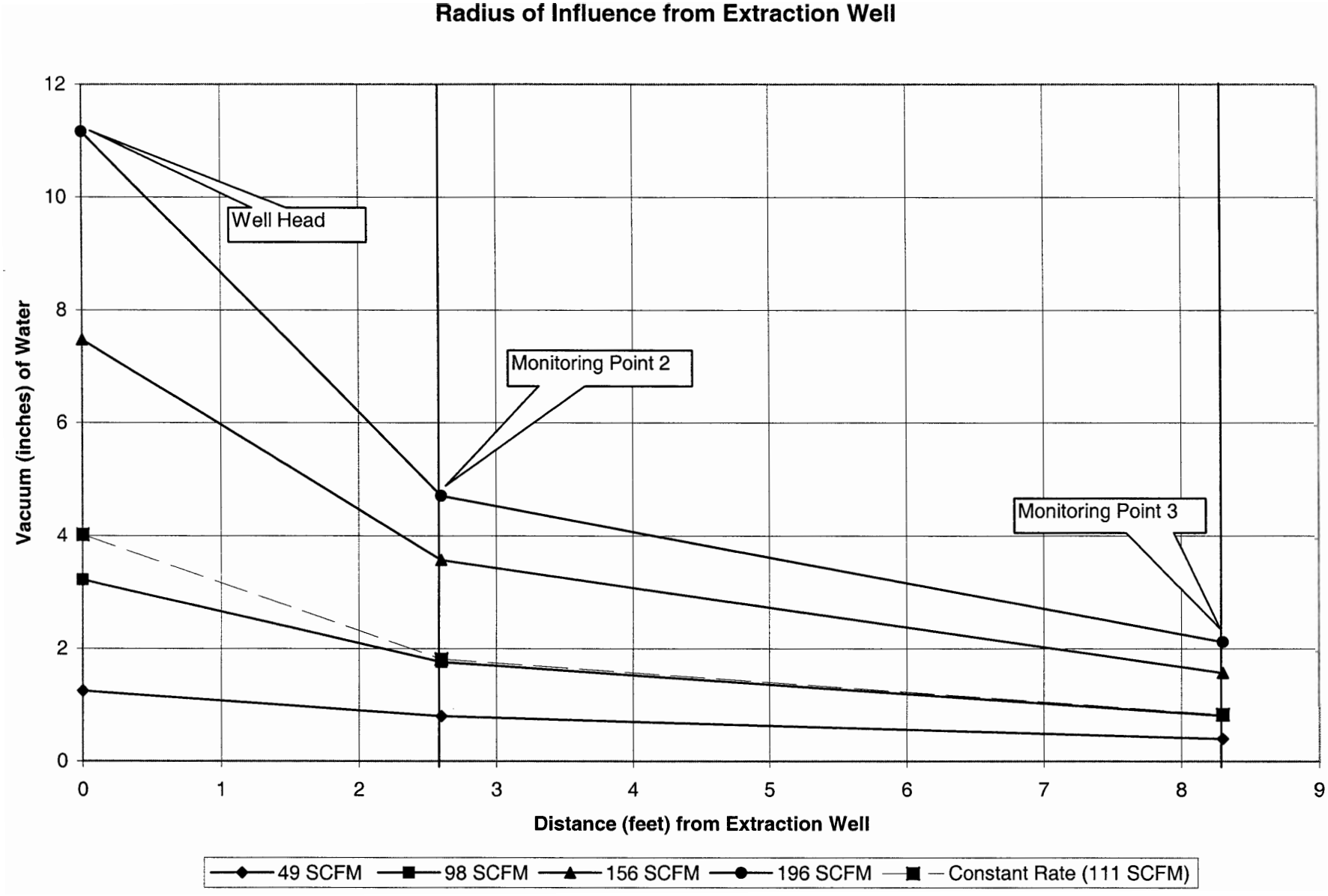
* Note: Values taken at end of each step

Time	Well Head Vaccuum	MP-2 Vaccuum	MP-3 Vaccuum
9:15	1.15	0.87	0.37
9:25	1.00	0.86	0.40
9:35	1.06	0.86	0.42
9:40	1.03	0.85	0.40
9:50	1.06	0.82	0.35
10:05	1.25	0.80	0.40
10:15	3.40	1.93	0.91
10:25	3.35	1.86	0.86
10:40	3.29	1.84	0.85
11:00	3.26	1.80	0.83
11:15	3.22	1.76	0.81
11:20	7.50	3.53	1.65
11:40	7.47	3.53	1.61
11:55	7.47	3.57	1.57
12:05	11.20	4.83	2.20
12:20	11.16	4.71	2.12

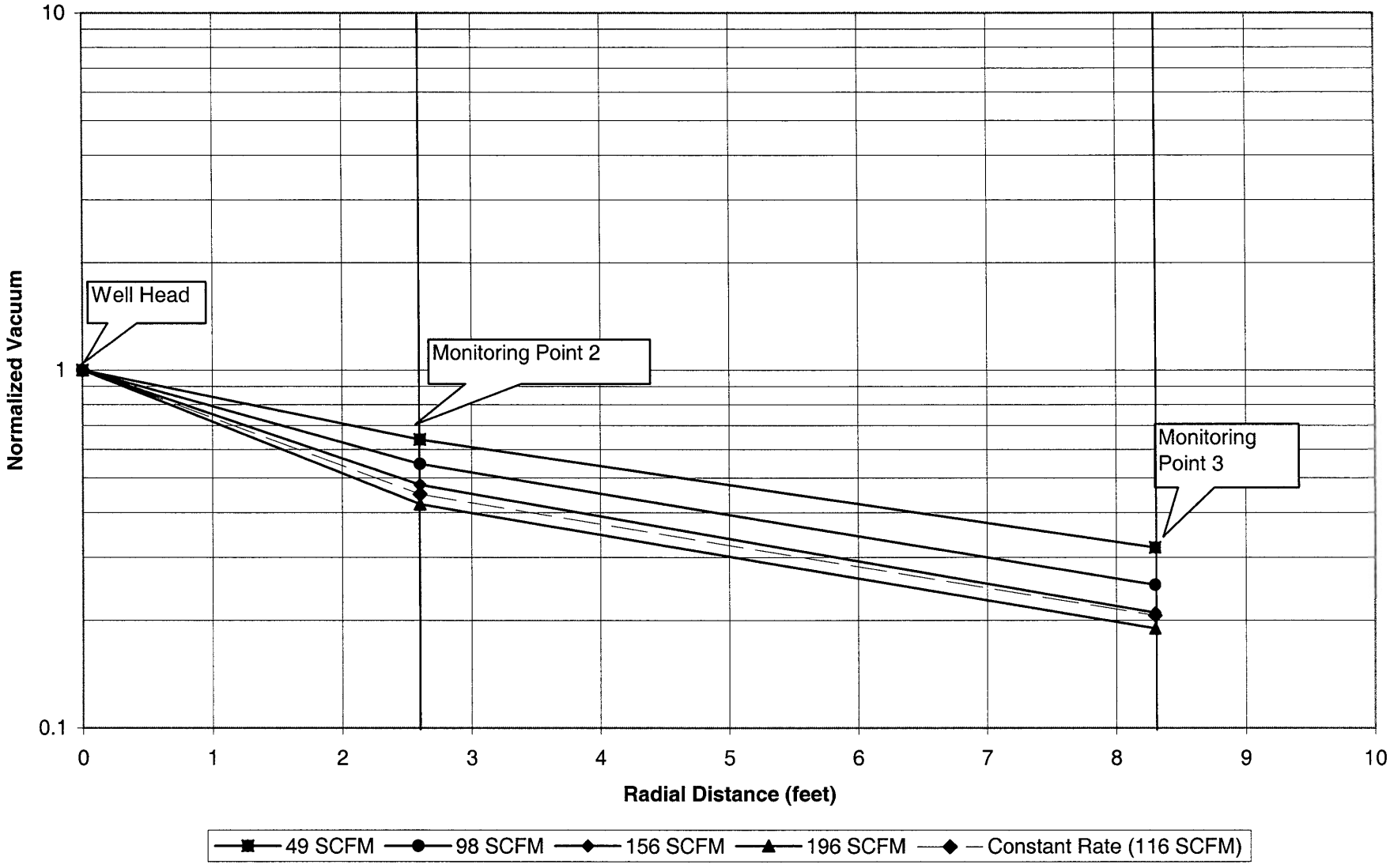
Flow versus Vacuum at Extraction Well



Radius of Influence from Extraction Well



Normalized Vacuum Test Plot



Appendix H

Soil Vapor (SUMMA®) Laboratory Analytical Results

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Air Toxics Ltd. Introduces the Electronic Report

Thank you for choosing Air Toxics Ltd. To better serve our customers, we are providing your report by e-mail. This document is provided in Portable Document Format which can be viewed with Acrobat Reader by Adobe.

This electronic report includes the following:

- Work order Summary;
- Laboratory Narrative;
- Results; and
- Chain of Custody (copy).

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 95630

(916) 985-1000 .FAX (916) 985-1020
Hours 8:00 A.M to 6:00 P.M. Pacific

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

WORK ORDER #: 0604514

Work Order Summary

CLIENT:	Ms. Karen Swartz GEI Consultants, Inc. 455 Winding Brook Dr. Suite 201 Glastonbury, CT 06033	**BILL TO:**	Ms. Karen Swartz GEI Consultants, Inc. 455 Winding Brook Dr. Suite 201 Glastonbury, CT 06033
PHONE:	860-368-5300	**P.O. #**	
FAX:	860-368-5307	**PROJECT #**	041880-1-1001 Carillon Cleaners
DATE RECEIVED:	04/25/2006	**CONTACT:**	Kelly Buettner
DATE COMPLETED:	05/08/2006		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.
01A	BC-1	Modified TO-14A	0.0 "Hg
01AA	BC-1 Duplicate	Modified TO-14A	0.0 "Hg
02A	BC-2	Modified TO-14A	0.6 psi
03A	BC-3	Modified TO-14A	0.4 psi
04A	BC-4	Modified TO-14A	0.8 psi
05A	BC-5	Modified TO-14A	0.2 psi
06A	BC-6	Modified TO-14A	0.4 psi
07A	BC-7	Modified TO-14A	0.4 psi
08A	AC-1	Modified TO-14A	0.0 "Hg
09A(cancelled)	TRIP	Modified TO-14A	17.5 "Hg
10A	XXXX	Modified TO-14A	0.0 "Hg
11A	Lab Blank	Modified TO-14A	NA
12A	CCV	Modified TO-14A	NA
13A	LCS	Modified TO-14A	NA

CERTIFIED BY: Linda A. Frumarx DATE: 05/10/06

Laboratory Director

Certfication numbers: CA NELAP - 02110CA, LA NELAP/LELAP- AI 30763, NJ NELAP - CA004
NY NELAP - 11291, UT NELAP - 9166389892
Name of Accrediting Agency: NELAP/Florida Department of Health, Scope of Application: Clean Air Act,
Accreditation number: E87680, Effective date: 07/01/05, Expiration date: 06/30/06
Air Toxics Ltd. certifies that the test results contained in this report meet all requirements of the NELAC standards

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 95630
(916) 985-1000 . (800) 985-5955 . FAX (916) 985-1020

LABORATORY NARRATIVE
Modified TO-14A
GEI Consultants, Inc.
Workorder# 0604514

Seven 1 Liter Summa Canister, One 1 Liter Summa Canister (100% Certified), and Two 1 Liter Silonite Canister (100% Certified) samples were received on April 25, 2006. The laboratory performed analysis via modified EPA Method TO-14A using GC/MS in the full scan mode. The method involves concentrating up to 0.2 liters of air. The concentrated aliquot is then flash vaporized and swept through a water management system to remove water vapor. Following dehumidification, the sample passes directly into the GC/MS for analysis.

Method modifications taken to run these samples are summarized in the below table. Specific project requirements may over-ride the ATL modifications.

Requirement	*TO-14A*	*ATL Modifications*
Daily CCV	+- 30% Difference	</= 30% Difference with two allowed out up to </=40%.; flag and narrate outliers
Initial Calibration criteria	RSD<30%	RSD</=30%, two compounds allowed up to 40%
BFB absolute abundance criteria	Within 10% of that from previous day	CCV internal standard area counts are compared to ICAL, corrective action for > 40% D
Blank acceptance criteria	<0.20 ppbv	<Reporting Limit
Moisture control	Nafion Dryer	Multisorbent trap
Sample collection media	Summa canister	ATL recommends use of summa canisters to insure data defensibility, but will report results from Tedlar bags at client request

Receiving Notes

The Chain of Custody (COC) information for sample TRIP did not match the entry on the sample tag with regard to sample identification. The discrepancy was noted in the Sample Receipt Confirmation email/fax and the information on the COC was used to process and report the sample.

The Chain of Custody was missing method information. ATL proceeded with the analysis as per the original contract or verbal agreement.

Sample TRIP was cancelled per client's request.

Analytical Notes

The reported LCS for each daily batch has been derived from more than one analytical file.

Definition of Data Qualifying Flags

Eight qualifiers may have been used on the data analysis sheets and indicates as follows:

B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).

J - Estimated value.
E - Exceeds instrument calibration range.
S - Saturated peak.
Q - Exceeds quality control limits.
U - Compound analyzed for but not detected above the reporting limit.
UJ- Non-detected compound associated with low bias in the CCV
N - The identification is based on presumptive evidence.

File extensions may have been used on the data analysis sheets and indicates as follows:
a-File was requantified
b-File was quantified by a second column and detector
r1-File was requantified for the purpose of reissue

Summary of Detected Compounds
MODIFIED EPA METHOD TO-14A GC/MS FULL SCAN

Client Sample ID: BC-1

Lab ID#: 0604514-01A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Tetrachloroethene	2000	770000	14000	5200000

Client Sample ID: BC-1 Duplicate

Lab ID#: 0604514-01AA

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Tetrachloroethene	2000	840000 E	14000	5700000 E

Client Sample ID: BC-2

Lab ID#: 0604514-02A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Tetrachloroethene	1900	620000	13000	4200000

Client Sample ID: BC-3

Lab ID#: 0604514-03A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Tetrachloroethene	980	320000	6700	2200000

Client Sample ID: BC-4

Lab ID#: 0604514-04A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Tetrachloroethene	640	180000	4300	1200000

Client Sample ID: BC-5

Lab ID#: 0604514-05A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Tetrachloroethene	400	120000	2700	780000

Summary of Detected Compounds
MODIFIED EPA METHOD TO-14A GC/MS FULL SCAN

Client Sample ID: BC-6

Lab ID#: 0604514-06A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Tetrachloroethene	280	110000	1900	730000

Client Sample ID: BC-7

Lab ID#: 0604514-07A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Tetrachloroethene	200	49000	1300	340000

Client Sample ID: AC-1

Lab ID#: 0604514-08A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Acetone	4.0	7.8	9.6	18
Methylene Chloride	1.0	9.2	3.5	32
Hexane	1.0	1.4	3.6	4.9
Tetrahydrofuran	1.0	1.4	3.0	4.1
Tetrachloroethene	1.0	27	6.8	180
m,p-Xylene	1.0	3.8	4.4	16
o-Xylene	1.0	1.5	4.4	6.4
4-Ethyltoluene	1.0	3.7	5.0	18
1,3,5-Trimethylbenzene	1.0	2.1	5.0	10
1,2,4-Trimethylbenzene	1.0	7.3	5.0	36

Client Sample ID: XXXX

Lab ID#: 0604514-10A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Tetrahydrofuran	100	100	300	300
Tetrachloroethene	100	34000	680	230000

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Client Sample ID: BC-1

Lab ID#: 0604514-01A

MODIFIED EPA METHOD TO-14A GC/MS FULL SCAN

File Name:	8050120	Date of Collection:	4/17/06
Dil. Factor:	4040	Date of Analysis:	5/2/06 12:39 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	2000	Not Detected	10000	Not Detected
Freon 114	2000	Not Detected	14000	Not Detected
Chloromethane	8100	Not Detected	17000	Not Detected
Vinyl Chloride	2000	Not Detected	5200	Not Detected
1,3-Butadiene	2000	Not Detected	4500	Not Detected
Bromomethane	2000	Not Detected	7800	Not Detected
Chloroethane	2000	Not Detected	5300	Not Detected
Freon 11	2000	Not Detected	11000	Not Detected
Ethanol	8100	Not Detected	15000	Not Detected
Freon 113	2000	Not Detected	15000	Not Detected
1,1-Dichloroethene	2000	Not Detected	8000	Not Detected
Acetone	8100	Not Detected	19000	Not Detected
2-Propanol	8100	Not Detected	20000	Not Detected
Carbon Disulfide	2000	Not Detected	6300	Not Detected
3-Chloropropene	8100	Not Detected	25000	Not Detected
Methylene Chloride	2000	Not Detected	7000	Not Detected
Methyl tert-butyl ether	2000	Not Detected	7300	Not Detected
trans-1,2-Dichloroethene	2000	Not Detected	8000	Not Detected
Hexane	2000	Not Detected	7100	Not Detected
1,1-Dichloroethane	2000	Not Detected	8200	Not Detected
2-Butanone (Methyl Ethyl Ketone)	2000	Not Detected	6000	Not Detected
cis-1,2-Dichloroethene	2000	Not Detected	8000	Not Detected
Tetrahydrofuran	2000	Not Detected	6000	Not Detected
Chloroform	2000	Not Detected	9900	Not Detected
1,1,1-Trichloroethane	2000	Not Detected	11000	Not Detected
Cyclohexane	2000	Not Detected	7000	Not Detected
Carbon Tetrachloride	2000	Not Detected	13000	Not Detected
2,2,4-Trimethylpentane	2000	Not Detected	9400	Not Detected
Benzene	2000	Not Detected	6400	Not Detected
1,2-Dichloroethane	2000	Not Detected	8200	Not Detected
Heptane	2000	Not Detected	8300	Not Detected
Trichloroethene	2000	Not Detected	11000	Not Detected
1,2-Dichloropropane	2000	Not Detected	9300	Not Detected
1,4-Dioxane	8100	Not Detected	29000	Not Detected
Bromodichloromethane	2000	Not Detected	14000	Not Detected
cis-1,3-Dichloropropene	2000	Not Detected	9200	Not Detected
4-Methyl-2-pentanone	2000	Not Detected	8300	Not Detected
Toluene	2000	Not Detected	7600	Not Detected
trans-1,3-Dichloropropene	2000	Not Detected	9200	Not Detected
1,1,2-Trichloroethane	2000	Not Detected	11000	Not Detected

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Client Sample ID: BC-1

Lab ID#: 0604514-01A

MODIFIED EPA METHOD TO-14A GC/MS FULL SCAN

File Name:	8050120	Date of Collection:	4/17/06
Dil. Factor:	4040	Date of Analysis:	5/2/06 12:39 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Tetrachloroethene	2000	770000	14000	5200000
2-Hexanone	8100	Not Detected	33000	Not Detected
Dibromochloromethane	2000	Not Detected	17000	Not Detected
1,2-Dibromoethane (EDB)	2000	Not Detected	16000	Not Detected
Chlorobenzene	2000	Not Detected	9300	Not Detected
Ethyl Benzene	2000	Not Detected	8800	Not Detected
m,p-Xylene	2000	Not Detected	8800	Not Detected
o-Xylene	2000	Not Detected	8800	Not Detected
Styrene	2000	Not Detected	8600	Not Detected
Bromoform	2000	Not Detected	21000	Not Detected
Cumene	2000	Not Detected	9900	Not Detected
1,1,2,2-Tetrachloroethane	2000	Not Detected	14000	Not Detected
Propylbenzene	2000	Not Detected	9900	Not Detected
4-Ethyltoluene	2000	Not Detected	9900	Not Detected
1,3,5-Trimethylbenzene	2000	Not Detected	9900	Not Detected
1,2,4-Trimethylbenzene	2000	Not Detected	9900	Not Detected
1,3-Dichlorobenzene	2000	Not Detected	12000	Not Detected
1,4-Dichlorobenzene	2000	Not Detected	12000	Not Detected
alpha-Chlorotoluene	2000	Not Detected	10000	Not Detected
1,2-Dichlorobenzene	2000	Not Detected	12000	Not Detected
1,2,4-Trichlorobenzene	8100	Not Detected	60000	Not Detected
Hexachlorobutadiene	8100	Not Detected	86000	Not Detected
Naphthalene	8100	Not Detected	42000	Not Detected

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	101	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	97	70-130

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: BC-1 Duplicate

Lab ID#: 0604514-01AA

MODIFIED EPA METHOD TO-14A GC/MS FULL SCAN

File Name:	8050108	Date of Collection: 4/17/06
Dil. Factor:	4040	Date of Analysis: 5/1/06 03:35 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	2000	Not Detected	10000	Not Detected
Freon 114	2000	Not Detected	14000	Not Detected
Chloromethane	8100	Not Detected	17000	Not Detected
Vinyl Chloride	2000	Not Detected	5200	Not Detected
1,3-Butadiene	2000	Not Detected	4500	Not Detected
Bromomethane	2000	Not Detected	7800	Not Detected
Chloroethane	2000	Not Detected	5300	Not Detected
Freon 11	2000	Not Detected	11000	Not Detected
Ethanol	8100	Not Detected	15000	Not Detected
Freon 113	2000	Not Detected	15000	Not Detected
1,1-Dichloroethene	2000	Not Detected	8000	Not Detected
Acetone	8100	Not Detected	19000	Not Detected
2-Propanol	8100	Not Detected	20000	Not Detected
Carbon Disulfide	2000	Not Detected	6300	Not Detected
3-Chloropropene	8100	Not Detected	25000	Not Detected
Methylene Chloride	2000	Not Detected	7000	Not Detected
Methyl tert-butyl ether	2000	Not Detected	7300	Not Detected
trans-1,2-Dichloroethene	2000	Not Detected	8000	Not Detected
Hexane	2000	Not Detected	7100	Not Detected
1,1-Dichloroethane	2000	Not Detected	8200	Not Detected
2-Butanone (Methyl Ethyl Ketone)	2000	Not Detected	6000	Not Detected
cis-1,2-Dichloroethene	2000	Not Detected	8000	Not Detected
Tetrahydrofuran	2000	Not Detected	6000	Not Detected
Chloroform	2000	Not Detected	9900	Not Detected
1,1,1-Trichloroethane	2000	Not Detected	11000	Not Detected
Cyclohexane	2000	Not Detected	7000	Not Detected
Carbon Tetrachloride	2000	Not Detected	13000	Not Detected
2,2,4-Trimethylpentane	2000	Not Detected	9400	Not Detected
Benzene	2000	Not Detected	6400	Not Detected
1,2-Dichloroethane	2000	Not Detected	8200	Not Detected
Heptane	2000	Not Detected	8300	Not Detected
Trichloroethene	2000	Not Detected	11000	Not Detected
1,2-Dichloropropane	2000	Not Detected	9300	Not Detected
1,4-Dioxane	8100	Not Detected	29000	Not Detected
Bromodichloromethane	2000	Not Detected	14000	Not Detected
cis-1,3-Dichloropropene	2000	Not Detected	9200	Not Detected
4-Methyl-2-pentanone	2000	Not Detected	8300	Not Detected
Toluene	2000	Not Detected	7600	Not Detected
trans-1,3-Dichloropropene	2000	Not Detected	9200	Not Detected
1,1,2-Trichloroethane	2000	Not Detected	11000	Not Detected

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: BC-1 Duplicate

Lab ID#: 0604514-01AA

MODIFIED EPA METHOD TO-14A GC/MS FULL SCAN

File Name:	8050108	Date of Collection:	4/17/06
Dil. Factor:	4040	Date of Analysis:	5/1/06 03:35 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Tetrachloroethene	2000	840000 E	14000	5700000 E
2-Hexanone	8100	Not Detected	33000	Not Detected
Dibromochloromethane	2000	Not Detected	17000	Not Detected
1,2-Dibromoethane (EDB)	2000	Not Detected	16000	Not Detected
Chlorobenzene	2000	Not Detected	9300	Not Detected
Ethyl Benzene	2000	Not Detected	8800	Not Detected
m,p-Xylene	2000	Not Detected	8800	Not Detected
o-Xylene	2000	Not Detected	8800	Not Detected
Styrene	2000	Not Detected	8600	Not Detected
Bromoform	2000	Not Detected	21000	Not Detected
Cumene	2000	Not Detected	9900	Not Detected
1,1,2,2-Tetrachloroethane	2000	Not Detected	14000	Not Detected
Propylbenzene	2000	Not Detected	9900	Not Detected
4-Ethyltoluene	2000	Not Detected	9900	Not Detected
1,3,5-Trimethylbenzene	2000	Not Detected	9900	Not Detected
1,2,4-Trimethylbenzene	2000	Not Detected	9900	Not Detected
1,3-Dichlorobenzene	2000	Not Detected	12000	Not Detected
1,4-Dichlorobenzene	2000	Not Detected	12000	Not Detected
alpha-Chlorotoluene	2000	Not Detected	10000	Not Detected
1,2-Dichlorobenzene	2000	Not Detected	12000	Not Detected
1,2,4-Trichlorobenzene	8100	Not Detected	60000	Not Detected
Hexachlorobutadiene	8100	Not Detected	86000	Not Detected
Naphthalene	8100	Not Detected	42000	Not Detected

E = Exceeds instrument calibration range.

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	105	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	100	70-130

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: BC-2

Lab ID#: 0604514-02A

MODIFIED EPA METHOD TO-14A GC/MS FULL SCAN

File Name:	8050109	Date of Collection:	4/17/06
Dil. Factor:	3880	Date of Analysis:	5/1/06 04:27 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	1900	Not Detected	9600	Not Detected
Freon 114	1900	Not Detected	14000	Not Detected
Chloromethane	7800	Not Detected	16000	Not Detected
Vinyl Chloride	1900	Not Detected	5000	Not Detected
1,3-Butadiene	1900	Not Detected	4300	Not Detected
Bromomethane	1900	Not Detected	7500	Not Detected
Chloroethane	1900	Not Detected	5100	Not Detected
Freon 11	1900	Not Detected	11000	Not Detected
Ethanol	7800	Not Detected	15000	Not Detected
Freon 113	1900	Not Detected	15000	Not Detected
1,1-Dichloroethene	1900	Not Detected	7700	Not Detected
Acetone	7800	Not Detected	18000	Not Detected
2-Propanol	7800	Not Detected	19000	Not Detected
Carbon Disulfide	1900	Not Detected	6000	Not Detected
3-Chloropropene	7800	Not Detected	24000	Not Detected
Methylene Chloride	1900	Not Detected	6700	Not Detected
Methyl tert-butyl ether	1900	Not Detected	7000	Not Detected
trans-1,2-Dichloroethene	1900	Not Detected	7700	Not Detected
Hexane	1900	Not Detected	6800	Not Detected
1,1-Dichloroethane	1900	Not Detected	7800	Not Detected
2-Butanone (Methyl Ethyl Ketone)	1900	Not Detected	5700	Not Detected
cis-1,2-Dichloroethene	1900	Not Detected	7700	Not Detected
Tetrahydrofuran	1900	Not Detected	5700	Not Detected
Chloroform	1900	Not Detected	9500	Not Detected
1,1,1-Trichloroethane	1900	Not Detected	10000	Not Detected
Cyclohexane	1900	Not Detected	6700	Not Detected
Carbon Tetrachloride	1900	Not Detected	12000	Not Detected
2,2,4-Trimethylpentane	1900	Not Detected	9100	Not Detected
Benzene	1900	Not Detected	6200	Not Detected
1,2-Dichloroethane	1900	Not Detected	7800	Not Detected
Heptane	1900	Not Detected	8000	Not Detected
Trichloroethene	1900	Not Detected	10000	Not Detected
1,2-Dichloropropane	1900	Not Detected	9000	Not Detected
1,4-Dioxane	7800	Not Detected	28000	Not Detected
Bromodichloromethane	1900	Not Detected	13000	Not Detected
cis-1,3-Dichloropropene	1900	Not Detected	8800	Not Detected
4-Methyl-2-pentanone	1900	Not Detected	7900	Not Detected
Toluene	1900	Not Detected	7300	Not Detected
trans-1,3-Dichloropropene	1900	Not Detected	8800	Not Detected
1,1,2-Trichloroethane	1900	Not Detected	10000	Not Detected

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: BC-2

Lab ID#: 0604514-02A

MODIFIED EPA METHOD TO-14A GC/MS FULL SCAN

File Name:	8050109	Date of Collection:	4/17/06
Dil. Factor:	3880	Date of Analysis:	5/1/06 04:27 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Tetrachloroethene	1900	620000	13000	4200000
2-Hexanone	7800	Not Detected	32000	Not Detected
Dibromochloromethane	1900	Not Detected	16000	Not Detected
1,2-Dibromoethane (EDB)	1900	Not Detected	15000	Not Detected
Chlorobenzene	1900	Not Detected	8900	Not Detected
Ethyl Benzene	1900	Not Detected	8400	Not Detected
m,p-Xylene	1900	Not Detected	8400	Not Detected
o-Xylene	1900	Not Detected	8400	Not Detected
Styrene	1900	Not Detected	8300	Not Detected
Bromoform	1900	Not Detected	20000	Not Detected
Cumene	1900	Not Detected	9500	Not Detected
1,1,2,2-Tetrachloroethane	1900	Not Detected	13000	Not Detected
Propylbenzene	1900	Not Detected	9500	Not Detected
4-Ethyltoluene	1900	Not Detected	9500	Not Detected
1,3,5-Trimethylbenzene	1900	Not Detected	9500	Not Detected
1,2,4-Trimethylbenzene	1900	Not Detected	9500	Not Detected
1,3-Dichlorobenzene	1900	Not Detected	12000	Not Detected
1,4-Dichlorobenzene	1900	Not Detected	12000	Not Detected
alpha-Chlorotoluene	1900	Not Detected	10000	Not Detected
1,2-Dichlorobenzene	1900	Not Detected	12000	Not Detected
1,2,4-Trichlorobenzene	7800	Not Detected	58000	Not Detected
Hexachlorobutadiene	7800	Not Detected	83000	Not Detected
Naphthalene	7800	Not Detected	41000	Not Detected

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	102	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	104	70-130

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: BC-3

Lab ID#: 0604514-03A

MODIFIED EPA METHOD TO-14A GC/MS FULL SCAN

File Name:	8050110	Date of Collection: 4/17/06
Dil. Factor:	1970	Date of Analysis: 5/1/06 05:36 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	980	Not Detected	4900	Not Detected
Freon 114	980	Not Detected	6900	Not Detected
Chloromethane	3900	Not Detected	8100	Not Detected
Vinyl Chloride	980	Not Detected	2500	Not Detected
1,3-Butadiene	980	Not Detected	2200	Not Detected
Bromomethane	980	Not Detected	3800	Not Detected
Chloroethane	980	Not Detected	2600	Not Detected
Freon 11	980	Not Detected	5500	Not Detected
Ethanol	3900	Not Detected	7400	Not Detected
Freon 113	980	Not Detected	7500	Not Detected
1,1-Dichloroethene	980	Not Detected	3900	Not Detected
Acetone	3900	Not Detected	9400	Not Detected
2-Propanol	3900	Not Detected	9700	Not Detected
Carbon Disulfide	980	Not Detected	3100	Not Detected
3-Chloropropene	3900	Not Detected	12000	Not Detected
Methylene Chloride	980	Not Detected	3400	Not Detected
Methyl tert-butyl ether	980	Not Detected	3600	Not Detected
trans-1,2-Dichloroethene	980	Not Detected	3900	Not Detected
Hexane	980	Not Detected	3500	Not Detected
1,1-Dichloroethane	980	Not Detected	4000	Not Detected
2-Butanone (Methyl Ethyl Ketone)	980	Not Detected	2900	Not Detected
cis-1,2-Dichloroethene	980	Not Detected	3900	Not Detected
Tetrahydrofuran	980	Not Detected	2900	Not Detected
Chloroform	980	Not Detected	4800	Not Detected
1,1,1-Trichloroethane	980	Not Detected	5400	Not Detected
Cyclohexane	980	Not Detected	3400	Not Detected
Carbon Tetrachloride	980	Not Detected	6200	Not Detected
2,2,4-Trimethylpentane	980	Not Detected	4600	Not Detected
Benzene	980	Not Detected	3100	Not Detected
1,2-Dichloroethane	980	Not Detected	4000	Not Detected
Heptane	980	Not Detected	4000	Not Detected
Trichloroethene	980	Not Detected	5300	Not Detected
1,2-Dichloropropane	980	Not Detected	4600	Not Detected
1,4-Dioxane	3900	Not Detected	14000	Not Detected
Bromodichloromethane	980	Not Detected	6600	Not Detected
cis-1,3-Dichloropropene	980	Not Detected	4500	Not Detected
4-Methyl-2-pentanone	980	Not Detected	4000	Not Detected
Toluene	980	Not Detected	3700	Not Detected
trans-1,3-Dichloropropene	980	Not Detected	4500	Not Detected
1,1,2-Trichloroethane	980	Not Detected	5400	Not Detected

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: BC-3

Lab ID#: 0604514-03A

MODIFIED EPA METHOD TO-14A GC/MS FULL SCAN

File Name:	8050110	Date of Collection:	4/17/06
Dil. Factor:	1970	Date of Analysis:	5/1/06 05:36 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Tetrachloroethene	980	320000	6700	2200000
2-Hexanone	3900	Not Detected	16000	Not Detected
Dibromochloromethane	980	Not Detected	8400	Not Detected
1,2-Dibromoethane (EDB)	980	Not Detected	7600	Not Detected
Chlorobenzene	980	Not Detected	4500	Not Detected
Ethyl Benzene	980	Not Detected	4300	Not Detected
m,p-Xylene	980	Not Detected	4300	Not Detected
o-Xylene	980	Not Detected	4300	Not Detected
Styrene	980	Not Detected	4200	Not Detected
Bromoform	980	Not Detected	10000	Not Detected
Cumene	980	Not Detected	4800	Not Detected
1,1,2,2-Tetrachloroethane	980	Not Detected	6800	Not Detected
Propylbenzene	980	Not Detected	4800	Not Detected
4-Ethyltoluene	980	Not Detected	4800	Not Detected
1,3,5-Trimethylbenzene	980	Not Detected	4800	Not Detected
1,2,4-Trimethylbenzene	980	Not Detected	4800	Not Detected
1,3-Dichlorobenzene	980	Not Detected	5900	Not Detected
1,4-Dichlorobenzene	980	Not Detected	5900	Not Detected
alpha-Chlorotoluene	980	Not Detected	5100	Not Detected
1,2-Dichlorobenzene	980	Not Detected	5900	Not Detected
1,2,4-Trichlorobenzene	3900	Not Detected	29000	Not Detected
Hexachlorobutadiene	3900	Not Detected	42000	Not Detected
Naphthalene	3900	Not Detected	21000	Not Detected

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	106	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	94	70-130

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: BC-4

Lab ID#: 0604514-04A

MODIFIED EPA METHOD TO-14A GC/MS FULL SCAN

File Name:	8050117	Date of Collection:	4/17/06
Dil. Factor:	1280	Date of Analysis:	5/1/06 09:21 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	640	Not Detected	3200	Not Detected
Freon 114	640	Not Detected	4500	Not Detected
Chloromethane	2600	Not Detected	5300	Not Detected
Vinyl Chloride	640	Not Detected	1600	Not Detected
1,3-Butadiene	640	Not Detected	1400	Not Detected
Bromomethane	640	Not Detected	2500	Not Detected
Chloroethane	640	Not Detected	1700	Not Detected
Freon 11	640	Not Detected	3600	Not Detected
Ethanol	2600	Not Detected	4800	Not Detected
Freon 113	640	Not Detected	4900	Not Detected
1,1-Dichloroethene	640	Not Detected	2500	Not Detected
Acetone	2600	Not Detected	6100	Not Detected
2-Propanol	2600	Not Detected	6300	Not Detected
Carbon Disulfide	640	Not Detected	2000	Not Detected
3-Chloropropene	2600	Not Detected	8000	Not Detected
Methylene Chloride	640	Not Detected	2200	Not Detected
Methyl tert-butyl ether	640	Not Detected	2300	Not Detected
trans-1,2-Dichloroethene	640	Not Detected	2500	Not Detected
Hexane	640	Not Detected	2200	Not Detected
1,1-Dichloroethane	640	Not Detected	2600	Not Detected
2-Butanone (Methyl Ethyl Ketone)	640	Not Detected	1900	Not Detected
cis-1,2-Dichloroethene	640	Not Detected	2500	Not Detected
Tetrahydrofuran	640	Not Detected	1900	Not Detected
Chloroform	640	Not Detected	3100	Not Detected
1,1,1-Trichloroethane	640	Not Detected	3500	Not Detected
Cyclohexane	640	Not Detected	2200	Not Detected
Carbon Tetrachloride	640	Not Detected	4000	Not Detected
2,2,4-Trimethylpentane	640	Not Detected	3000	Not Detected
Benzene	640	Not Detected	2000	Not Detected
1,2-Dichloroethane	640	Not Detected	2600	Not Detected
Heptane	640	Not Detected	2600	Not Detected
Trichloroethene	640	Not Detected	3400	Not Detected
1,2-Dichloropropane	640	Not Detected	3000	Not Detected
1,4-Dioxane	2600	Not Detected	9200	Not Detected
Bromodichloromethane	640	Not Detected	4300	Not Detected
cis-1,3-Dichloropropene	640	Not Detected	2900	Not Detected
4-Methyl-2-pentanone	640	Not Detected	2600	Not Detected
Toluene	640	Not Detected	2400	Not Detected
trans-1,3-Dichloropropene	640	Not Detected	2900	Not Detected
1,1,2-Trichloroethane	640	Not Detected	3500	Not Detected

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: BC-4

Lab ID#: 0604514-04A

MODIFIED EPA METHOD TO-14A GC/MS FULL SCAN

File Name:	8050117	Date of Collection:	4/17/06
Dil. Factor:	1280	Date of Analysis:	5/1/06 09:21 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Tetrachloroethene	640	180000	4300	1200000
2-Hexanone	2600	Not Detected	10000	Not Detected
Dibromochloromethane	640	Not Detected	5400	Not Detected
1,2-Dibromoethane (EDB)	640	Not Detected	4900	Not Detected
Chlorobenzene	640	Not Detected	2900	Not Detected
Ethyl Benzene	640	Not Detected	2800	Not Detected
m,p-Xylene	640	Not Detected	2800	Not Detected
o-Xylene	640	Not Detected	2800	Not Detected
Styrene	640	Not Detected	2700	Not Detected
Bromoform	640	Not Detected	6600	Not Detected
Cumene	640	Not Detected	3100	Not Detected
1,1,2,2-Tetrachloroethane	640	Not Detected	4400	Not Detected
Propylbenzene	640	Not Detected	3100	Not Detected
4-Ethyltoluene	640	Not Detected	3100	Not Detected
1,3,5-Trimethylbenzene	640	Not Detected	3100	Not Detected
1,2,4-Trimethylbenzene	640	Not Detected	3100	Not Detected
1,3-Dichlorobenzene	640	Not Detected	3800	Not Detected
1,4-Dichlorobenzene	640	Not Detected	3800	Not Detected
alpha-Chlorotoluene	640	Not Detected	3300	Not Detected
1,2-Dichlorobenzene	640	Not Detected	3800	Not Detected
1,2,4-Trichlorobenzene	2600	Not Detected	19000	Not Detected
Hexachlorobutadiene	2600	Not Detected	27000	Not Detected
Naphthalene	2600	Not Detected	13000	Not Detected

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	104	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	103	70-130

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: BC-5

Lab ID#: 0604514-05A

MODIFIED EPA METHOD TO-14A GC/MS FULL SCAN

File Name:	8050112	Date of Collection:	4/17/06
Dil. Factor:	796	Date of Analysis:	5/1/06 06:31 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	400	Not Detected	2000	Not Detected
Freon 114	400	Not Detected	2800	Not Detected
Chloromethane	1600	Not Detected	3300	Not Detected
Vinyl Chloride	400	Not Detected	1000	Not Detected
1,3-Butadiene	400	Not Detected	880	Not Detected
Bromomethane	400	Not Detected	1500	Not Detected
Chloroethane	400	Not Detected	1000	Not Detected
Freon 11	400	Not Detected	2200	Not Detected
Ethanol	1600	Not Detected	3000	Not Detected
Freon 113	400	Not Detected	3000	Not Detected
1,1-Dichloroethene	400	Not Detected	1600	Not Detected
Acetone	1600	Not Detected	3800	Not Detected
2-Propanol	1600	Not Detected	3900	Not Detected
Carbon Disulfide	400	Not Detected	1200	Not Detected
3-Chloropropene	1600	Not Detected	5000	Not Detected
Methylene Chloride	400	Not Detected	1400	Not Detected
Methyl tert-butyl ether	400	Not Detected	1400	Not Detected
trans-1,2-Dichloroethene	400	Not Detected	1600	Not Detected
Hexane	400	Not Detected	1400	Not Detected
1,1-Dichloroethane	400	Not Detected	1600	Not Detected
2-Butanone (Methyl Ethyl Ketone)	400	Not Detected	1200	Not Detected
cis-1,2-Dichloroethene	400	Not Detected	1600	Not Detected
Tetrahydrofuran	400	Not Detected	1200	Not Detected
Chloroform	400	Not Detected	1900	Not Detected
1,1,1-Trichloroethane	400	Not Detected	2200	Not Detected
Cyclohexane	400	Not Detected	1400	Not Detected
Carbon Tetrachloride	400	Not Detected	2500	Not Detected
2,2,4-Trimethylpentane	400	Not Detected	1800	Not Detected
Benzene	400	Not Detected	1300	Not Detected
1,2-Dichloroethane	400	Not Detected	1600	Not Detected
Heptane	400	Not Detected	1600	Not Detected
Trichloroethene	400	Not Detected	2100	Not Detected
1,2-Dichloropropane	400	Not Detected	1800	Not Detected
1,4-Dioxane	1600	Not Detected	5700	Not Detected
Bromodichloromethane	400	Not Detected	2700	Not Detected
cis-1,3-Dichloropropene	400	Not Detected	1800	Not Detected
4-Methyl-2-pentanone	400	Not Detected	1600	Not Detected
Toluene	400	Not Detected	1500	Not Detected
trans-1,3-Dichloropropene	400	Not Detected	1800	Not Detected
1,1,2-Trichloroethane	400	Not Detected	2200	Not Detected

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: BC-5

Lab ID#: 0604514-05A

MODIFIED EPA METHOD TO-14A GC/MS FULL SCAN

File Name:	8050112	Date of Collection:	4/17/06
Dil. Factor:	796	Date of Analysis:	5/1/06 06:31 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Tetrachloroethene	400	120000	2700	780000
2-Hexanone	1600	Not Detected	6500	Not Detected
Dibromochloromethane	400	Not Detected	3400	Not Detected
1,2-Dibromoethane (EDB)	400	Not Detected	3000	Not Detected
Chlorobenzene	400	Not Detected	1800	Not Detected
Ethyl Benzene	400	Not Detected	1700	Not Detected
m,p-Xylene	400	Not Detected	1700	Not Detected
o-Xylene	400	Not Detected	1700	Not Detected
Styrene	400	Not Detected	1700	Not Detected
Bromoform	400	Not Detected	4100	Not Detected
Cumene	400	Not Detected	2000	Not Detected
1,1,2,2-Tetrachloroethane	400	Not Detected	2700	Not Detected
Propylbenzene	400	Not Detected	2000	Not Detected
4-Ethyltoluene	400	Not Detected	2000	Not Detected
1,3,5-Trimethylbenzene	400	Not Detected	2000	Not Detected
1,2,4-Trimethylbenzene	400	Not Detected	2000	Not Detected
1,3-Dichlorobenzene	400	Not Detected	2400	Not Detected
1,4-Dichlorobenzene	400	Not Detected	2400	Not Detected
alpha-Chlorotoluene	400	Not Detected	2100	Not Detected
1,2-Dichlorobenzene	400	Not Detected	2400	Not Detected
1,2,4-Trichlorobenzene	1600	Not Detected	12000	Not Detected
Hexachlorobutadiene	1600	Not Detected	17000	Not Detected
Naphthalene	1600	Not Detected	8300	Not Detected

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	98	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	102	70-130

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: BC-6

Lab ID#: 0604514-06A

MODIFIED EPA METHOD TO-14A GC/MS FULL SCAN

File Name:	8050113	Date of Collection:	4/17/06
Dil. Factor:	563	Date of Analysis:	5/1/06 06:59 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	280	Not Detected	1400	Not Detected
Freon 114	280	Not Detected	2000	Not Detected
Chloromethane	1100	Not Detected	2300	Not Detected
Vinyl Chloride	280	Not Detected	720	Not Detected
1,3-Butadiene	280	Not Detected	620	Not Detected
Bromomethane	280	Not Detected	1100	Not Detected
Chloroethane	280	Not Detected	740	Not Detected
Freon 11	280	Not Detected	1600	Not Detected
Ethanol	1100	Not Detected	2100	Not Detected
Freon 113	280	Not Detected	2200	Not Detected
1,1-Dichloroethene	280	Not Detected	1100	Not Detected
Acetone	1100	Not Detected	2700	Not Detected
2-Propanol	1100	Not Detected	2800	Not Detected
Carbon Disulfide	280	Not Detected	880	Not Detected
3-Chloropropene	1100	Not Detected	3500	Not Detected
Methylene Chloride	280	Not Detected	980	Not Detected
Methyl tert-butyl ether	280	Not Detected	1000	Not Detected
trans-1,2-Dichloroethene	280	Not Detected	1100	Not Detected
Hexane	280	Not Detected	990	Not Detected
1,1-Dichloroethane	280	Not Detected	1100	Not Detected
2-Butanone (Methyl Ethyl Ketone)	280	Not Detected	830	Not Detected
cis-1,2-Dichloroethene	280	Not Detected	1100	Not Detected
Tetrahydrofuran	280	Not Detected	830	Not Detected
Chloroform	280	Not Detected	1400	Not Detected
1,1,1-Trichloroethane	280	Not Detected	1500	Not Detected
Cyclohexane	280	Not Detected	970	Not Detected
Carbon Tetrachloride	280	Not Detected	1800	Not Detected
2,2,4-Trimethylpentane	280	Not Detected	1300	Not Detected
Benzene	280	Not Detected	900	Not Detected
1,2-Dichloroethane	280	Not Detected	1100	Not Detected
Heptane	280	Not Detected	1200	Not Detected
Trichloroethene	280	Not Detected	1500	Not Detected
1,2-Dichloropropane	280	Not Detected	1300	Not Detected
1,4-Dioxane	1100	Not Detected	4000	Not Detected
Bromodichloromethane	280	Not Detected	1900	Not Detected
cis-1,3-Dichloropropene	280	Not Detected	1300	Not Detected
4-Methyl-2-pentanone	280	Not Detected	1200	Not Detected
Toluene	280	Not Detected	1100	Not Detected
trans-1,3-Dichloropropene	280	Not Detected	1300	Not Detected
1,1,2-Trichloroethane	280	Not Detected	1500	Not Detected

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: BC-6

Lab ID#: 0604514-06A

MODIFIED EPA METHOD TO-14A GC/MS FULL SCAN

File Name:	8050113	Date of Collection:	4/17/06
Dil. Factor:	563	Date of Analysis:	5/1/06 06:59 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Tetrachloroethene	280	110000	1900	730000
2-Hexanone	1100	Not Detected	4600	Not Detected
Dibromochloromethane	280	Not Detected	2400	Not Detected
1,2-Dibromoethane (EDB)	280	Not Detected	2200	Not Detected
Chlorobenzene	280	Not Detected	1300	Not Detected
Ethyl Benzene	280	Not Detected	1200	Not Detected
m,p-Xylene	280	Not Detected	1200	Not Detected
o-Xylene	280	Not Detected	1200	Not Detected
Styrene	280	Not Detected	1200	Not Detected
Bromoform	280	Not Detected	2900	Not Detected
Cumene	280	Not Detected	1400	Not Detected
1,1,2,2-Tetrachloroethane	280	Not Detected	1900	Not Detected
Propylbenzene	280	Not Detected	1400	Not Detected
4-Ethyltoluene	280	Not Detected	1400	Not Detected
1,3,5-Trimethylbenzene	280	Not Detected	1400	Not Detected
1,2,4-Trimethylbenzene	280	Not Detected	1400	Not Detected
1,3-Dichlorobenzene	280	Not Detected	1700	Not Detected
1,4-Dichlorobenzene	280	Not Detected	1700	Not Detected
alpha-Chlorotoluene	280	Not Detected	1400	Not Detected
1,2-Dichlorobenzene	280	Not Detected	1700	Not Detected
1,2,4-Trichlorobenzene	1100	Not Detected	8400	Not Detected
Hexachlorobutadiene	1100	Not Detected	12000	Not Detected
Naphthalene	1100	Not Detected	5900	Not Detected

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	102	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	104	70-130

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: BC-7

Lab ID#: 0604514-07A

MODIFIED EPA METHOD TO-14A GC/MS FULL SCAN

File Name:	8050114	Date of Collection: 4/17/06
Dil. Factor:	394	Date of Analysis: 5/1/06 07:26 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	200	Not Detected	970	Not Detected
Freon 114	200	Not Detected	1400	Not Detected
Chloromethane	790	Not Detected	1600	Not Detected
Vinyl Chloride	200	Not Detected	500	Not Detected
1,3-Butadiene	200	Not Detected	440	Not Detected
Bromomethane	200	Not Detected	760	Not Detected
Chloroethane	200	Not Detected	520	Not Detected
Freon 11	200	Not Detected	1100	Not Detected
Ethanol	790	Not Detected	1500	Not Detected
Freon 113	200	Not Detected	1500	Not Detected
1,1-Dichloroethene	200	Not Detected	780	Not Detected
Acetone	790	Not Detected	1900	Not Detected
2-Propanol	790	Not Detected	1900	Not Detected
Carbon Disulfide	200	Not Detected	610	Not Detected
3-Chloropropene	790	Not Detected	2500	Not Detected
Methylene Chloride	200	Not Detected	680	Not Detected
Methyl tert-butyl ether	200	Not Detected	710	Not Detected
trans-1,2-Dichloroethene	200	Not Detected	780	Not Detected
Hexane	200	Not Detected	690	Not Detected
1,1-Dichloroethane	200	Not Detected	800	Not Detected
2-Butanone (Methyl Ethyl Ketone)	200	Not Detected	580	Not Detected
cis-1,2-Dichloroethene	200	Not Detected	780	Not Detected
Tetrahydrofuran	200	Not Detected	580	Not Detected
Chloroform	200	Not Detected	960	Not Detected
1,1,1-Trichloroethane	200	Not Detected	1100	Not Detected
Cyclohexane	200	Not Detected	680	Not Detected
Carbon Tetrachloride	200	Not Detected	1200	Not Detected
2,2,4-Trimethylpentane	200	Not Detected	920	Not Detected
Benzene	200	Not Detected	630	Not Detected
1,2-Dichloroethane	200	Not Detected	800	Not Detected
Heptane	200	Not Detected	810	Not Detected
Trichloroethene	200	Not Detected	1000	Not Detected
1,2-Dichloropropane	200	Not Detected	910	Not Detected
1,4-Dioxane	790	Not Detected	2800	Not Detected
Bromodichloromethane	200	Not Detected	1300	Not Detected
cis-1,3-Dichloropropene	200	Not Detected	890	Not Detected
4-Methyl-2-pentanone	200	Not Detected	810	Not Detected
Toluene	200	Not Detected	740	Not Detected
trans-1,3-Dichloropropene	200	Not Detected	890	Not Detected
1,1,2-Trichloroethane	200	Not Detected	1100	Not Detected

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: BC-7

Lab ID#: 0604514-07A

MODIFIED EPA METHOD TO-14A GC/MS FULL SCAN

File Name:	8050114	Date of Collection:	4/17/06
Dil. Factor:	394	Date of Analysis:	5/1/06 07:26 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Tetrachloroethene	200	49000	1300	340000
2-Hexanone	790	Not Detected	3200	Not Detected
Dibromochloromethane	200	Not Detected	1700	Not Detected
1,2-Dibromoethane (EDB)	200	Not Detected	1500	Not Detected
Chlorobenzene	200	Not Detected	910	Not Detected
Ethyl Benzene	200	Not Detected	860	Not Detected
m,p-Xylene	200	Not Detected	860	Not Detected
o-Xylene	200	Not Detected	860	Not Detected
Styrene	200	Not Detected	840	Not Detected
Bromoform	200	Not Detected	2000	Not Detected
Cumene	200	Not Detected	970	Not Detected
1,1,2,2-Tetrachloroethane	200	Not Detected	1400	Not Detected
Propylbenzene	200	Not Detected	970	Not Detected
4-Ethyltoluene	200	Not Detected	970	Not Detected
1,3,5-Trimethylbenzene	200	Not Detected	970	Not Detected
1,2,4-Trimethylbenzene	200	Not Detected	970	Not Detected
1,3-Dichlorobenzene	200	Not Detected	1200	Not Detected
1,4-Dichlorobenzene	200	Not Detected	1200	Not Detected
alpha-Chlorotoluene	200	Not Detected	1000	Not Detected
1,2-Dichlorobenzene	200	Not Detected	1200	Not Detected
1,2,4-Trichlorobenzene	790	Not Detected	5800	Not Detected
Hexachlorobutadiene	790	Not Detected	8400	Not Detected
Naphthalene	790	Not Detected	4100	Not Detected

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	109	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	97	70-130

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: AC-1

Lab ID#: 0604514-08A

MODIFIED EPA METHOD TO-14A GC/MS FULL SCAN

File Name:	8050115	Date of Collection:	4/17/06
Dil. Factor:	2.02	Date of Analysis:	5/1/06 07:58 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	1.0	Not Detected	5.0	Not Detected
Freon 114	1.0	Not Detected	7.1	Not Detected
Chloromethane	4.0	Not Detected	8.3	Not Detected
Vinyl Chloride	1.0	Not Detected	2.6	Not Detected
1,3-Butadiene	1.0	Not Detected	2.2	Not Detected
Bromomethane	1.0	Not Detected	3.9	Not Detected
Chloroethane	1.0	Not Detected	2.7	Not Detected
Freon 11	1.0	Not Detected	5.7	Not Detected
Ethanol	4.0	Not Detected	7.6	Not Detected
Freon 113	1.0	Not Detected	7.7	Not Detected
1,1-Dichloroethene	1.0	Not Detected	4.0	Not Detected
Acetone	4.0	7.8	9.6	18
2-Propanol	4.0	Not Detected	9.9	Not Detected
Carbon Disulfide	1.0	Not Detected	3.1	Not Detected
3-Chloropropene	4.0	Not Detected	13	Not Detected
Methylene Chloride	1.0	9.2	3.5	32
Methyl tert-butyl ether	1.0	Not Detected	3.6	Not Detected
trans-1,2-Dichloroethene	1.0	Not Detected	4.0	Not Detected
Hexane	1.0	1.4	3.6	4.9
1,1-Dichloroethane	1.0	Not Detected	4.1	Not Detected
2-Butanone (Methyl Ethyl Ketone)	1.0	Not Detected	3.0	Not Detected
cis-1,2-Dichloroethene	1.0	Not Detected	4.0	Not Detected
Tetrahydrofuran	1.0	1.4	3.0	4.1
Chloroform	1.0	Not Detected	4.9	Not Detected
1,1,1-Trichloroethane	1.0	Not Detected	5.5	Not Detected
Cyclohexane	1.0	Not Detected	3.5	Not Detected
Carbon Tetrachloride	1.0	Not Detected	6.4	Not Detected
2,2,4-Trimethylpentane	1.0	Not Detected	4.7	Not Detected
Benzene	1.0	Not Detected	3.2	Not Detected
1,2-Dichloroethane	1.0	Not Detected	4.1	Not Detected
Heptane	1.0	Not Detected	4.1	Not Detected
Trichloroethene	1.0	Not Detected	5.4	Not Detected
1,2-Dichloropropane	1.0	Not Detected	4.7	Not Detected
1,4-Dioxane	4.0	Not Detected	14	Not Detected
Bromodichloromethane	1.0	Not Detected	6.8	Not Detected
cis-1,3-Dichloropropene	1.0	Not Detected	4.6	Not Detected
4-Methyl-2-pentanone	1.0	Not Detected	4.1	Not Detected
Toluene	1.0	Not Detected	3.8	Not Detected
trans-1,3-Dichloropropene	1.0	Not Detected	4.6	Not Detected
1,1,2-Trichloroethane	1.0	Not Detected	5.5	Not Detected

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: AC-1

Lab ID#: 0604514-08A

MODIFIED EPA METHOD TO-14A GC/MS FULL SCAN

File Name:	8050115	Date of Collection:	4/17/06
Dil. Factor:	2.02	Date of Analysis:	5/1/06 07:58 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Tetrachloroethene	1.0	27	6.8	180
2-Hexanone	4.0	Not Detected	16	Not Detected
Dibromochloromethane	1.0	Not Detected	8.6	Not Detected
1,2-Dibromoethane (EDB)	1.0	Not Detected	7.8	Not Detected
Chlorobenzene	1.0	Not Detected	4.6	Not Detected
Ethyl Benzene	1.0	Not Detected	4.4	Not Detected
m,p-Xylene	1.0	3.8	4.4	16
o-Xylene	1.0	1.5	4.4	6.4
Styrene	1.0	Not Detected	4.3	Not Detected
Bromoform	1.0	Not Detected	10	Not Detected
Cumene	1.0	Not Detected	5.0	Not Detected
1,1,2,2-Tetrachloroethane	1.0	Not Detected	6.9	Not Detected
Propylbenzene	1.0	Not Detected	5.0	Not Detected
4-Ethyltoluene	1.0	3.7	5.0	18
1,3,5-Trimethylbenzene	1.0	2.1	5.0	10
1,2,4-Trimethylbenzene	1.0	7.3	5.0	36
1,3-Dichlorobenzene	1.0	Not Detected	6.1	Not Detected
1,4-Dichlorobenzene	1.0	Not Detected	6.1	Not Detected
alpha-Chlorotoluene	1.0	Not Detected	5.2	Not Detected
1,2-Dichlorobenzene	1.0	Not Detected	6.1	Not Detected
1,2,4-Trichlorobenzene	4.0	Not Detected	30	Not Detected
Hexachlorobutadiene	4.0	Not Detected	43	Not Detected
Naphthalene	4.0	Not Detected	21	Not Detected

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	102	70-130
Toluene-d8	96	70-130
4-Bromofluorobenzene	101	70-130

@ AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: XXXX

Lab ID#: 0604514-10A

MODIFIED EPA METHOD TO-14A GC/MS FULL SCAN

File Name:	8050122	Date of Collection: 4/17/06
Dil. Factor:	202	Date of Analysis: 5/2/06 03:13 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	100	Not Detected	500	Not Detected
Freon 114	100	Not Detected	710	Not Detected
Chloromethane	400	Not Detected	830	Not Detected
Vinyl Chloride	100	Not Detected	260	Not Detected
1,3-Butadiene	100	Not Detected	220	Not Detected
Bromomethane	100	Not Detected	390	Not Detected
Chloroethane	100	Not Detected	270	Not Detected
Freon 11	100	Not Detected	570	Not Detected
Ethanol	400	Not Detected	760	Not Detected
Freon 113	100	Not Detected	770	Not Detected
1,1-Dichloroethene	100	Not Detected	400	Not Detected
Acetone	400	Not Detected	960	Not Detected
2-Propanol	400	Not Detected	990	Not Detected
Carbon Disulfide	100	Not Detected	310	Not Detected
3-Chloropropene	400	Not Detected	1300	Not Detected
Methylene Chloride	100	Not Detected	350	Not Detected
Methyl tert-butyl ether	100	Not Detected	360	Not Detected
trans-1,2-Dichloroethene	100	Not Detected	400	Not Detected
Hexane	100	Not Detected	360	Not Detected
1,1-Dichloroethane	100	Not Detected	410	Not Detected
2-Butanone (Methyl Ethyl Ketone)	100	Not Detected	300	Not Detected
cis-1,2-Dichloroethene	100	Not Detected	400	Not Detected
Tetrahydrofuran	100	100	300	300
Chloroform	100	Not Detected	490	Not Detected
1,1,1-Trichloroethane	100	Not Detected	550	Not Detected
Cyclohexane	100	Not Detected	350	Not Detected
Carbon Tetrachloride	100	Not Detected	640	Not Detected
2,2,4-Trimethylpentane	100	Not Detected	470	Not Detected
Benzene	100	Not Detected	320	Not Detected
1,2-Dichloroethane	100	Not Detected	410	Not Detected
Heptane	100	Not Detected	410	Not Detected
Trichloroethene	100	Not Detected	540	Not Detected
1,2-Dichloropropane	100	Not Detected	470	Not Detected
1,4-Dioxane	400	Not Detected	1400	Not Detected
Bromodichloromethane	100	Not Detected	680	Not Detected
cis-1,3-Dichloropropene	100	Not Detected	460	Not Detected
4-Methyl-2-pentanone	100	Not Detected	410	Not Detected
Toluene	100	Not Detected	380	Not Detected
trans-1,3-Dichloropropene	100	Not Detected	460	Not Detected
1,1,2-Trichloroethane	100	Not Detected	550	Not Detected

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: XXXX

Lab ID#: 0604514-10A

MODIFIED EPA METHOD TO-14A GC/MS FULL SCAN

File Name:	8050122	Date of Collection:	4/17/06
Dil. Factor:	202	Date of Analysis:	5/2/06 03:13 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Tetrachloroethene	100	34000	680	230000
2-Hexanone	400	Not Detected	1600	Not Detected
Dibromochloromethane	100	Not Detected	860	Not Detected
1,2-Dibromoethane (EDB)	100	Not Detected	780	Not Detected
Chlorobenzene	100	Not Detected	460	Not Detected
Ethyl Benzene	100	Not Detected	440	Not Detected
m,p-Xylene	100	Not Detected	440	Not Detected
o-Xylene	100	Not Detected	440	Not Detected
Styrene	100	Not Detected	430	Not Detected
Bromoform	100	Not Detected	1000	Not Detected
Cumene	100	Not Detected	500	Not Detected
1,1,2,2-Tetrachloroethane	100	Not Detected	690	Not Detected
Propylbenzene	100	Not Detected	500	Not Detected
4-Ethyltoluene	100	Not Detected	500	Not Detected
1,3,5-Trimethylbenzene	100	Not Detected	500	Not Detected
1,2,4-Trimethylbenzene	100	Not Detected	500	Not Detected
1,3-Dichlorobenzene	100	Not Detected	610	Not Detected
1,4-Dichlorobenzene	100	Not Detected	610	Not Detected
alpha-Chlorotoluene	100	Not Detected	520	Not Detected
1,2-Dichlorobenzene	100	Not Detected	610	Not Detected
1,2,4-Trichlorobenzene	400	Not Detected	3000	Not Detected
Hexachlorobutadiene	400	Not Detected	4300	Not Detected
Naphthalene	400	Not Detected	2100	Not Detected

Container Type: 1 Liter Silonite Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	99	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	100	70-130

@ AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: Lab Blank

Lab ID#: 0604514-11A

MODIFIED EPA METHOD TO-14A GC/MS FULL SCAN

File Name:	8050106	Date of Collection: NA	
Dil. Factor:	1.00	Date of Analysis: 5/1/06 01:43 PM	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.50	Not Detected	2.5	Not Detected
Freon 114	0.50	Not Detected	3.5	Not Detected
Chloromethane	2.0	Not Detected	4.1	Not Detected
Vinyl Chloride	0.50	Not Detected	1.3	Not Detected
1,3-Butadiene	0.50	Not Detected	1.1	Not Detected
Bromomethane	0.50	Not Detected	1.9	Not Detected
Chloroethane	0.50	Not Detected	1.3	Not Detected
Freon 11	0.50	Not Detected	2.8	Not Detected
Ethanol	2.0	Not Detected	3.8	Not Detected
Freon 113	0.50	Not Detected	3.8	Not Detected
1,1-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Acetone	2.0	Not Detected	4.8	Not Detected
2-Propanol	2.0	Not Detected	4.9	Not Detected
Carbon Disulfide	0.50	Not Detected	1.6	Not Detected
3-Chloropropene	2.0	Not Detected	6.3	Not Detected
Methylene Chloride	0.50	Not Detected	1.7	Not Detected
Methyl tert-butyl ether	0.50	Not Detected	1.8	Not Detected
trans-1,2-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Hexane	0.50	Not Detected	1.8	Not Detected
1,1-Dichloroethane	0.50	Not Detected	2.0	Not Detected
2-Butanone (Methyl Ethyl Ketone)	0.50	Not Detected	1.5	Not Detected
cis-1,2-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Tetrahydrofuran	0.50	Not Detected	1.5	Not Detected
Chloroform	0.50	Not Detected	2.4	Not Detected
1,1,1-Trichloroethane	0.50	Not Detected	2.7	Not Detected
Cyclohexane	0.50	Not Detected	1.7	Not Detected
Carbon Tetrachloride	0.50	Not Detected	3.1	Not Detected
2,2,4-Trimethylpentane	0.50	Not Detected	2.3	Not Detected
Benzene	0.50	Not Detected	1.6	Not Detected
1,2-Dichloroethane	0.50	Not Detected	2.0	Not Detected
Heptane	0.50	Not Detected	2.0	Not Detected
Trichloroethene	0.50	Not Detected	2.7	Not Detected
1,2-Dichloropropane	0.50	Not Detected	2.3	Not Detected
1,4-Dioxane	2.0	Not Detected	7.2	Not Detected
Bromodichloromethane	0.50	Not Detected	3.4	Not Detected
cis-1,3-Dichloropropene	0.50	Not Detected	2.3	Not Detected
4-Methyl-2-pentanone	0.50	Not Detected	2.0	Not Detected
Toluene	0.50	Not Detected	1.9	Not Detected
trans-1,3-Dichloropropene	0.50	Not Detected	2.3	Not Detected
1,1,2-Trichloroethane	0.50	Not Detected	2.7	Not Detected

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: Lab Blank

Lab ID#: 0604514-11A

MODIFIED EPA METHOD TO-14A GC/MS FULL SCAN

File Name:	8050106	Date of Collection: NA	
Dil. Factor:	1.00	Date of Analysis: 5/1/06 01:43 PM	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Tetrachloroethene	0.50	Not Detected	3.4	Not Detected
2-Hexanone	2.0	Not Detected	8.2	Not Detected
Dibromochloromethane	0.50	Not Detected	4.2	Not Detected
1,2-Dibromoethane (EDB)	0.50	Not Detected	3.8	Not Detected
Chlorobenzene	0.50	Not Detected	2.3	Not Detected
Ethyl Benzene	0.50	Not Detected	2.2	Not Detected
m,p-Xylene	0.50	Not Detected	2.2	Not Detected
o-Xylene	0.50	Not Detected	2.2	Not Detected
Styrene	0.50	Not Detected	2.1	Not Detected
Bromoform	0.50	Not Detected	5.2	Not Detected
Cumene	0.50	Not Detected	2.4	Not Detected
1,1,2,2-Tetrachloroethane	0.50	Not Detected	3.4	Not Detected
Propylbenzene	0.50	Not Detected	2.4	Not Detected
4-Ethyltoluene	0.50	Not Detected	2.4	Not Detected
1,3,5-Trimethylbenzene	0.50	Not Detected	2.4	Not Detected
1,2,4-Trimethylbenzene	0.50	Not Detected	2.4	Not Detected
1,3-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
1,4-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
alpha-Chlorotoluene	0.50	Not Detected	2.6	Not Detected
1,2-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
1,2,4-Trichlorobenzene	2.0	Not Detected	15	Not Detected
Hexachlorobutadiene	2.0	Not Detected	21	Not Detected
Naphthalene	2.0	Not Detected	10	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	102	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	105	70-130

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: CCV

Lab ID#: 0604514-12A

MODIFIED EPA METHOD TO-14A GC/MS FULL SCAN

File Name:	8050102	Date of Collection: NA	
Dil. Factor:	1.00	Date of Analysis: 5/1/06 11:04 AM	

Compound	%Recovery
Freon 12	91
Freon 114	94
Chloromethane	85
Vinyl Chloride	90
1,3-Butadiene	82
Bromomethane	80
Chloroethane	73
Freon 11	95
Ethanol	92
Freon 113	93
1,1-Dichloroethene	91
Acetone	91
2-Propanol	91
Carbon Disulfide	87
3-Chloropropene	96
Methylene Chloride	90
Methyl tert-butyl ether	82
trans-1,2-Dichloroethene	83
Hexane	88
1,1-Dichloroethane	92
2-Butanone (Methyl Ethyl Ketone)	85
cis-1,2-Dichloroethene	86
Tetrahydrofuran	77
Chloroform	94
1,1,1-Trichloroethane	95
Cyclohexane	87
Carbon Tetrachloride	105
2,2,4-Trimethylpentane	90
Benzene	81
1,2-Dichloroethane	100
Heptane	90
Trichloroethene	92
1,2-Dichloropropane	87
1,4-Dioxane	94
Bromodichloromethane	99
cis-1,3-Dichloropropene	96
4-Methyl-2-pentanone	95
Toluene	97
trans-1,3-Dichloropropene	103
1,1,2-Trichloroethane	85

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: CCV

Lab ID#: 0604514-12A

MODIFIED EPA METHOD TO-14A GC/MS FULL SCAN

File Name:	8050102	Date of Collection: NA	
Dil. Factor:	1.00	Date of Analysis: 5/1/06 11:04 AM	

Compound	%Recovery
Tetrachloroethene	94
2-Hexanone	95
Dibromochloromethane	98
1,2-Dibromoethane (EDB)	96
Chlorobenzene	92
Ethyl Benzene	93
m,p-Xylene	93
o-Xylene	93
Styrene	94
Bromoform	102
Cumene	90
1,1,2,2-Tetrachloroethane	91
Propylbenzene	92
4-Ethyltoluene	90
1,3,5-Trimethylbenzene	98
1,2,4-Trimethylbenzene	95
1,3-Dichlorobenzene	92
1,4-Dichlorobenzene	101
alpha-Chlorotoluene	99
1,2-Dichlorobenzene	88
1,2,4-Trichlorobenzene	87
Hexachlorobutadiene	115
Naphthalene	76

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	100	70-130
Toluene-d8	104	70-130
4-Bromofluorobenzene	108	70-130

@ AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: LCS

Lab ID#: 0604514-13A

MODIFIED EPA METHOD TO-14A GC/MS FULL SCAN

File Name:	8050103	Date of Collection: NA	
Dil. Factor:	1.00	Date of Analysis: 5/1/06 11:31 AM	

Compound	%Recovery
Freon 12	96
Freon 114	98
Chloromethane	91
Vinyl Chloride	93
1,3-Butadiene	96
Bromomethane	86
Chloroethane	81
Freon 11	102
Ethanol	92
Freon 113	98
1,1-Dichloroethene	94
Acetone	102
2-Propanol	94
Carbon Disulfide	99
3-Chloropropene	111
Methylene Chloride	93
Methyl tert-butyl ether	91
trans-1,2-Dichloroethene	92
Hexane	96
1,1-Dichloroethane	98
2-Butanone (Methyl Ethyl Ketone)	95
cis-1,2-Dichloroethene	92
Tetrahydrofuran	79
Chloroform	96
1,1,1-Trichloroethane	97
Cyclohexane	93
Carbon Tetrachloride	109
2,2,4-Trimethylpentane	107
Benzene	84
1,2-Dichloroethane	102
Heptane	96
Trichloroethene	94
1,2-Dichloropropane	92
1,4-Dioxane	90
Bromodichloromethane	97
cis-1,3-Dichloropropene	87
4-Methyl-2-pentanone	101
Toluene	101
trans-1,3-Dichloropropene	94
1,1,2-Trichloroethane	85

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: LCS

Lab ID#: 0604514-13A

MODIFIED EPA METHOD TO-14A GC/MS FULL SCAN

File Name:	8050103	Date of Collection: NA	
Dil. Factor:	1.00	Date of Analysis: 5/1/06 11:31 AM	

Compound	%Recovery
Tetrachloroethene	96
2-Hexanone	89
Dibromochloromethane	91
1,2-Dibromoethane (EDB)	94
Chlorobenzene	96
Ethyl Benzene	94
m,p-Xylene	91
o-Xylene	82
Styrene	86
Bromoform	83
Cumene	101
1,1,2,2-Tetrachloroethane	90
Propylbenzene	106
4-Ethyltoluene	101
1,3,5-Trimethylbenzene	90
1,2,4-Trimethylbenzene	66 Q
1,3-Dichlorobenzene	91
1,4-Dichlorobenzene	97
alpha-Chlorotoluene	115
1,2-Dichlorobenzene	88
1,2,4-Trichlorobenzene	111
Hexachlorobutadiene	109
Naphthalene	97

Q = Exceeds Quality Control limits.

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	106	70-130
Toluene-d8	103	70-130
4-Bromofluorobenzene	108	70-130

Appendix I

Proposed SVE System Component Vendors Information

PVC & CPVC Union Ball Valves

For information about ball valves, see page 370. For information about pipe size, see pages 2-3.

Pipe OD to Pipe Size Conversions

Pipe OD	5/8"	3/4"	1"	1 3/8"	1 5/8"	1 7/8"	2 3/8"	2 7/8"	3 1/2"
Pipe Size	3/8"	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"

Double-Union PVC and CPVC Ball Valves

Socket Weld

- Maximum Pressure: Fluids: 225 psi @ 70° F
- Vacuum Rating: 28" Hg
- Temperature Range: PVC: 40° to 140° F CPVC: 40° to 190° F
- Ports: Full

Union connections at both ends allow installation and repair without disturbing pipe connections. Seats are PTFE and tee handle is polypropylene. All can be used with Schedule 80 fittings and pipe. ***PVC valves*** have a PVC body, ball, and stem. Color is gray. ***CPVC valves*** withstand a wider temperature range and have a CPVC body, ball, and blowout-proof stem. Color is light gray. *EPDM O-rings* are used in general service applications. *Viton O-rings* are chemical resistant. **Connections:** Sizes 1/2" through 2" include a pair of NPT female adapters and a pair of socket-weld (not threaded) adapters. For 2 1/2", 3", and 4" sizes, choose NPT female threaded or socket weld (not threaded) adapters.

Pipe Size	End-to-End Lg.	PVC VALVES EPDM O-Rings	Each	PVC VALVES Viton O-Rings	Each	CPVC VALVES EPDM O-Rings	Each	CPVC VALVES Viton
Threaded and Socket-Weld (Not Threaded) Connections								
1/2"	4 5/8"	**4887K51**	$17.13	**4887K33**	$20.38	**4719K11**	$25.52	**4719K**
3/4"	4 3/4"	**4887K52**	20.69	**4887K34**	24.18	**4719K12**	31.94	**4719K**
1"	5 1/4"	**4887K53**	24.59	**4887K35**	28.71	**4719K13**	39.05	**4719K**
1 1/4"	6 3/16"	**4887K54**	32.34	**4887K36**	39.03	**4719K14**	54.40	**4719K**
1 1/2"	6 3/4"	**4887K55**	40.79	**4887K37**	47.60	**4719K15**	64.63	**4719K**
2"	8"	**4887K56**	53.66	**4887K38**	62.81	**4719K16**	89.27	**4719K**
Threaded Connections Only								
2 1/2"	10 11/16"	**4887K44**	125.42	**4887K42**	148.18	**4719K27**	178.32	**4719K**
3"	10 9/16"	**4887K71**	106.54	**4887K13**	131.53	**4719K31**	254.06	**4719K**
4"	12 15/16"	**4887K72**	188.07	**4887K14**	222.68	**4719K32**	376.63	**4719K**
Socket-Weld (Not Threaded) Connections Only								
2 1/2"	10 11/16"	**4887K43**	125.42	**4887K41**	148.18	**4719K47**	178.32	**4719K**
3"	10 9/16"	**4887K75**	112.47	**4887K23**	131.53	**4719K71**	279.47	**4719K**
4"	12 15/16"	**4887K76**	188.07	**4887K24**	222.68	**4719K72**	376.63	**4719K**

BSPP Double-Union PVC and CPVC Ball Valves

- Maximum Pressure: Fluids: 1/2" to 2": 235 psi @ 73° F 2 1/2" to 4": 150 psi @ 73° F
- Vacuum Rating: 26" Hg
- Temperature Range: PVC: 40° to 140° F; CPVC: 40° to 200° F
- Ports: Full

Designed to fit British Standard Pipe Parallel thread, these valves have union connections at both ends that permit service without disturbing pipe connections. (For more information about BSPP thread, see page 3). All are NSF certified for drinking water and can be used with Schedule 80 fittings and pipe. They have Viton O-rings, PTFE seats, and polypropylene tee handle. ***PVC valves*** are dark gray and have a PVC body, ball, and stem. ***CPVC valves*** offer a higher max. temperature and have a CPVC body, ball, and stem. Color is light gray. **Connections:** BSPP female.

Pipe Size	End-to-End Lg.	PVC	Each	CPVC	Each
1/2"	5 3/16"	**4543K41**	$32.38	**4727K31**	$42.70
3/4"	6 3/16"	**4543K42**	38.30	**4727K32**	53.78
1"	6 9/16"	**4543K43**	45.67	**4727K33**	64.01
1 1/4"	7 1/16"	**4543K44**	72.38	**4727K34**	101.80
1 1/2"	8 1/32"	**4543K45**	75.83	**4727K35**	107.48
2"	8 13/16"	**4543K46**	99.26	**4727K36**	148.72
2 1/2"	11 7/8"	**4543K77**	205.88	**4727K67**	280.44
3"	11 15/16"	**4543K78**	222.59	**4727K68**	327.93
4"	13 3/16"	**4543K79**	373.21	**4727K69**	584.38

Economy Double-Union PVC Ball Valves

- Maximum Pressure: W.O.G.: (water, oil, inert gas): 240 psi @ 73° F
- Vacuum Rating: Not rated
- Temperature Range: 32° to 112° F
- Ports: Full

A lower maximum temperature makes these valves an economical alternative to the those at the top of this page. Union connections at both ends allow installation and service without disrupting pipe connections. Valves can be used with Schedule 80 fittings and pipe. Body and ball are PVC, seats are PTFE, and tee handle is polypropylene. Color is dark gray. ***EPDM O-rings*** are used in general service applications. ***Viton O-rings*** are chemical resistant.

Connections: Valves include NPT female and socket-weld (not threaded) adapters.

Pipe Size	End-to-End Lg.	EDPM O-Rings	Each	Viton O-Rings	Each
1/2"	3 5/16"	**4852T12**	$15.03	**4852T34**	$17.78
3/4"	4 1/2"	**4852T13**	16.67	**4852T35**	20.00
1"	4 7/8"	**4852T14**	20.00	**4852T36**	23.31
1 1/4"	5 19/32"	**4852T15**	28.89	**4852T37**	33.90
1 1/2"	6 9/16"	**4852T16**	33.90	**4852T38**	37.23
2"	7 51/64"	**4852T17**	46.12	**4852T39**	49.47

Double-Union Metering PVC Ball

Socket Weld

- Maximum Pressure: Water: 150
- Vacuum Rating: Not rated
- Temperature Range: 32° to 140°
- Ports: Full

Metering ball valves have an integral flow meter to indicate degrees of opening (0° to 90°). You can determine flow at a known pressure. Designed for water service only. Union connections at each end allow easy installation and repair. Valves can be used with Schedule 80 fittings and pipe. Body, ball, stem, and tee handle are PVC. Seat is PTFE. Color is dark gray. ***EPDM O-rings*** are used in general service applications. ***Viton O-rings*** are chemical resistant.

Connections: To Order: Please specify NPT female or socket-weld (not threaded).

Pipe Size	End-to-End Lg. EDPM O-Rings	Each	End-to-End Lg. Viton O-R
3/8"	4 29/64"	**4490K1**	$69.62	4 9/64"	**4490K**
1/2"	4 1/2"	**4490K2**	72.10	4 11/64"	**4490K**

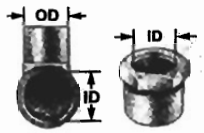
Double-Union PVC and CPVC Ball Valves with Locking Handle

- Maximum Pressure: Fluids: 235 psi @ 100° F
- Vacuum Rating: 26" Hg
- Temperature Range: 40° to 140°
- Ports: Full

Squeeze handle to lock and prevent opening accidently. Union connections at both ends allow service without disrupting pipe connections. NSF certified for use with drinking water; can be used with Schedule 80 fittings and pipe. Body is PVC, seats are PTFE, and tee handle is polypropylene. Color is dark gray. ***EPDM O-rings*** are used in general service applications. ***Viton O-rings*** are chemical resistant. **Connections:** Include NPT female and socket-weld (not threaded) adapters.

Pipe Size	End-to-End Lg. NPT Female	Socket Weld	EPDM O-Rings	Each	Viton O
PVC Valves					
1/2"	3 3/16"	4 3/16"	**4812T21**	$16.14	**4812T33**
3/4"	4 1/4"	4 3/4"	**4812T23**	19.09	**4812T3**
1"	4 11/16"	5 1/8"	**4812T25**	22.74	**4812T3**
1 1/4"	5 3/16"	5 3/4"	**4812T27**	31.46	**4812T3**
1 1/2"	5 7/16"	6 1/4"	**4812T29**	37.89	**4812T4**
2"	6 3/4"	7 3/4"	**4812T31**	49.99	**4812T43**
CPVC Valves					
1/2"	3 3/16"	4 3/16"	**4823T45**	21.31	**4823T57**
3/4"	4 1/4"	4 3/4"	**4823T47**	26.84	**4823T59**
1"	4 11/16"	5 1/8"	**4823T49**	31.95	**4823T61**
1 1/4"	5 3/16"	5 3/4"	**4823T51**	50.79	**4823T63**
1 1/2"	5 7/16"	6 1/4"	**4823T53**	53.65	**4823T65**
2"	6 3/4"	7 3/4"	**4823T55**	71.75	**4823T67**

For information about selecting and measuring pipe and fittings, see pages 2-3.
For information about plastic fittings and pipe, see page 61.



Unthreaded *Threaded*

Please Read Before Ordering: Pipe size is the accepted industry designation, not the actual measured size. To determine pipe size, first measure the outside diameter (OD) or inside diameter (ID), as shown at left. For ***unthreaded*** fittings, take the actual measurement and select the corresponding pipe size. For ***threaded*** fittings, round up the measurement to the closest ID listed in the chart below and select the corresponding pipe size. For example, if the threaded pipe fitting ID measures 1 3/16", the next highest ID in the chart is 1 3/8", and the corresponding pipe size is 1".

Unthreaded OD or ID	—	0.675"	0.840"	1.050"	1.315"	1.660"	1.90"	2.375"	2.875"	3.50"	4.50"	6.625"	8.625"
Threaded ID	1/2"	—	3/4"	1"	1 3/8"	1 5/8"	1 7/8"	2 3/8"	2 7/8"	3 1/2"	4 1/2"	—	—
Pipe Size	1/4"	3/8"	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"	6"	8"

Standard-Wall (Schedule 40) White PVC Pipe Fittings

- NSF-61 certified for use with drinking (potable) water
- Maximum Temperature: 140° F
- Pipe: Use standard-wall (Schedule 40) white PVC unthreaded (see page 63)

Offering corrosion resistance, strength, and rigidity, these standard-wall PVC fittings are the most common choice for plastic fittings in low-pressure plumbing applications. They meet ASTM D1784 and D2466.

Connect fittings to pipe by cementing the pipe end (male) into the socket end (female) using a primer and cement (see page 66). The pipe end is also known as a spigot. Connections: Unthreaded socket end (female), unthreaded pipe end (male), or threaded (NPT).

Unthreaded Socket End (Female) to Unthreaded Socket End (Female)






Pipe Size	90° Elbows	Each	45° Elbows	Each	Tees	Each	Crosses	Each	Caps	Each	Couplings Lg.	Couplings	Each
3/8"	4880K108	$1.54			4880K109	$1.18					1 9/32"	4880K114	$0.54
1/2"	4880K21	.31	4880K31	$0.51	4880K41	.38	4880K241	$1.17	4880K51	$0.28	1 21/32"	4880K71	.20
3/4"	4880K22	.35	4880K32	.78	4880K42	.43	4880K242	1.94	4880K52	.32	1 11/16"	4880K72	.28
1"	4880K23	.62	4880K33	.94	4880K43	.82	4880K243	2.42	4880K53	.51	2 3/32"	4880K73	.48
1 1/4"	4880K24	1.10	4880K34	1.31	4880K44	1.28	4880K244	3.20	4880K54	.72	2 5/8"	4880K74	.66
1 1/2"	4880K25	1.17	4880K35	1.64	4880K45	1.55	4880K245	3.62	4880K55	.78	2 5/8"	4880K75	.72
2"	4880K26	1.83	4880K36	2.14	4880K46	2.26	4880K246	5.34	4880K56	.94	2 7/8"	4880K76	1.10
2 1/2"	4880K103	5.56	4880K113	5.57	4880K123	7.45	4880K247	11.32	4880K143	2.99	4 7/32"	4880K133	2.42
3"	4880K27	6.67	4880K37	8.66	4880K47	9.78	4880K248	13.88	4880K57	3.28	4 1/4"	4880K77	3.78
4"	4880K28	11.92	4880K38	15.53	4880K48	17.69	4880K249	20.56	4880K58	7.45	4 1/4"	4880K78	5.46
6"	4880K101	25.72	4880K111	26.02	4880K121	37.43	—	—	4880K141	12.12	7 5/16"	4880K131	11.74
8"	4880K102	61.37	4880K112	58.01	4880K122	86.84	—	—	4880K142	29.10	9 5/16"	4880K132	21.90

Reducing Tees

Pipe Size, (A) × (B) × (C)		Each	Pipe Size, (A) × (B) × (C)		Each
3/4" × 1/2" × 3/4"	4880K971	$0.51	2" × 1 1/2" × 2"	4880K978	$2.42
1" × 3/4" × 3/4"	4880K972	1.45	2 1/2" × 1 1/4" × 2 1/2"	4880K979	7.42
1" × 1/2" × 1"	4880K973	.87	2 1/2" × 2" × 2 1/2"	4880K981	7.42
1" × 3/4" × 1"	4880K974	.94	3" × 2" × 3"	4880K982	10.62
1 1/4" × 1" × 1"	4880K975	1.97	4" × 3" × 4"	4880K983	17.69
1 1/2" × 3/4" × 1 1/2"	4880K976	2.46	6" × 4" × 6"	4880K984	37.43
1 1/2" × 1" × 1 1/2"	4880K977	2.46	8" × 6" × 8"	4880K985	86.84

Unions

Pipe Size		Each
1/2"	4880K301	$2.99
3/4"	4880K302	3.41
1"	4880K303	3.51
1 1/4"	4880K304	11.30
1 1/2"	4880K305	11.79
2"	4880K306	15.88

Unthreaded Pipe End (Male) to Unthreaded Socket End (Female)

Hex Reducing Bushings

Pipe Size, Male × Female		Each	Pipe Size, Male × Female		Each	Pipe Size, Male × Female		Each
3/4" × 1/2"	4880K313	$0.35	2" × 3/4"	4880K337	$1.50	3" × 1 1/2"	4880K519	$3.58
1" × 1/2"	4880K314	.64	2" × 1"	4880K338	1.50	3" × 2"	4880K612	3.58
1" × 3/4"	4880K315	.64	2" × 1 1/4"	4880K339	1.50	3" × 2 1/2"	4880K613	3.58
1 1/4" × 1/2"	4880K171	.86	2" × 1 1/2"	4880K512	1.50	4" × 2"	4880K614	7.22
1 1/4" × 3/4"	4880K317	.86	2 1/2" × 1"	4880K513	2.42	4" × 2 1/2"	4880K616	8.01
1 1/4" × 1"	4880K318	.75	2 1/2" × 1 1/4"	4880K514	2.42	4" × 3"	4880K615	8.01
1 1/2" × 1/2"	4880K319	.80	2 1/2" × 1 1/2"	4880K515	2.42	6" × 2"	4880K181	13.40
1 1/2" × 3/4"	4880K333	.80	2 1/2" × 2"	4880K516	2.42	6" × 4"	4880K183	18.21
1 1/2" × 1"	4880K334	.80	3" × 1"	4880K517	3.58	8" × 4"	4880K185	43.15
1 1/2" × 1 1/4"	4880K335	.80	3" × 1 1/4"	4880K518	3.58	8" × 6"	4880K186	43.15
2" × 1/2"	4880K172	1.50						

90° Elbows

Pipe Size		Each
1/2"	4880K771	$0.87
3/4"	4880K772	1.06
1"	4880K773	1.85
1 1/4"	4880K774	2.18
1 1/2"	4880K775	2.42
2"	4880K776	4.67

Unthreaded Pipe End (Male) to Threaded End

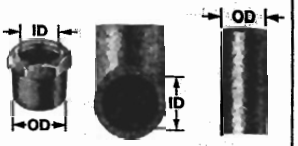
Hex Reducing Bushings, Pipe End (A) × Female NPT (B)

Pipe Size, (A) × (B)		Each	Pipe Size, (A) × (B)		Each	Pipe Size, (A) × (B)		Each	Pipe Size, (A) × (B)		Each
1/2" × 1/4"	4880K199	$0.66	1 1/2" × 3/4"	4880K208	$1.45	2" × 1 1/2"	4880K216	$1.94	3" × 1 1/2"	4880K228	$3.23
3/4" × 1/2"	4880K201	.51	1 1/2" × 1"	4880K209	1.45	2 1/2" × 1"	4880K217	2.81	3" × 2"	4880K229	3.23
1" × 1/2"	4880K202	.82	1 1/2" × 1 1/4"	4880K211	1.45	2 1/2" × 1 1/4"	4880K218	2.81	3" × 2 1/2"	4880K224	3.23
1" × 3/4"	4880K203	.82	2" × 1/2"	4880K212	1.94	2 1/2" × 1 1/2"	4880K219	2.81	4" × 2"	4880K231	7.22
1 1/4" × 1/2"	4880K204	1.26	2" × 3/4"	4880K213	1.94	2 1/2" × 2"	4880K221	2.81	4" × 2 1/2"	4880K225	7.22
1 1/4" × 3/4"	4880K205	1.26	2" × 1"	4880K214	1.94	3" × 1"	4880K222	3.23	4" × 3"	4880K233	7.22
1 1/4" × 1"	4880K206	1.26	2" × 1 1/4"	4880K215	1.94	3" × 1 1/4"	4880K223	3.23	6" × 4"	4880K235	17.94
1 1/2" × 1/2"	4880K207	1.45									

(Continued on following page)

Warning! *Never use PVC fittings and pipe with compressed air or gas.*

Please Read Before Ordering: Pipe size is the accepted industry designation, not the actual measured size. To determine pipe size, first measure the outside diameter (OD) or inside diameter (ID), as shown at right. For ***threaded*** fittings, round up the measurement to the closest OD or ID listed in the chart below and select the corresponding pipe size. For example, if the threaded OD or ID measures 1³⁄₁₆", the next highest OD or ID in the chart is 1³⁄₈", and the corresponding pipe size is 1". For ***unthreaded*** fittings, take the actual measurement and select the corresponding pipe size.



Threaded Fitting *Unthreaded Fitting* *Unthreaded Pipe*

Threaded OD or ID	½"	⅝"	¾"	1"	1³⁄₈"	1⅝"	1⅞"	2⅜"	2⅞"	3½"	4½"	6⅝"	8⅝"
Unthreaded ID	0.54"	0.675"	0.84"	1.05"	1.315"	1.66"	1.90"	2.375"	2.875"	3.50"	4.50"	6.625"	8.625"
Pipe Size	¼"	⅜"	½"	¾"	1"	1¼"	1½"	2"	2½"	3"	4"	6"	8"

Standard-Wall (Schedule 40) White PVC Pipe Fittings *(Continued from previous page)*

Threaded End to Unthreaded Socket End (Female)



Pipe Size	90° Elbows	Each	Male × Female Adapters	Each	Female Adapters	Each
½"	4880K321	$0.36	4880K61	$0.28	4880K81	$0.35
¾"	4880K322	.42	4880K62	.31	4880K82	.43
1"	4880K323	.78	4880K63	.54	4880K83	.51
1¼"	4880K324	1.31	4880K64	.66	4880K84	.78
1½"	4880K325	1.45	4880K65	.90	4880K85	.90
2"	4880K326	3.75	4880K66	1.17	4880K86	1.21
2½"	4880K327	9.26	4880K163	3.47	4880K153	3.04
3"	4880K328	13.88	4880K67	5.08	4880K87	4.08
4"	4880K329	21.04	4880K68	6.47	4880K88	6.78
6"	—	—	4880K161	11.44	4880K151	16.91
8"	—	—	4880K162	48.17	4880K152	30.50

REDUCING ADAPTERS


Male NPT × Socket End (Female)

Pipe Size		Each
½" × ⅜"	4880K431	$0.52
¾" × ½"	4880K433	.48
1" × ¾"	4880K435	1.61
1¼" × 1"	4880K437	1.97
1½" × 1¼"	4880K439	2.38
2" × 1½"	4880K442	2.72

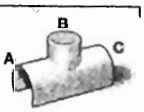
Socket End (Female) × Male NPT

Pipe Size		Each
¾" × ½"	4880K432	$0.52
1" × ¾"	4880K434	.75
1¼" × 1"	4880K436	1.75
1½" × 1¼"	4880K438	1.97
2" × 1½"	4880K441	2.38
2½" × 2"	4880K443	4.23
3" × 2½"	4880K444	5.12
4" × 3"	4880K445	8.19

Snap-On Tees with NPT Female Threaded Outlet

Get a tee connection without removing any of your piping system. Simply apply primer and cement, then snap over a pipe. When the cement is cured, drill a hole through the fitting and pipe.

Pipe Size, (A) × (B) × (C)		Each
¾" × ¾" × ¾"	4880K104	$1.39
¾" × ½" × ¾"	4880K105	1.17
1" × ½" × 1"	4880K106	$2.11
1" × ¾" × 1"	4880K107	2.11



Threaded End to Threaded End


Unions

Pipe Size		Each
½"	4880K371	$3.36
¾"	4880K372	3.68
1"	4880K373	7.65
1¼"	4880K374	13.14
1½"	4880K375	13.44
2"	4880K376	16.50

Hex Reducing Bushings

Pipe Size, Male × Female		Each
⅜" × ¼"	4880K342	$1.45
½" × ¼"	4880K343	1.45
½" × ⅜"	4880K344	1.45
¾" × ¼"	4880K345	.90
¾" × ⅜"	4880K346	.90
¾" × ½"	4880K347	.90
1" × ½"	4880K348	1.26
1" × ¾"	4880K349	$1.26
1¼" × ½"	4880K351	1.87
1¼" × ¾"	4880K352	1.87
1¼" × 1"	4880K353	1.87
1½" × ½"	4880K354	2.26
1½" × ¾"	4880K355	2.26
1½" × 1"	4880K356	2.26
1½" × 1¼"	4880K357	$2.26
2" × 1"	4880K358	2.42
2" × 1¼"	4880K359	2.42
2" × 1½"	4880K361	2.42
2½" × 2"	4880K363	8.46
3" × 2"	4880K362	9.99

Selectable-Angle Standard-Wall (Schedule 40) White PVC Unthreaded Pipe Elbows

- NSF-61 certified for use with drinking (potable) water
- Maximum Temperature: 140° F
- Pipe: Use standard-wall (Schedule 40) white PVC unthreaded (see below)

Always have the right elbow on hand to complete your job—you can cut these two-piece elbows to any angle you need. Furnished as a 90° elbow, they have cutting guides at 22½°, 33¾°, 45°, 56¼°, 67½°, and 78¾° angles; they also have a measuring template so you can cut a custom angle. After cutting, prime and cement the two pieces together (see page 66 for primer and cement). They're IAPMO listed and meet ASTM D2466. Connections: Socket end (female).

Pipe Size		Each
1½"	4747T11	$5.35
2"	4747T12	6.71
3"	4747T13	18.88
4"	4747T14	24.69

Standard-Wall (Schedule 40) White PVC Unthreaded Pipe

- NSF-61 certified for use with drinking (potable) water
- Maximum Pressure: See below
- Maximum Temperature: 140° F
- Fittings: Use standard-wall (Schedule 40) white PVC (see page 62 and above)

PVC is the most popular plastic material for low-pressure plumbing applications, offering good corrosion resistance, strength, and rigidity. This pipe meets ASTM D1784 and D1785 and CSA B137.3-99.

Connect pipe to fittings by cementing the pipe end (male) into the socket end (female) using a primer and cement (see page 66).

Pipe Size	ID	Max. psi @ 73° F	5-ft. Lengths	Each	10-ft. Lengths	Each
½"	0.354"	780	48925K21★	$3.56	48925K41★	$5.46
¾"	0.483"	620	48925K22★	4.70	48925K42★	7.21
1"	0.608"	600	48925K91	1.88	48925K11	2.50
1¼"	0.810"	480	48925K92	2.50	48925K12	3.33
1½"	0.935"	450	48925K93	3.68	48925K13	4.90
2"	1.383"	370	48925K94	4.98	48925K14	6.63

★ Available in dark gray.

Pipe Size	ID	Max. psi @ 73° F	5-ft. Lengths	Each	10-ft. Lengths	Each
1½"	1.592"	330	48925K95	$5.86	48925K15	$7.82
2"	2.049"	280	48925K96	7.85	48925K16	10.47
2½"	2.445"	300	48925K99	13.92	48925K19	20.88
3"	3.042"	260	48925K97	14.41	48925K17	21.62
4"	3.998"	220	48925K98	20.51	48925K18	30.77
6"	6.031"	180	48925K25	35.73	48925K45	53.62
8"	7.943"	160	48925K26	53.64	48925K46	80.47

Warning! *Never use PVC fittings and pipe with compressed air or gas.*

AIRTECH® VACUUM

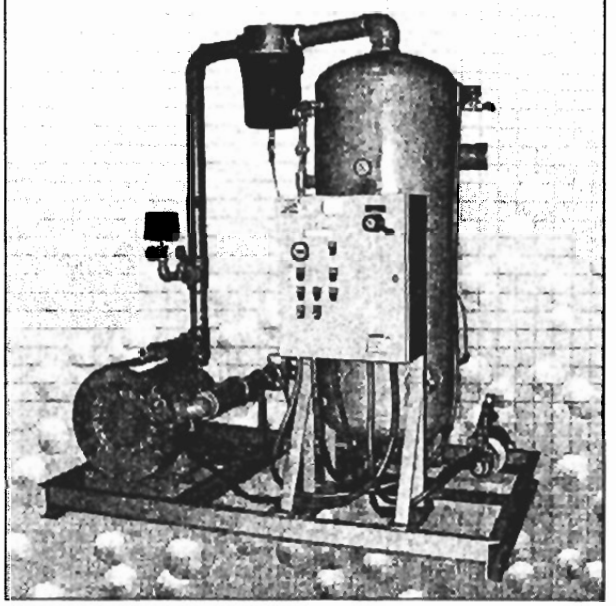
Soil Vapor Extraction Systems

The typical soil remediation system utilizes two regenerative blowers for sparging and soil vapor extraction. The extraction blower works in combination with a liquid separator and particulate filter extracting contaminants from the soil.

The Airtech Soil Vapor Extraction (SVE) System features:

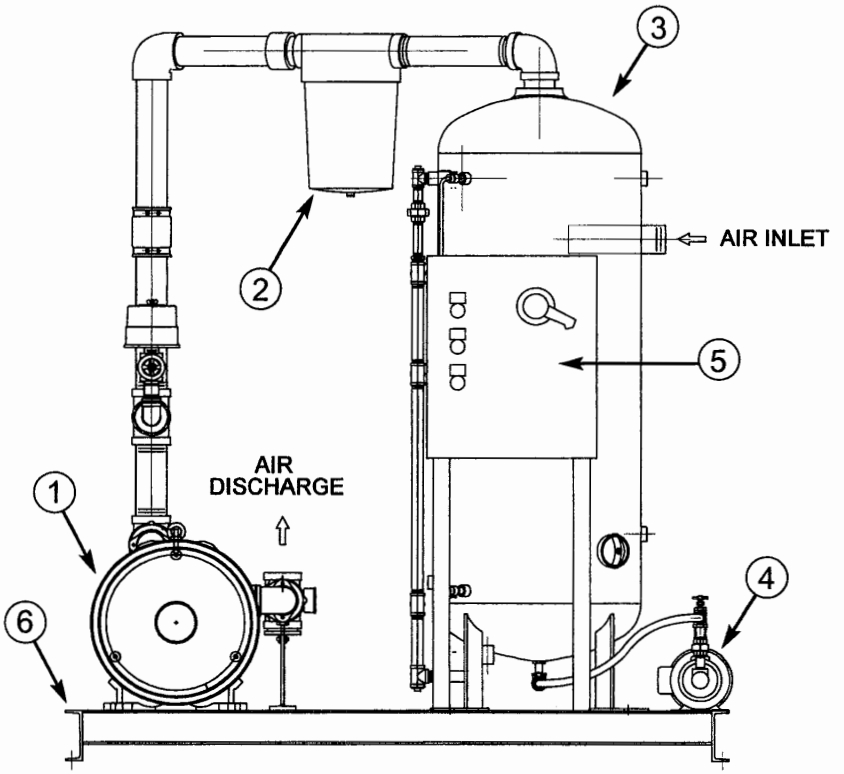
- High-Performance Regenerative Blowers with flow capacities up to 1500 CFM.
- Extraction vacuum levels as high as 20"Hg.
- Sparging pressures up to 13 PSIG
- Moisture separator with sight glass, level switches and auto drain
- Easy access inlet particulate filter assembly
- State of the art motor control center
- Vacuum and pressure instrumentation for system monitoring
- UL/CSA approved components

Soil Vapor Extraction & Sparging System



System Layout:

1. Regenerative Blower
2. Inlet Particulate Filter
3. Moisture Separator/Knock-out pot
4. Liquid Transfer Pump
5. Motor Control Center
6. Steel Base



AIRTECH® VACUUM ENGLEWOOD, NJ 07631

TEL: (888) 222-9940 FAX: (201) 569-1696

Soil Vapor Extraction System - SVE

1-SVE1500-2.4

Simplex Vacuum Blower Extraction System- Base Mounted includes the following:

(1) 2BH1500-7AV35 Siemens Regenerative Vacuum Blower – 2.35 HP TEFC, 1 phase, 230 volt, 60 Hz. Blower will provide 150 cfm and can pull to 70" H2O.

(1) Inlet Filter Assembly

(1) relief valve set at 70"H2O
(1) wire mesh element
(1) 40 gallon moisture separator - with level switch, level gauge
(1) vacuum gauge

Simplex NEMA 3R Control Panel – single phase – 230 Volt

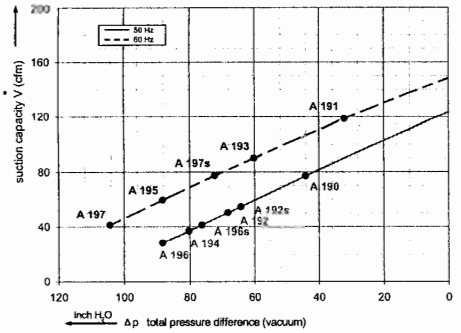
Circuit breaker disconnect
Control circuit transformer
High separator level shutdown with light

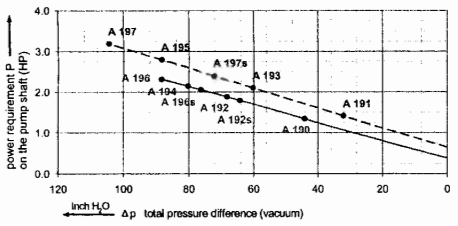
UL approved cabinet.

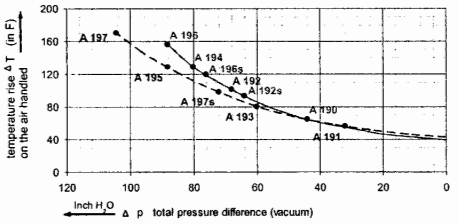
- System shall be base mounted, pre-piped, pre-wired, and thoroughly factory tested.

2BH1 500

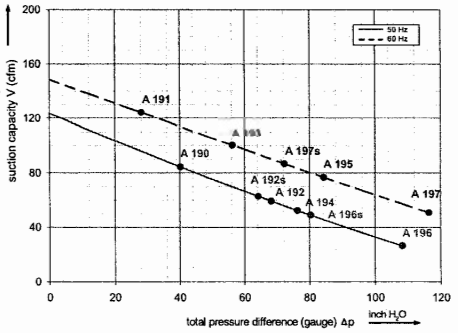
Performance curve for Vacuum pump

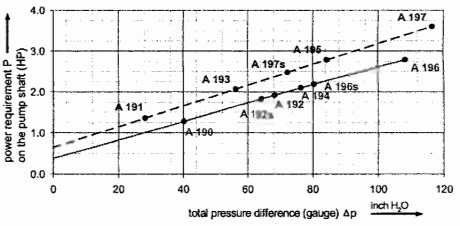


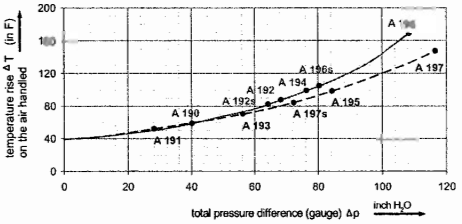




Performance curve for Compressor







The performance curves are based on air at a temperature of 59 F and an atmospheric pressure of 401.53 inch H2O with a tolerance of +/- 10 %.
The total pressure differences are valid for suction and ambient temperatures up to 77 F.
For other conditions please confer with us.

Each G_200 type can be applied both as vacuum pump and compressor in continuous operation over the total stated performance curve range. The motors are available as standard for the input voltage range of 50 and 60 Hz and for protection category IP 55 as well as approbated for UL and CSA. Blowers with ATEX 94/9 EG are available, too.

Selection and ordering data

Type 2BH1 500

Curve No.	Order No.	Frequency	Rated power	Input voltage		Input current		Permissible total differential pressure [2]		Sound pressure level [3]	Weight ca.
								Vacuum	Compressor		
		Hz	HP	V		A		inch H2O	inch H2O	dB(A)	lbs
3~ 50/60 Hz IP55 isulation material class F 1)											
A 190	2BH1500-7AH06	50	1.14	200D ... 240D	345Y ... 415Y	4.2D	2.4Y	-44	40	64	40
A 191	2BH1500-7AH06	60	1.27	220D ... 275D	380Y ... 480Y	4.0D	2.3Y	-32	28	70	40
A 192	2BH1500-7AH16	50	1.74	200D ... 240D	345Y ... 415Y	6.6D	3.8Y	-68	68	64	44
A 193	2BH1500-7AH16	60	2.0	220D ... 275D	380Y ... 480Y	6.9D	4.0Y	-60	56	70	44
A 194	2BH1500-7AH26	50	2.14	200D ... 240D	345Y ... 415Y	7.5D	4.3Y	-80	76	64	46
A 195	2BH1500-7AH26	60	2.75	220D ... 275D	380Y ... 480Y	7.6D	4.4Y	-88	84	70	46
A 196	2BH1500-7AH36	50	2.95	200D ... 240D	345Y ... 415Y	9.7D	5.6Y	-88	108	64	55
A 197	2BH1500-7AH36	60	3.42	220D ... 275D	380Y ... 480Y	10.3D	6.0Y	-104	116	70	55
1~ 50/60 Hz IP55 with attached condenser for continuous operation											
A 196s	2BH1500-7AV34	50	2.0	100	200	22.0	11.0	-76	80	64	48
A 197s	2BH1500-7AV34	60	2.35	100	200	24.0	12.0	-72	72	70	48
A 196s	2BH1500-7AV35	50	2.0	115	230	22.0	11.0	-76	80	64	48
A 197s	2BH1500-7AV35	60	2.35	115	230	24.0	12.0	-72	72	70	48
1~ 50 Hz IP55 with attached condenser for continuous operation											
A 192s	2BH1500-7AA11	50	1.47	230		6.9		-64	64	64	44

Other voltage ranges

		2BH1500-7A ☐ . ☐
50Hz	60Hz	↑ ↑
3~		
185...225 V D / 320...390 V Y	200...240 V D / 345...415 V Y	H 1
200...240 V D / 345...415 V Y	220...275 V D / 380...480 V Y	H 6
345...415 V D	380...480 V D	H 7
500 V D	575 V D	C 5

Machines according to the ATEX norm 94/4 EG are available for the whole performance range.
Following types available: Category 3 G, 3/2 G, 3 D and 3/2 D.

1~		
100 / 200 V	100 / 200 V	V 4
115 / 230 V	115 / 230 V	V 5
230 V	—	A 1

Further voltage range on request; please quote in plain text.

All G_200 achieve the standards and norms of the low voltage directive 72/23/EWG, rotating electrotechnical motor EN 60034-1-34, electromagnetic compatibility (EMC) DIN EN 61000-3/-6/-4.

1) For standard UL for ELECTRIC FANS UL 507 and CSA 22.2 No. 13 for Fans and Ventilators (Certificate Number E225239).

2) Relief-valve are available for limiting differential pressure.

3) Measuring-surface sound-pressure level acc. to DIN EN 21680, measured at a distance of 3.28 ft. The pump is throttled to an average suction pressure, a hose is connected to the discharge side (vacuum pump) / suction side (compressor), but is not fitted with relief valves.

The motors are designed according to the DIN EN 60 034 / DIN IEC 34-1 and temperature class F.

For the three phase machines the tolerances are +/- 10 % for fixed voltage and +/- 5 % for voltage range.

The single phase machines are designed with a +/- 5 % tolerances. If only 90 % of the maxium allowed pressure will be used for the continuousoperating then the allowed voltage range add to +/- 10 %.

For all single and three phase machines which designed according to the UL and CSA norm (UL 507 and CSA 22.2 No. 100) the maximum allowed voltage tolerances are - 10 % resp. + 6 %.

The frequency tolerance is maximum +/- 2 %.

Changes in particular the quoted performance curve, datas and weights without prior notice. The figures are without obligations.

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Germany

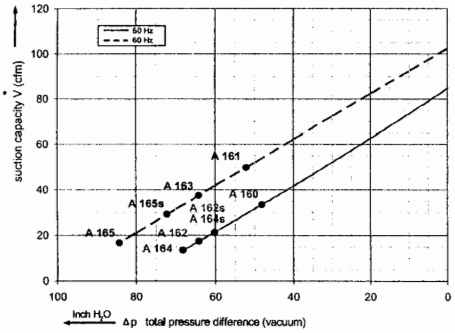
☎ +49 911 1454 – 0

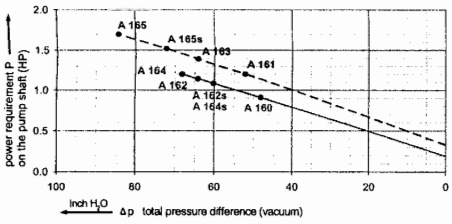
nash_elmo Industries GmbH

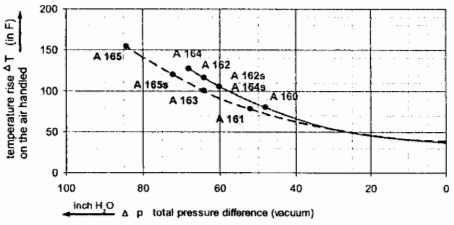
Industriestr. 26
97616 Bad Neustadt/Saale
Germany

2BH1 400

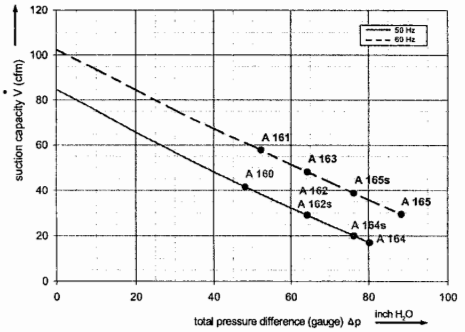
Performance curve for Vacuum pump

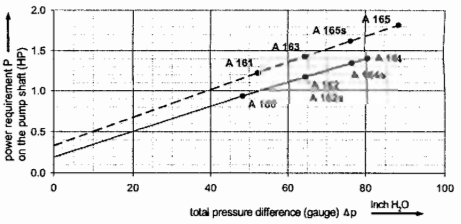


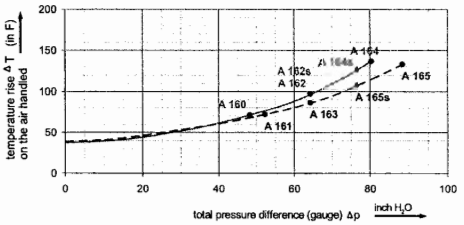




Performance curve for Compressor







The performance curves are based on air at a temperature of 59 F and an atmospheric pressure of 401.53 inch H2O with a tolerance of +/- 10 %.
The total pressure differences are valid for suction and ambient temperatures up to 77 F.
For other conditions please confer with us.

Each G_200 type can be applied both as vacuum pump and compressor in continuous operation over the total stated performance curve range. The motors are available as standard for the input voltage range of 50 and 60 Hz and for protection category IP 55 as well as approbated for UL and CSA. Blowers with ATEX 94/9 EG are available, too.

Selection and ordering data

Type 2BH1 400

Curve No.	Order No.	Fre-quency	Rated power	Input voltage		Input current		Permissible total differential pressure [2]		Sound pressure level [3]	Weight ca.
								Vacuum	Compressor		
		Hz	HP	V		A		inch H2O	inch H2O	dB(A)	lbs
3~ 50/60 Hz IP55 isulation material class F 1)											
A 160	2BH1400-7AH06	50	0.94	200D ... 240D	345Y ... 415Y	3.8 D	2.2 Y	-48	48	63	29
A 161	2BH1400-7AH06	60	1.11	220D ... 275D	380Y ... 480Y	3.75D	2.15Y	-52	52	64	29
A 162	2BH1400-7AH16	50	1.14	200D ... 240D	345Y ... 415Y	4.2 D	2.4 Y	-64	64	63	33
A 163	2BH1400-7AH16	60	1.27	220D ... 275D	380Y ... 480Y	4.0 D	2.3 Y	-64	64	64	33
A 164	2BH1400-7AH26	50	1.74	200D ... 240D	345Y ... 415Y	6.6 D	3.8 Y	-68	80	63	35
A 165	2BH1400-7AH26	60	2.0	220D ... 275D	380Y ... 480Y	6.9 D	4.0 Y	-84	88	64	35
1~ 50/60 Hz IP55 with attached condenser for continuous operation											
A 164s	2BH1400-7AV24	50	1.47	100	200	15.2	7.6	-60	76	63	35
A 165s	2BH1400-7AV24	60	1.74	100	200	17.2	8.6	-72	76	64	35
A 164s	2BH1400-7AV25	50	1.47	115	230	14.6	7.3	-60	76	63	35
A 165s	2BH1400-7AV25	60	1.74	115	230	16.6	8.3	-72	76	64	35
1~ 50 Hz IP55 with attached condenser for continuous operation											
A 162s	2BH1400-7AA11	50	1.07	230		5.2		-60	64	63	33

Other voltage ranges

		2BH1400-7A ☐. ☐
50Hz	60Hz	↑ ↑
3~		
185...225 V D / 320...390 V Y	200...240 V D / 345...415 V Y	H 1
200...240 V D / 345...415 V Y	220...275 V D / 380...480 V Y	H 6
345...415 V D	380...480 V D	H 7
500 V D	575 V D	C 5
Machines according to the ATEX norm 94/4 EG are available for the whole performance range. Following types available: Category 3 G, 3/2 G, 3 D and 3/2 D.		
1~		
100 / 200 V	100 / 200 V	V 4
115 / 230 V	115 / 230 V	V 5
230 V	---	A 1
Further voltage range on request; please quote in plain text.		

All G_200 achieve the standards and norms of the low voltage directive 72/23/EWG, rotating electrotechnical motor EN 60034-1-34, electromagnetic compatibility (EMC) DIN EN 61000-3/-6/-4.

1) For standard UL for ELECTRIC FANS UL 507 and CSA 22.2 No. 13 for Fans and Ventilators (Certificate Number E225239).

2) Relief-valve are available for limiting differential pressure.

3) Measuring-surface sound-pressure level acc. to DIN EN 21680, measured at a distance of 3.28 ft. The pump is throttled to an average suction pressure, a hose is connected to the discharge side (vacuum pump) / suction side (compressor), but is not fitted with relief valves.

The motors are designed according to the DIN EN 60 034 / DIN IEC 34-1 and temperature class F.

For the three phase machines the tolerances are +/- 10 % for fixed voltage and +/- 5 % for voltage range.

The single phase machines are designed with a +/- 5 % tolerances. If only 90 % of the maxium allowed pressure will be used for the continuousoperating then the allowed voltage range add to +/- 10 %.

For all single and three phase machines which designed according to the UL and CSA norm (UL 507 and CSA 22.2 No. 100) the maximum allowed voltage tolerances are - 10 % resp. + 6 %.

The frequency tolerance is maximum +/- 2 %.

Changes in particular the quoted performance curve, datas and weights without prior notice. The figures are without obligations.

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ENGLEWOOD, NJ 07631
TEL. (201) 569-1173 FAX. (201) 569-1696

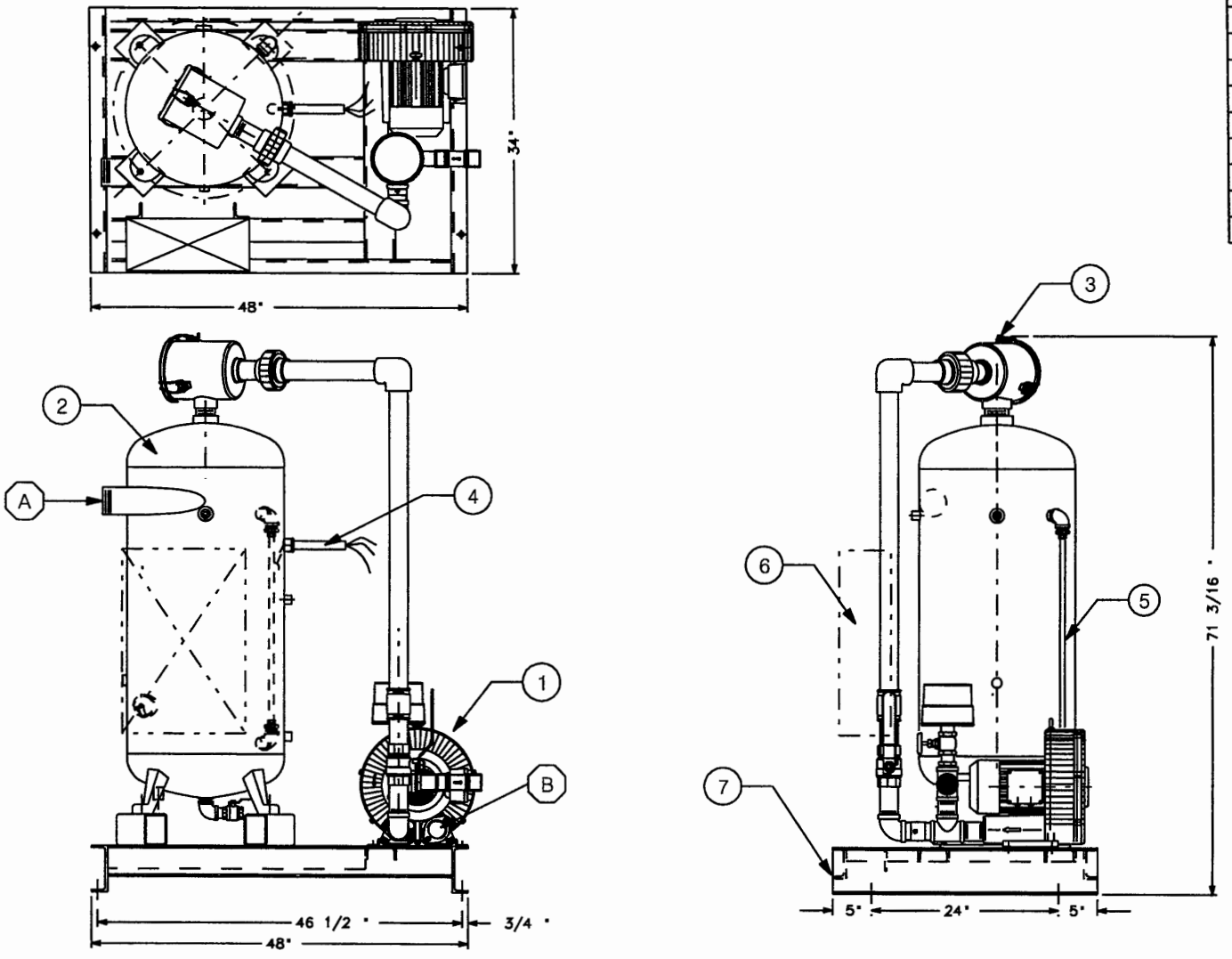
SOIL VAPOR EXTRACTION SYSTEM
1-SVE1600-5

Drawing Ref. No. 1-SVE1600-5

Page 1 of

Effective Date: 5-11-06

ITEM	QTY	DESCRIPTION	PART NO.
1	1	VACUUM BLOWER	2BH16007AH26
2	1	MOISTURE SEPARATOR	60 GAL.
3	1	VACUUM INLET FILTER	
4	1	HIGH LEVEL SWITCH	
5	1	LIQUID LEVEL INDICATOR	
6	1	CONTROL PANEL	
7	1	BASE	
A	1	VACUUM INLET	3" NPT
B	1	VACUUM EXHAUST	2" NPT

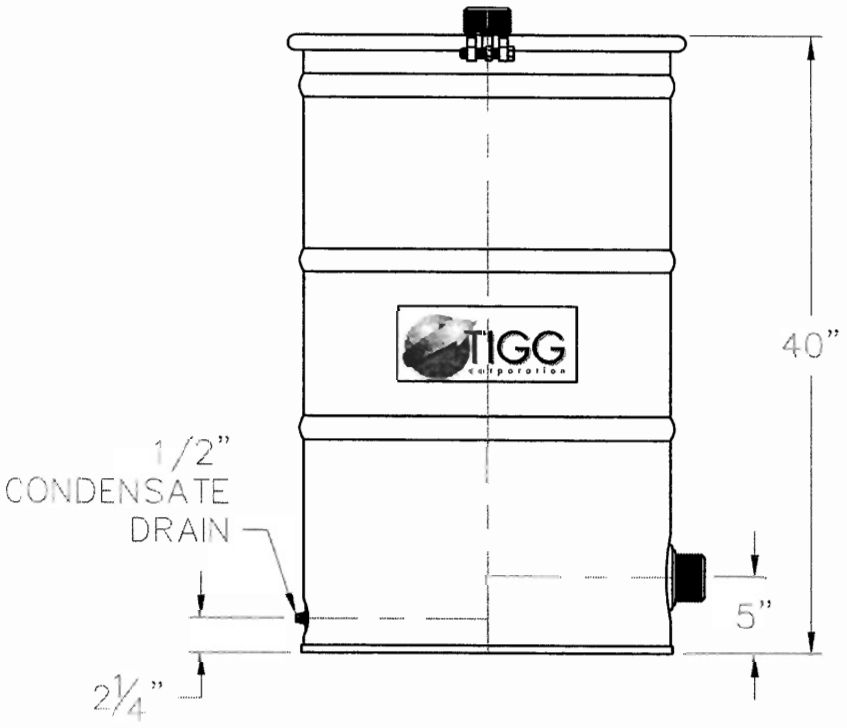


Weight:

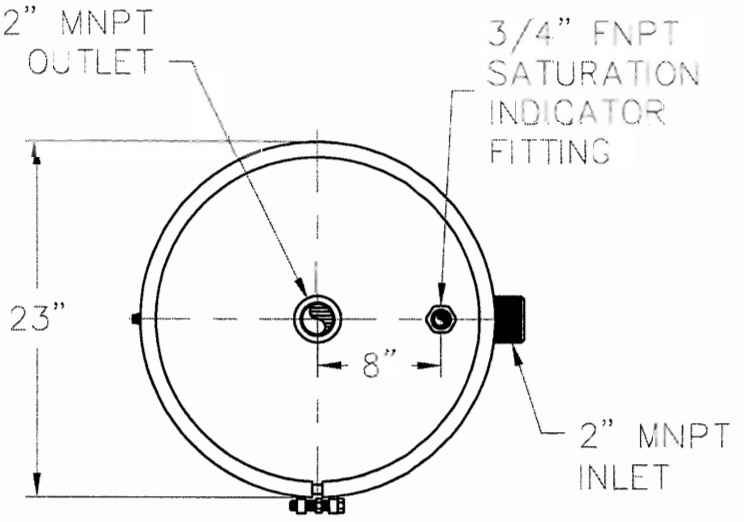
725 LBS

TYPICAL DIMENSIONS ONLY. NOT TO BE USED FOR CONSTRUCTION WITHOUT CONSULTING FACTORY. SUBJECT TO CHANGE WITHOUT NOTICE.

1-SVE1600-5



ELEVATION



PLAN

VESSEL STANDARDS

VESSEL MATERIALS : CARBON STEEL	APPROXIMATE VOLUME OF VESSEL : 7.5 FT
LINING : DOUBLE EPOXY PHENOLIC	STANDARD CARBON FILL : 175 LBS
EXTERIOR PAINT : ACRYLIC ALKYD ENAMEL	SHIP WT. : 218 LBS
INTERNALS : STAINLESS STEEL	CARBON TYPE : TIGG 5C 0410 VAPOR PHASE
ADSORBENT OUTLET ASSEMBLY : REMOVABLE COVER	MAXIMUM OPERATING PRESSURE : 6 PSIG
CONDENSATE DRAIN ASSEMBLY : 1/2" STEEL PLUG	MAXIMUM OPERATING TEMPERATURE : 200°F

NO.	REVISION	BY	DATE
1	REVISE TITLEBLOCK	JB	6/30/03

PROJECT

PROJ. NO. SALES

P.O. NO.

DRAWN BY	ZS
DESIGN BY	BL
CHKD. BY	BL
DATE	10/12/99
SCALE	NTS

TIGG corporation

ECONOSORB-V

ECONOSORB-V-1001 REV. 1

TIGG corporation
800 Old Pond Road Suite 706
Bridgeville, PA 15017
Toll Free: 800-925-0011
Phone: 412-257-9580
Fax: 412-257-8520
E-mail : info@tigg.com

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Econosorb V - Drum Units
Econosorb VP Steel Vessels
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Polyethylene Drum Units
High Density Polyethylene Vessels
Steel Vessels
Radial Flow Units
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Cansorb® Liquid Phase
Complementary Equipment
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Activated Carbon Adsorption System
ECONOSORB - V™ Steel Drum Adsorber

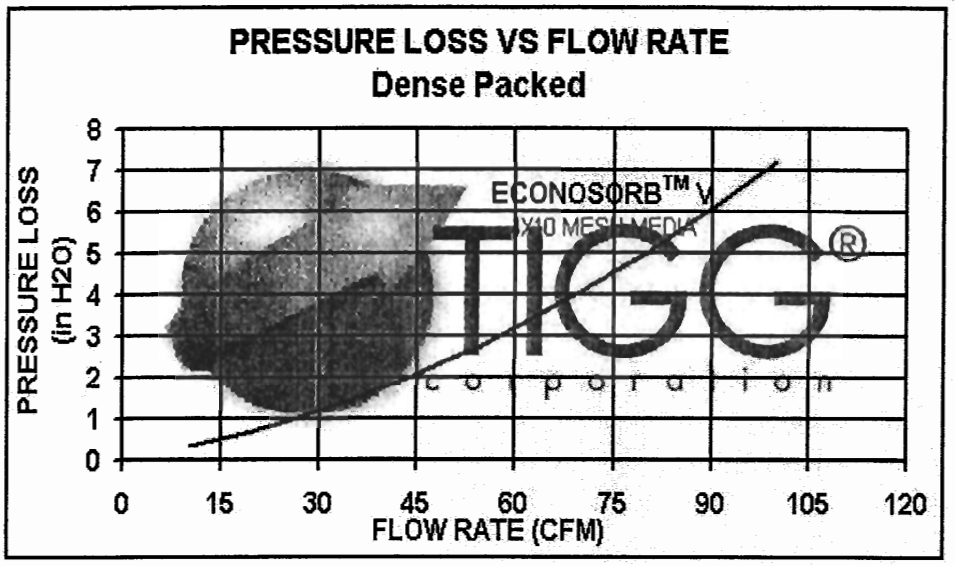
Vapor phase adsorption systems for environmental remediation applications

The **ECONOSORB - V** steel drum activated carbon adsorption system is designed for environmental remediation applications. This activated carbon adsorber is specifically designed for dependable performance and competitive pricing. The ECONOSORB - V activated carbon adsorber is constructed of carbon steel and provides a double epoxy/phenolic lining durable enough for environmental remediation applications. This activated carbon adsorption system features specially constructed vapor distributors, designed to promote even flow distribution and efficient use of the activated carbon and have a low pressure drop. Specifications and properties are subject to change without notice.

CARBON ADSORPTION VAPOR PHASE MODEL	NOM FLOW (CFM)	MAX PRESS (PSIG)	MAX TEMP (deg F)	MNPT INLET / OUTLET (IN)	DIAM / HEIGHT (IN)	STANDARD ADSORBENT FILL (LBS)	MAXIMUM ADSORBENT FILL (LBS)	SHIPPING WEIGHT - STANDARD FILL (LBS)
ECONOSORB™ V	100	6	200	2	23 / 40	175	200	218

ACTIVATED CARBON ADSORPTION NOTES:

1. Nominal flow can be used in environmental remediation activated carbon applications. Desired contact time may allow higher or lower flow rates.
2. TIGG dry reactivated or virgin coal base activated carbon or coconut shell activated carbon provided as standard for environmental remediation applications.
3. Activated carbon fills are based on a bed density of 27 lb/ft3
4. Activated carbon fills can differ based on variable bed density and alternate adsorbents.
5. Pressure drop curves are based on a dense packed activated carbon bed. Please contact your TIGG sales representative for more specific information.



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We Accept

APT (ADSORPTION PREDICTIVE TECHNIQUE)

FOR ESTIMATING ADSORPTION CAPACITY

APT is a proprietary computer program and database to support TIGG's adsorption-related businesses. The program is used to assist in projecting activated carbon saturation adsorption capacities at defined system conditions, for purification of air and water streams. Adsorption capacity predictions can be made for new carbon adsorption systems and for systems with adsorbates that have not previously been studied. All carbon adsorption predictions are based on the efficiency of virgin TIGG 5C (vapor) and TIGG 5D (liquid) coal based activated carbons.

The program is able to project the preferential order of adsorption among adsorbate(s), even if the given mixture has never been studied experimentally. The prediction is dependent on the accuracy of reported analyses of all contaminants to be removed and any additional competitive adsorbate(s) substances. The information shown below is required to perform a prediction of adsorption.

Vapor System Variables

Vapor Flow, SCFM
Vapor Pressure, psig
Vapor Relative Humidity, %
Vapor Temperature, deg. F or deg. C
Adsorbate Name(s)
Inlet Concentration(s), ppm

Liquid System Variables

Water Flow, GPM
Water pH
Adsorbate Name(s)
Inlet Concentration(s), ppm

For adsorbates that are not in TIGG's database of common impurities, the following additional information regarding the adsorbate(s) must be provided:

Required Information

Formula and Molecular Weight
Specific Gravity
Boiling Point, deg. F
Vapor Pressure (two points)
mmHg @ deg. C
Water Solubility, ppm

Optional Information

Liquid Density (two points)
g/cc @ deg. C
Refractive Index

To determine if your adsorbate(s) is in TIGG's data bases, please contact your TIGG sales representative.

TIGG corporation

800 Old Pond Rd., Suite 706
Bridgeville, PA 15017
(412) 257-9580 phone
(412) 257-8520 fax
www.tigg.com
info@tigg.com

Run 1

Flow Rate: 100 CFM
Temperature: 80 f
Relative Humidity: 40 %
Adsorption Pressure: 1 ATM

Concentration(ppmv)	Component
770.000	perchloroethylene

89.99 Pounds Carbon Per Day
Average Loading: 51.852 Pounds Per 100 Pounds Carbon

Run 2

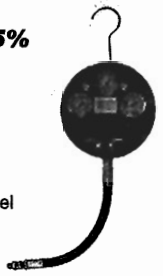
Flow Rate: 100 CFM
Temperature: 80 f
Relative Humidity: 40 %
Adsorption Pressure: 1 ATM

Concentration(ppmv)	Component
49.000	perchloroethylene

8.01 Pounds Carbon Per Day
Average Loading: 37.091 Pounds Per 100 Pounds Carbon

For information about gauges, see page 536.

Case Test Gauges—±2.5% curacy (Not Graded)



- ree dual-scale
- one case:
- res 0 to –30" Hg/0-150 psi
- 0-600 psi (kg/cm²),
- 000 psi (kg/cm²)
- e hose with ⅛" NPT male steel
- phosphor-bronze
- tube
- luminum
- Acrylic

Range, Process	BOTTOM CONNECTION 12" Hose Each	36" Hose Each
	4054K63 ..$254.14	4054K64 ..$257.91

Diaphragm Vacuum Gauges

- size: ±1.5% (Not Graded)
- (Grade 1A)
- xtremely low vacuum readings
- hosphor-bronze
- NPT male brass
- dial size: acrylic; 4" dial size: glass
- s: 0 to 140° F

Vacuum Ranges (Inches of H_2O)				
	Grad. Marks	Vacuum Range	Figure Intervals	Grad. Marks
	–0.2	0 to –60	–10	–1
	–0.5	0 to –100	–20	–2

specify vacuum range om the table above.

	BOTTOM CONNECTION Standard Each	With NIST ♦ Certificate of Calibration Each
	4106K1 ....$31.90	3843K3 .....$91.08
tain. Steel	4106K2 .... 75.15	3843K4 ..... 134.33

of Standards and Technology.

tainless Steel-Case Vacuum ound Pocket Test Gauges— cale Accuracy (Grade 2A)

- steel protective cover and with carrying strap included
- ow
- Type 316 stainless steel
- ressure tube
- NPT male Type 316
- olycarbonate

Vacuum/Pressure (Inches Hg/psi)				
ig. ints	Grad. Marks	Vacuum/ Pressure Range	Fig. Int.	Grad. Marks
		Compound Gauges (Cont.)		
/__	2" /__	0 to –30"/0- 60	10"	1"/1
		0 to –30"/0-100	10"	2"/1
/2	0.5"/0.2	0 to –30"/0-150	30"	5"/2
/5	1" /0.5	0 to –30"/0-300	50"	5"/2

pecify vacuum/pressure above.

erature Range Process	Bottom Connection Each
F ..... –40° to +250° F	3961K2 ..... $106.24

Glycerin-Filled Type 304 Stainless Steel-Case Vacuum and Compound Gauges— ±1% Mid-Scale Accuracy (Grade A)

Center Back Connection

- Refillable glycerin-filled gauges dampen needle vibration; allow more accurate gauge readings
- General service Bourdon pressure tube:
  1½" dial: Phosphor bronze
  2½" and 4" dial: Copper alloy
- Connection: 1½" dial: ⅛" NPT male brass
  2½" and 4" dial: ¼" NPT male brass
- Lens Material: 1½" and 2½" dial: Polycarbonate
  4" dial: Acrylic
- Temperature Range:
  1½" dial: –5° to +150° F Ambient and Process
  2½" and 4" dial: –4° to +140° F Ambient; –40° to +140° F Process

Available Vacuum/Pressure Ranges						
Vac./Press. Range, Hg/psi	Figure Int., Hg/psi 1½"	2½"	4"	Grad. Marks, Hg/psi 1½"	2½"	4"
Vacuum Gauges						
0 to –30"/___	5"/__	5"/__	5"/__	0.5"/__	0.5"/__	0.5"/__
Compound Gauges						
0 to –30"/0- 15	10"/ 5	10"/ 5	5"/ 3	1"/0.5	1"/0.5	1"/0.5
0 to –30"/0- 30	10"/10	10"/10	10"/ 5	1"/1	2"/1	1"/0.5
0 to –30"/0- 60	10"/10	30"/20	10"/10	2"/1	2"/2	2"/2
0 to –30"/0-100	30"/20	30"/20	30"/10	5"/2	5"/2	5"/2
0 to –30"/0-160★	30"/20	30"/20	30"/20	5"/2	10"/5	5"/5
0 to –30"/0-200◢	_____	30"/50	30"/20	_____	10"/5	5"/5
0 to –30"/0-300	30"/50	30"/50	30"/50	10"/5	10"/5	10"/5

★ 0 to –30"/0-150 for 1½" dials. ◢ Not available in 1½" dial size.

To Order: Please specify vacuum/pressure range from table above.

Dial Size	Bottom Connection Each	Center Back Connection Each	Lower Back Connection Each
1½"	38545K4 ... $23.31	38545K5■ $23.31	_____ ... _____
2½"	38545K6 ... 20.23	38545K7 ... 20.23	_____ ... _____
4"	38545K8 ... 39.24	_____ ... _____	38545K2 ... $39.24

■ Not available with 0 to –30"/0-300 psi vacuum/pressure range.

Type 304 Stainless Steel-Case Vacuum and Compound Pocket Test Gauges

Dry with Bottom Connection

- Accuracy: 2½" dial size: ±1.5% (Not Graded)
  4" dial size: ±1% (Grade 1A)
- Corrosive service Type 316 stainless steel Bourdon pressure tube
- Connection: Type 316 stainless steel:
  2½" dial size: ¼" NPT male; 4" dial size: ½" NPT male
- Lens Material: 2½" dial size: nylon; 4" dial size: glass
- Temperature Range: ***Dry*** Ambient: –40° to +260° F;
  Process: 2½" dial size: –40° to +260° F; 4" dial size: –40° to +450° F
  Refillable Glycerin-Filled Ambient and Process: 0° to 160° F

Available Vacuum/Pressure (Inches Hg/psi)		
Vacuum/Pressure Range	Fig. Int.	Grad. Marks
Vacuum Gauges		
0 to –30"/___	–5"/__	–0.5"/__
Compound Gauges		
0 to –30"/0- 15	–10"/5	–1" /0.5
0 to –30"/0- 30	–30"/10▲	–2" /1♣
0 to –30"/0- 60	–30"/20♦	–5" /2■
0 to –30"/0-100	–30"/20	–5" /2
0 to –30"/0-160	–30"/40♠	–5" /4♥
0 to –30"/0-200	–30"/40	–5" /4
0 to –30"/0-300	–30"/50	___ /5

For 4" dial-size gauges: ▲ 5 psi. ♣ 0.5 psi. ♦ 10 psi.
■ 1 psi. ♠ 20 psi. ♥ 2 psi.

To Order: Please specify vacuum/pressure range from table above.

Dial Size	Bottom Connection Each	Center Back Connection Each	Lower Back Connection Each
Dry			
2½"	38595K1 .... $53.07	38595K2 .... $60.70	_____ ... _____
4"	38595K3 .... 77.50	_____ ... _____	38595K4 .... $85.12
Refillable Glycerin-Filled			
2½"	38605K1 .... 63.35	38605K2 .... 73.94	_____ ... _____
4"	38605K3 .... 99.98	_____ ... _____	38605K4 .... 109.56

Corrosive Service Pressure Gauges

For information about gauges, see page 536.

Color-Coded Polyester-Case Gauges—
±1% Full-Scale Accuracy (Grade 1A)

- Color coding allows quick and easy visual identification of your pressure systems
- Dual-scale dial with psi/kPa readings
- Corrosive service Type 316L stainless steel Bourdon pressure tube
- Connection: ½" NPT male Type 316 stainless steel
- Lens Material: Acrylic

Available Pressure Ranges

Pressure Range psi	Pressure Range kPa	Fig. Int., psi	Grad. Marks, psi	Pressure Range psi	Pressure Range kPa	Fig. Int., psi	Grad. Marks, psi
0- 15	0- 100	2	0.25	0- 400	0- 2,800	50	5
0- 30	0- 200	5	0.5	0- 600	0- 4,200	100	5
0- 60	0- 400	10	0.5	0-1,000	0- 7,000	100	10
0-100	0- 700	10	1	0-1,500	0-10,500	300	10
0-160	0-1,100	20	1	0-2,000	0-14,000	200	10
0-200	0-1,400	20	2	0-3,000	0-21,000	500	20
0-300	0-2,100	50	2	0-5,000	0-35,000	500	50

To Order: Please specify pressure range in psi from table above. Also specify case color: black, blue, green, orange, red, white, or yellow.

Dial Size	Temperature Range, Ambient	Temperature Range, Process	Bottom Connection	Each
4"	–40° to +149° F	–40° to +149° F	3925K8	$119.74

Polyester-Case Gauges—
±0.5% Full-Scale Accuracy (Grade 2A)

Dry

- Solid front, blowout back offers safety in the event of Bourdon pressure tube failure
- Case: Tapered, black polyester
- Corrosive service Type 316 stainless steel Bourdon pressure tube
- Connection: ½" NPT male Type 316 stainless steel
- Lens Material: Acrylic
- Temp. Range: Ambient: Dry, –40° to +140° F
  Glycerine-Filled, –4° to +140° F
  Process: –40° to +212° F

Available Pressure Ranges

Pressure Range psi	Pressure Range kPa	Fig. Int., psi	Grad. Marks, psi	Pressure Range psi	Pressure Range kPa	Fig. Int., psi	Grad. Marks, psi
0- 15	0- 100	1	0.1	0- 1,000	0- 6,800	100	10
0- 30	0- 200	5	0.2	0- 1,500	0- 10,200	200	10
0- 60	0- 410	5	0.5	0- 2,000	0- 13,500	200	20
0-100	0- 690	10	1	0- 3,000	0- 20,500	500	20
0-160	0-1,100	20	1	0- 5,000	0- 34,000	500	50
0-200	0-1,350	20	2	0-10,000	0- 68,000	1,000	100
0-300	0-2,050	50	2	0-15,000	0-102,000	2,000	100
0-400	0-2,700	50	5	0-20,000	0-137,000	2,000	200
0-600	0-4,100	50	5				

To Order: Please specify pressure range in psi from the table above.

Dial Size	Bottom Connection: Dry	Each	Bottom Connection: Refillable Glycerin-Filled	Each
Single-Scale Dial with psi Readings				
4½"	4065K7	$79.38	4065K9	$96.57
Dual-Scale Dial with psi/kPa Readings				
4½"	4065K3	77.95	4065K5	94.66

Digital Aluminum-Case Gauges—
±0.25% Full-Scale Accuracy (Grade 3A)

- Gauges with 0-3 to 0-1000 psi pressure ranges have a 3½-digit LCD display; 0-3000 and 0-5000 psi pressure ranges have a 4-digit LCD display
- Corrosive service Type 316 stainless steel sensor
- Connection: ¼" NPT male Type 316 stainless steel
- Lens Material: Polycarbonate
- Temperature Range: Ambient and Process: –4° to +185° F

Battery-powered gauges have auto shutoff after five minutes, plus a low-battery indicator.

Models with 0-3 to 0-1000 psi pressure ranges are powered by two AA batteries (included). They have an on/off button.

Models with 0-3000 and 0-5000 psi pressure ranges are powered by two AAA batteries (included). They have an on button.

AC/DC-powered gauges accept 8-24 VAC or 9-32 VDC power.

Low-Pressure Polyester-Ca
±1% Mid-Scale Accuracy (Grade A)

- Dual-scale dial with inches per inch² and psi/inches
- Solid front, blowout back in the event of Bourdon pres
- Case: Tapered, black poly
- Corrosive service Type 31 Bourdon pressure tube
- Connection: ¼" NPT male Type 316 sta
- Lens Material: Acrylic

Available Pressure Ranges

Pressure Range	Figure Intervals	Grad. Marks	Pressure Range	Figure Inter
Inches of H_2O			*Inches of H₂O*	
0-10	1	0.1	0-100	10
0-15	1	0.1	0-150	10
0-20	2	0.2	*psi*	
0-30	5	0.2	0- 5	0.5
0-40	10	0.5	0- 8	1
0-60	5	0.5	0- 10	1
0-80	10	1		

To Order: Please specify pressure range from the table above.

Dial Size	Temperature Range, Ambient	Temperature Range, Process	Bott
4½"	–4° to +140° F	–40° to +212° F	3931K11

Aluminum-Case Gauges—
±0.5% Full-Scale Accuracy (Grade 2A)

- Dual-scale dial with psi/kPa
- Micrometer pointer for adjustme
- Corrosive service Type 316 sta Bourdon pressure tube
- Connection: ½" NPT male Type 316
- Lens Material: Glass
- Temp. Range: Ambient: –40° to
  Process: –40° to

Available Pressure Ranges

Pressure Range psi	Pressure Range kPa	Fig. Int., psi	Grad. Marks, psi	Pressure Range psi	Pressure Range kPa
0- 15	0- 100	1	0.1	0- 400	0- 2,700
0- 30	0- 200	2	0.2	0- 600	0- 4,000
0- 60	0- 400	5	0.5	0- 1,000	0- 6,900
0-100	0- 690	10	1	0- 2,000	0-13,800
0-150	0-1,000	10	1	0- 3,000	0-20,000
0-200	0-1,380	20	2	0- 5,000	0-34,500
0-300	0-2,000	20	2	0-10,000	0-69,000

To Order: Please specify pressure range in psi from

Dial Size	Back Flange Bottom Connection	Each	Front Flange Lower Back Co	
4½"	4008K2	$96.63	4008K6	
6"	4008K3	126.32	4008K7	

Available Pressure Ranges (psi)

Pressure Range	Reso-lution	Pressure Range	Reso-lution	Pressure Range
0- 3	0.01	0-100	0.1	0-1000
0- 5	0.01	0-199.9	0.1	0-3000
0-15	0.01	0-300	1	0-5000
0-30	0.1	0-500	1	

To Order: Please specify pressure range in psi from the table above.

Power	Dial Size, Wd. × Ht.	LCD Ht.	Pressure Range, psi	Bott
Battery	3⅜" × 2⅞"	25/32"	0-3 to 0-1000	3943K11
Battery	3⅜" × 2⅞"	25/32"	0-3000 and 0-5000	3943K13
AC/DC	3⅜" × 2⅞"	25/32"	0-3 to 0-1000	3943K14
AC/DC	3⅜" × 2⅞"	25/32"	0-3000 and 0-5000	3943K16

Polypropylene, Nylon & PVC Ball Valves

For information about ball valves, see page 370. For information about pipe size, see pages 2-3.

Pipe OD to Pipe Size Conversions

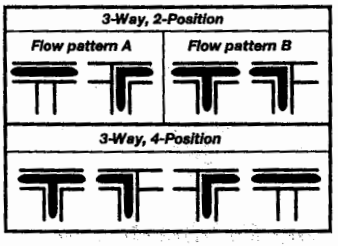
Pipe OD	3/8"	1/2"	5/8"	3/4"	1"	1 3/8"	1 5/8"	1 7/8"	2 3/8"	2 7/8"	3 1/2"
Pipe Size	1/8"	1/4"	3/8"	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"

Elliptic Polypropylene Valves

2-Way

3-Way

- Maximum Pressure: W.O.G. (water, oil, inert gas): 1/8" to 3/4": 150 psi @ 73° F; 1 1/2" to 2": 100 psi @ 73° F
- Vacuum Rating: Not rated
- Temperature Range: 15° to 180° F
- Ports: Full



Because of their elliptical design, these valves are easy to disassemble. Just remove metal handle retainer, slide stem out for cleaning or to replace O-rings, reassemble in minutes. Like ball valves, these operate with an easy 90° rotation. Center O-ring seals off one flow at a time. Flow patterns are available on *3-way, 4-position* valves only. Body, elliptical cylinder, and stem are polypropylene; O-rings are Viton; and handle is Type 316 stainless steel. Color is gray.

Choose *2-way* (on/off); *3-way, 2-position*; or *3-way, 4-position* (see diagram at left). **To Order:** For 3-way, 2-position valves, specify flow pattern A or B from diagram at left.

Connections: NPT female.

Pipe Size	End-to-End Lg.	2-Way	Each	3-Way, 2-Position	Each
1/8"	2 1/4"	45695K11	$26.88	45695K21	$44.62
1/4"	2 1/4"	45695K12	26.88	45695K22	44.62
3/8"	3"	45695K13	31.72	45695K23	52.69
1/2"	3"	45695K14	31.72	45695K24	52.69
3/4"	3 1/2"	45695K15	44.62	45695K25	59.68
1 1/4"	5 7/8"	45695K17	120.00	45695K27	196.67
2"	5 7/8"	45695K18	172.92	45695K28	248.33

Easy-Grip Miniature Nylon Ball Valves

Female × Female

Barb × Barb

- Maximum Pressure: Water and inert gas: 125 psi @ 140° F
- Vacuum Rating: Not rated
- Temp. Range: 33° to 140° F
- Ports: See table

Great in confined spaces, these valves have an all-nylon construction for excellent chemical resistance and a flat, easy-to-grip handle. Seats and O-rings are Buna-N. Color is black. **Connections:** See table.

Size	End-to-End Lg.	Port Size		Each
NPT Female × NPT Female				
1/8"	1 7/8"	Full	4796K31	$9.67
1/4"	1 7/8"	Full	4796K32	9.67
NPT Female × NPT Male				
1/8"	2 3/16"	Full	4796K37	9.67
1/4"	2 3/16"	Full	4796K38	9.67
NPT Male × NPT Male				
1/8"	2 1/2"	Full	4796K46	9.67
1/4"	2 1/2"	Full	4796K47	9.67
Barb × Barb (Tube ID)				
1/4"	3 3/16"	Full	4796K71	9.67
3/8"	3 3/16"	Full	4796K73	9.67
1/2"	3 3/16"	Reduced	4796K75	9.67

Easy-Grip Miniature PVC Ball Valves

NPT Female Straight

Barb 3-Way

- Maximum Pressure: Water, liquids, inert gas: 125 psi @ 140° F
- Vacuum Rating: Not rated
- Temperature Range: 33° to 140° F
- Ports: Full

Valves are tiny enough to accommodate extra-small pipe sizes yet the flat lever handle is easy to grip. Body, ball, stem, and handle are made of PVC. O-rings are Buna-N. Color is gray.

3-way valves have a bottom inlet. Either side can be the outlet, depending on handle position. Valves with *NPT male and NPT female connections* have a male bottom inlet with female side outlets.

Connections: See table.

Size	End-to-End Lg.	Straight	Each	3-Way	Each
NPT Female					
1/8"	1 7/8"	4757K11	$9.01	4757K51	$12.77
1/4"	1 7/8"	4757K12	9.01	4757K52	12.77
NPT Male and NPT Female					
1/8"	2 3/16"	4757K13	9.01	4757K53■	12.77
1/4"	2 3/16"	4757K14	9.01	4757K54■	12.77
NPT Male					
1/8"	2 1/2"	4757K15	9.01	4757K55	12.77
1/4"	2 1/2"	4757K16	9.01	4757K56	12.77
Barb (Tube ID)					
1/4"	3 3/16"	4757K17	9.01	4757K57	12.77
3/8"	3 3/16"	4757K18	9.01	4757K58	12.77
1/2"	3 3/16"	4757K19	9.01	4757K59	12.77
Instant Tube Fitting (Tube OD)					
1/4"	2 3/4"	4757K21	11.37	4757K61	16.29
3/8"	2 3/4"	4757K22	11.37	4757K62	16.29

■ End-to-end length is 1 7/8".

Miniature PVC Ball Valves

Female × Female Straight

Male × Barb 90° Right Angle

- Maximum Pressure: Water service: 125 psi @ [illegible]
- Vacuum Rating: [illegible]
- Temperature: 33° to 140° F
- Ports: Full

Mini valves are the perfect solution for tight spots and low flow rates. Standard 58 material approved for use with drinking water. Body and stem are PVC; O-rings are Buna-N (unless noted). Available in straight line and 90° angle styles. All have thumb grip handles. Color is gray.

Connections: NPT.

Size	Straight End-to-End Lg.	Each	90° End-to-End Lg.
NPT Female × NPT Female			
1/4" × 1/4"	2 31/64"	45975K25 $4.81	1 51/64"
3/8" × 3/8"	2 31/64"	45975K28 4.81	1 51/64"
3/4" × 3/4"	3 1/8"	9848K44★ 10.33	
NPT Female × NPT Male			
1/4" × 3/8"	2 15/16"	45975K31 4.81	2 1/4"
1/4" × 1/4"	2 15/16"	45975K26 4.81	2 1/4"
3/8" × 3/8"	2 15/16"	45975K32 4.81	1 51/64"
3/4" × 3/4"	2 19/32"	9848K41★ 10.33	
NPT Female × Compression Tube Fitting (Tube OD)			
1/4" × 1/4"	2 57/64"	45975K27 5.21	2 13/64"
1/4" × 3/8"	3 1/16"	45975K33 5.21	2 3/8"
NPT Female × Instant Tube Fitting (Tube OD)			
1/4" × 1/4"	2 5/8"	45975K34 6.58	2"
1/4" × 3/8"	2 5/8"	45975K35 6.58	2"
NPT Female × Barb (Tube ID 3/8" to 5/8")			
1/4"	2 57/64"	45975K61 5.59	2 57/64"
3/8"	3 31/64"	45975K62 5.59	2 57/64"
NPT Male × Barb (Tube ID 3/8" to 5/8")			
1/4"	3 31/64"	45975K63 5.59	2 57/64"
3/8"	3 31/64"	45975K64 5.59	2 57/64"

★ Ball inlet O-ring is Santoprene and outlet O-ring is [illegible]

PVC Ball Valves with GHT Connections

Female × Male

Female × Female

- Maximum Pressure: Water: 125 [illegible]
- Vacuum Rating: [illegible]
- Temperature: 33° to 140° F
- Ports: Full

With a garden hose thread connection (GHT), these valves are ideal for plumbing applications. Easy-to-turn handle indicates whether valve is open or closed. Valves have a PVC body. Stem O-ring is Viton. Ball inlet O-ring is Santoprene and outlet O-ring is PTFE.

Pipe Size	End-to-End Lg.	Inlet × Outlet
3/4"	2 29/32"	GHT Female × GHT Male
3/4"	2 29/32"	GHT Female × NPT Male
3/4"	2 7/8"	GHT Female × NPT Female
3/4"	2 29/32"	NPT Female × GHT Male

Bimetal Stem Thermometers

For information about bimetal thermometers, see page 510.

Clip-On Bimetal Stem Thermometers

Clip these thermometers to the rims of tanks, trays, vats, and other containers. Thermometers have a nonthreaded back connection. Thermometers and clips are made of Type 304 stainless steel. Include an airtight case to eliminate fogging and an external calibration adjustment. Stem dia. is 5/32". Accuracy is ±1% of full scale.

1¾" dial size thermometers with ranges up to 300° F and 110° C have a polycarbonate lens; those with ranges over 300° F and 110° C have a glass lens. ***2" dial size*** thermometers have a glass lens. ***3" dial size*** thermometer has a polycarbonate lens.

To Order: Please specify temperature range from the chart below.

Available Temperature Ranges

Temp. Range	Grad.	Temp. Range	Grad.
−40° to +160° F	2° F	50° to 300° F	2° F
0° to 140° F	2° F	50° to 400° F	5° F
0° to 180° F	2° F	50° to 500° F	5° F
0° to 220° F	2° F	150° to 750° F	10° F
0° to 250° F	2° F	−10° to +110° C	1° C
25° to 125° F	1° F		

Stem Lg.	1¾" Dial Size	Each	2" Dial Size	Each	3" Dial Size	Each
5"	39675K21	$21.89	4101K51	$31.00		
8"	39675K11	21.89	4101K31	31.00	38305K33	$35.11

Side-Reading Bimetal Stem Thermometers

Left-Side Connection

Right-Side Connection

Great for tight areas, thermometers mount horizontally but face upright for easy viewing. Made of Type 304 stainless steel with a glass lens and external calibration. An airtight case prevents fogging. Dial size is 3". Stem dia. is ¼". Accuracy is ±1% of full scale. Connection is ½" NPT male.

To Order: Please specify temperature range from the chart below.

Available Temperature Ranges

Temp. Range	Grad.	Temp. Range	Grad.
−40° to +160° F	2° F	50° to 400° F	5° F
0° to 200° F	2° F	50° to 550° F	5° F
20° to 240° F	2° F	0° to 250° F/−20° to +120° C	2° F▲

▲ 1° graduations for Celsius

Stem Lg.	Left-Side Connection	Each	Right-Side Connection	Each
2½"	38575K1	$52.95	38575K9	$52.95
4"	38575K2	52.95	38575K13	52.95
6"	38575K3	52.95	38575K16	52.95

Bimetal Stem Thermometers with 4-20 mA Output

Monitor temperatures on location and in remote areas. Thermometers include a three-wire RTD sensor output with aluminum head and 4-20 mA, 2-wire transmitter. Transmitter requires 8-36 VDC power supply. Accuracy of transmitter is ±0.2% of full scale.

All have an adjustable-angle connection and are made of Type 304 stainless steel with a glass lens and external calibration. An airtight case eliminates fogging. Stem dia. is ⅜". Accuracy of thermometer is ±1% of full scale. Connection is ½" NPT male.

To Order: Please specify temp. from chart below.

Available Temperature Ranges

Temp. Range	Grad.	Temp. Range	Grad.
−100° to +100° F	2° F	20° to 240° F	2° F
−40° to +160° F	2° F	50° to 300° F	2° F
0° to 200° F	2° F	50° to 400° F	5° F
0° to 250° F	2° F	50° to 550° F	5° F

Stem Lg.	3" Dial Size	Each	5" Dial Size	Each
2½"	3436K32	$508.64	3436K52	$529.38
4"	3436K34	508.64	3436K54	529.38
6"	3436K36	508.64	3436K56	529.38
9"	3436K39	508.64	3436K59	529.38
12"	3436K42	508.64	3436K62	529.38

Panel-Mount Bimetal Stem Thermometers

Thermometers have a chrome-plat… that's suitable for mounting on … The flange has three 5/32" dia. mountin… spaced on a 2 29/32" dia. bolt circle, … Thermometers have a nonthreade… tion, Type 430 stainless steel case, … a Type 304 stainless steel stem, a… The dial is sealed with a silicone gas… sistance. Temperatures are shown … tions. Dial size is 2". Stem dia. is …

Stem Lg.	−40° to +160° F Temp. Range Accuracy	Each	0° to … Temp. … Accuracy
4"	±3° F	3561K12 $15.82	±2° F
6"	±3° F	3561K22 16.73	±2° F
9"	±3° F	3561K42 18.00	±2° F

Bimetal Stem Thermometers with PFA-Coated Stem

The PFA-coated stem on these therm… vides enhanced corrosion resistance. … are made of 300 series stainless steel wi… They have a back connection, an airtigh… nate fogging, and an external calibratio… Stem dia. is ¼". Accuracy is ±1% of fu… nection is ½" NPT male.

To Order: Please specify temp. range fro…

Available Temperature Ranges

Temp. Range	Grad.	Temp. Range
−40° to +160° F	2° F	50° to 300° F
0° to 200° F	2° F	50° to 500° F
0° to 250° F	2° F	

Stem Lg.	3" Dial Size	Each	5" …
2½"	3541K11	$45.19	354…
4"	3541K13	45.19	354…
6"	3541K15	45.19	354…
9"	3541K17	56.30	354…
12"	3541K19	71.36	354…

Bimetal Stem Thermometers for Food Processing

NPT Male

Sanitary Quick Clamp

Nonglass lenses make these ther… pecially suitable for use in food pro… ronments. Thermometers are made … stainless steel. They have a back … an airtight case to eliminate foggi…

½" NPT male connection thermom… dia. stem and external calibration adj… racy is ±1% of full scale. The *3" dial s…* carbonate lens; *5" dial size* has an ac…

Sanitary quick-clamp thermomete… sanitary fitting and meet 3-A sanitary s… for use in sterile processing environ… them right into sanitary quick-clamp fi… mowell needed (for fittings, see page … meters have an acrylic lens and … Accuracy is within one graduation.

To Order: Please specify temp… from the chart below.

Available Temperature …

Temp. Range	Grad.	Temp. Ra…
−40° to +120° F	2° F	50° to …
0° to 200° F	2° F	0° to …
0° to 250° F	2° F	0° to …
50° to 300° F	2° F	

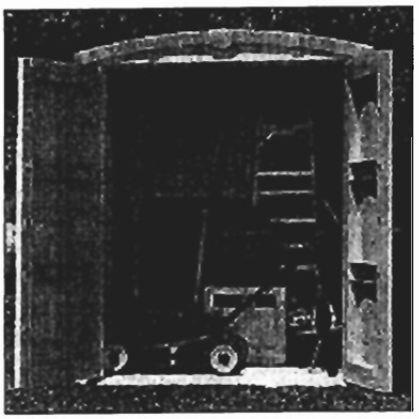
★ Not available in sanitary quick-…

Stem Lg.	3" Dial Size	Each	5" …
½" NPT Male Connection			
2½"	32665K21	$44.62	3266…
4"	32665K22	44.62	3266…
6"	32665K23	44.62	3266…
1½" Sanitary Quick-Clamp Connection			
2½"	32665K11	155.90	3266…
4½"	32665K12	155.90	3266…
2" Sanitary Quick-Clamp Connection			
2½"	32665K41	181.37	3266…
4½"	32665K42	181.37	3266…

large sheds

Storage Buildings
Vertical Sheds
Horizontal Sheds
Accessories

Large Storage Shed



View Larger Image

Part#: GS8000
Size*: 5' 6" W x 5' 5" D x 6' 11" H
Capacity: 5' W x 4' 6" D x 6' 2" H
Color: Taupe

- 138 Cubic foot capacity
- Great for storing bikes, lawn furniture, yard equipment, and tools
- Padlockable doors with upper and lower door latches
- Easy assembly
- Built-in support for wood shelf
- Stay-dry design
- Long lasting resin construction

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Find a Retailer

Purchase Replacement Parts

View Assembly Instructions (PDF file 258 KB)
To view these files, you need Adobe Acrobat Reader 5.0 or higher.

The latest version of Adobe Acrobat Reader can be downloaded (free of charge) by clicking the GET ACROBAT READER button. If you already have Adobe Acrobat Reader version 5.0 or higher, click on the view assembly instructions link above and the assembly instructions file will open.

NOTE: To avoid competing with our retailers, we will only sell replacement parts on-line. For a listing of the retailers where you can purchase our product please click on the Find a Retailer link listed above.

*Products are subject to change without notice and dimensions given may vary from the actual product.

Appendix J

Proposed SVE System Design Calculations

IN-SITU VAPOR EXTRACTION PIPING DESIGN
CARILLON CLEANERS, HUNTINGTON, NY

PIPING MANIFOLD HEADLOSS CALCULATIONS
VE-1 TO TREATMENT BUILDING

ASSUMPTIONS:

SOIL GAS TEMPERATURE	50 Degrees F	PIPE TYPE	PVC-SMOOTH
KINEMATIC VISCOSITY	9.17E-03 ft^2/min	MASS DENSITY	7.81E-02 lb/ft^3
DYNAMIC VISCOSITY	4.28E-02 lb/ft-hr		

NODE		FITTING			AIR FLOW	DUCT SIZE	VELOCITY	VELOCITY PRESSURE	PIPE LENGTH	FITTING LOSS COEFFICIENT	PIPE PRESSURE DROP	TOTAL PRESSURE DROP	PRESSURE DROP (SAFETY)	REYNOLDS NUMBER	FRICTION FACTOR	SECTIONAL PRESSURE DROP
FROM	TO	#	SOURCE	TYPE	(CFM)	(INCHES)	(FT/MIN)	(" of H2O)	(FEET)	Co	(" of H2O)	(" of H2O)	(" of H2O)	(DIM)	(DIM)	(" of H2O)
0	0	0	-	ATMOSPHERE	100.00	-	-	-	-	-	-	-	0	-	-	
1	3	1	-	SOIL WELL	100.00	-	-	-	-	-	-	-	5	-	-	
		2	-*	VALVE	100.00	2.00	4583.65	1.36	-	2.00	-	2.73	3.14	83641	0.0186	
		3	-	PIPE	100.00	2.00	4583.65	1.36	4.00	-	0.61	0.61	0.70	83641	0.0186	
		4	3-1	90 ELBOW	100.00	2.00	4583.65	1.36	-	0.22	-	0.30	0.34	83641	0.0186	
		5	-	PIPE	100.00	2.00	4583.65	1.36	10.00	-	1.52	1.52	1.75	83641	0.0186	10.93
3	4	6	6-9*	TEE-MAIN	100.00	2.00	4583.65	1.36	-	2.08	-	2.84	3.26	83641	0.0186	
		7	-	PIPE	100.00	2.00	4583.65	1.36	4.00	-	0.61	0.61	0.70	83641	0.0186	
		8	3-1	90 ELBOW	100.00	2.00	4583.65	1.36	-	0.22	-	0.30	0.34	83641	0.0186	
		9	-	PIPE	100.00	2.00	4583.65	1.36	2.00	-	0.30	0.30	0.35	83641	0.0186	
		10	3-1	90 ELBOW	100.00	2.00	4583.65	1.36	-	0.22	-	0.30	0.34	83641	0.0186	
		11	-	PIPE	100.00	2.00	4583.65	1.36	20.00	-	3.04	3.04	3.50	83641	0.0186	
		12	3-1	90 ELBOW	100.00	2.00	4583.65	1.36	-	0.22	-	0.30	0.34	83641	0.0186	
		13	-	PIPE	100.00	2.00	4583.65	1.36	10.00	-	1.52	1.52	1.75	83641	0.0186	
		14	3-1	90 ELBOW	100.00	2.00	4583.65	1.36	-	0.22	-	0.30	0.34	83641	0.0186	
		15	-	PIPE	100.00	2.00	4583.65	1.36	10.00	-	1.52	1.52	1.75	83641	0.0186	
		16	3-1	90 ELBOW	100.00	2.00	4583.65	1.36	-	0.22	-	0.30	0.34	83641	0.0186	
		17	-	PIPE	100.00	2.00	4583.65	1.36	3.00	-	0.46	0.46	0.53	83641	0.0186	
		18	4-1	DIFFUSER	100.00	3.00	2037.18	0.27	-	0.62	-	0.17	0.19	55761	0.0206	
		19	ASSUMED1	SEPARATOR	100.00	-	-	-	-	-	3*	5.00	5.75	-	-	
		20	MANUFAC.	FILTER	100.00	3.00	-	-	-	-	1**	3.00	3.45	-	-	
		21	4-1	DIFFUSER	100.00	2.00	4583.65	1.36	-	0.62	-	0.85	0.97	83641	0.0186	
		22	-	PIPE	100.00	2.00	4583.65	1.36	3.00	-	0.46	0.46	0.53	83641	0.0186	
		23	3-1	90 ELBOW	100.00	2.00	4583.65	1.36	-	0.22	-	0.30	0.34	83641	0.0186	
		24	-*	VALVE	100.00	2.00	4583.65	1.36	-	2.00	-	2.73	3.14	83641	0.0186	
		25	-	PIPE	100.00	2.00	4583.65	1.36	3.00	-	0.46	0.46	0.53	83641	0.0186	
		26	6-9*	TEE	100.00	2.00	4583.65	1.36	-	2.08	-	2.84	3.26	83641	0.0186	
		27		BLOWER INLET	100.00											27.76
4	4	28		BLOWER OUTLET	100.00								-55.00			-55.00
		29	-	PIPE	100.00	2.00	4583.65	1.36	3.00	-	0.46	0.46	0.53	83641	0.0186	
		30	3-1	90 ELBOW	100.00	2.00	4583.65	1.36	-	0.22	-	0.30	0.34	83641	0.0186	
		31	-	PIPE	100.00	2.00	4583.65	1.36	4.00	-	0.61	0.61	0.70	83641	0.0186	
		32	3-1	90 ELBOW	100.00	2.00	4583.65	1.36	-	0.22	-	0.30	0.34	83641	0.0186	
		33		CARBON	100.00							3.50	4.03			
		34	3-1	90 ELBOW	100.00	2.00	4583.65	1.36	-	0.22	-	0.30	0.34	83641	0.0186	
		35	-	PIPE	100.00	2.00	4583.65	1.36	4.00	-	0.61	0.61	0.70	83641	0.0186	
		36	3-1	90 ELBOW	100.00	2.00	4583.65	1.36	-	0.22	-	0.30	0.34	83641	0.0186	
		37		CARBON	100.00							3.50	4.03			
		38	3-1	90 ELBOW	100.00	2.00	4583.65	1.36	-	0.22	-	0.30	0.34	83641	0.0186	
		39	-	PIPE	100.00	2.00	4583.65	1.36	2.00	-	0.30	0.30	0.35	83641	0.0186	
		40	3-1	90 ELBOW	100.00	2.00	4583.65	1.36	-	0.22	-	0.30	0.34	83641	0.0186	
		41	-	PIPE	100.00	2.00	4583.65	1.36	20.00	-	3.04	3.04	3.50	83641	0.0186	
		42	6-9*	TEE	100.00	2.00	4583.65	1.36	-	2.08	-	2.84	3.26	83641	0.0186	
		0		ATMOSPHERE								0.00	0.00			
																19.16

* Value Estimated from Published Data

FITTING DESCRIPTION	FITTING NUMBER	PRESSURE DROPS	SAFETY DROPS	CUMULATIVE DROPS
ATMOSPHERE	0	-	0	0.00
SOIL WELL	1	-	5	-5.00
VALVE	2	2.73	3.14	-8.14
PIPE	3	0.61	0.70	-8.84
90 ELBOW	4	0.30	0.34	-9.18
PIPE	5	1.52	1.75	-10.93
TEE-MAIN	6	2.84	3.26	-14.19
PIPE	7	0.61	0.70	-14.89
90 ELBOW	8	0.30	0.34	-15.24
PIPE	9	0.30	0.35	-15.59
90 ELBOW	10	0.30	0.34	-15.93
PIPE	11	3.04	3.50	-19.43
90 ELBOW	12	0.30	0.34	-19.78
PIPE	13	1.52	1.75	-21.53
90 ELBOW	14	0.30	0.34	-21.87
PIPE	15	1.52	1.75	-23.62
90 ELBOW	16	0.30	0.34	-23.97
PIPE	17	0.46	0.53	-24.50
DIFFUSER	18	0.17	0.19	-24.69
SEPARATOR	19	5.00	5.75	-30.44
FILTER	20	3.00	3.45	-33.89
DIFFUSER	21	0.85	0.97	-34.86
PIPE	22	0.46	0.53	-35.38
90 ELBOW	23	0.30	0.34	-35.73
VALVE	24	2.73	3.14	-38.87
PIPE	25	0.46	0.53	-39.39
TEE	26	2.84	3.26	-42.65
BLOWER INLET	27	0.00	0.00	-42.65
BLOWER OUTLET	28			19.16
PIPE	29	0.46	0.53	18.63
90 ELBOW	30	0.30	0.34	18.29
PIPE	31	0.61	0.70	17.59
90 ELBOW	32	0.30	0.34	17.24
CARBON	33	3.50	4.03	13.22
90 ELBOW	34	0.30	0.34	12.87
PIPE	35	0.61	0.70	12.17
90 ELBOW	36	0.30	0.34	11.83
CARBON	37	3.50	4.03	7.80
90 ELBOW	38	0.30	0.34	7.46
PIPE	39	0.30	0.35	7.11
90 ELBOW	40	0.30	0.34	6.76
PIPE	41	3.04	3.50	3.26
TEE	42	2.84	3.26	0.00
ATMOSPHERE	0	0.00	0.00	0.00

IN-SITU VAPOR EXTRACTION PIPING DESIGN
CARILLON CLEANERS, HUNTINGTON, NY

PIPING MANIFOLD HEADLOSS CALCULATIONS

FITTING			PARAMETERS	FITTING LOSS COEFFICIENT
#	SOURCE	TYPE		Co
2	-*	VALVE	Assumed	2.00
3	-	PIPE	N/A	-
4	3-1	90 ELBOW	r/D=0.75 (Assumed) Co'=0.33 K angle= 1	0.22
5	-	PIPE	N/A	-
6	6-9*	TEE-MAIN	Vb/Vc=4 Cc,b=0.52 x 4 = 2.08 (assumed)	2.08
7	-	PIPE	N/A	-
8	3-1	90 ELBOW	r/D=0.75 (Assumed) Co'=0.33 K angle= 1	0.22
9	-	PIPE	N/A	-
10	3-1	90 ELBOW	r/D=0.75 (Assumed) Co'=0.33 K angle= 1	0.22
11	-	PIPE	N/A	-
12	3-1	90 ELBOW	r/D=0.75 (Assumed) Co'=0.33 K angle= 1	0.22
13	-	PIPE	N/A	-
14	3-1	90 ELBOW	r/D=0.75 (Assumed) Co'=0.33 K angle= 1	0.22
15	-	PIPE	N/A	-
16	3-1	90 ELBOW	r/D=0.75 (Assumed) Co'=0.33 K angle= 1	0.22
17	-	PIPE	N/A	-
18	4-1	DIFFUSER	Re=35129 A1/Ao=4 Angle=180 Deg.	0.62
19	ASSUMED*	SEPARATOR	N/A	-
20	MANUFAC.	FILTER	N/A	-
21	4-1	DIFFUSER	Re=35129 A1/Ao=4 Angle=180 Deg.	0.62
22	-	PIPE	N/A	-
23	3-1	90 ELBOW	r/D=0.75 (Assumed) Co'=0.33 K angle= 1	0.22
24	-*	VALVE	Assumed	2.00
25	-	PIPE	N/A	-
26	6-9*	TEE	Vb/Vc=4 Cc,b=0.52 x 4 = 2.08 (assumed)	2.08
27		BLOWER INLET		
28		BLOWER OUTLET		
29	-	PIPE	N/A	-
30	3-1	90 ELBOW	r/D=0.75 (Assumed) Co'=0.33 K angle= 1	0.22
31	-	PIPE	N/A	-
32	3-1	90 ELBOW	r/D=0.75 (Assumed) Co'=0.33 K angle= 1	0.22
33		CARBON		
34	3-1	90 ELBOW	r/D=0.75 (Assumed) Co'=0.33 K angle= 1	0.22
35	-	PIPE	N/A	-
36	3-1	90 ELBOW	r/D=0.75 (Assumed) Co'=0.33 K angle= 1	0.22
37		CARBON		
38	3-1	90 ELBOW	r/D=0.75 (Assumed) Co'=0.33 K angle= 1	0.22
39	-	PIPE	N/A	-
40	3-1	90 ELBOW	r/D=0.75 (Assumed) Co'=0.33 K angle= 1	0.22
41	-	PIPE	N/A	-
42	6-9*	TEE	Vb/Vc=4 Cc,b=0.52 x 4 = 2.08 (assumed)	2.08
0		ATMOSPHERE		

COMPONENT NUMBER(S)	COMPONENT DESCRIPTION	QUANTITY	MANUFACTURE'S MODEL
2, 44	BALL VALVE	2	2-INCH SCHEDULE 40 PVC
3, 5,7,9,11,13,15,17,31,32,33,36,40,42,AND 45	PIPE	117 LINEAR FEET	2-INCH SCHEDULE 40 PVC
4,8,10,12,14,16,29,33,35,37, 39, AND 41	90 ELBOW	12	2-INCH SCHEDULE 40 PVC
6 AND 43	TEE	2	2-INCH SCHEDULE 40 PVC
18	DIFFUSER	1	2-INCH TO 3-INCH SCHEDULE 40 PVC
19	SEPARATOR	--	PREFABRICATED/SKID MOUNTED SYSTEM TO BE DETERMINED BY VENDOR
20	FILTER	--	PREFABRICATED/SKID MOUNTED SYSTEM TO BE DETERMINED BY VENDOR
21	DIFFUSER	--	PREFABRICATED/SKID MOUNTED SYSTEM TO BE DETERMINED BY VENDOR
22	PIPE	--	PREFABRICATED/SKID MOUNTED SYSTEM TO BE DETERMINED BY VENDOR
23	90 ELBOW	--	PREFABRICATED/SKID MOUNTED SYSTEM TO BE DETERMINED BY VENDOR
24	VALVE	--	PREFABRICATED/SKID MOUNTED SYSTEM TO BE DETERMINED BY VENDOR
25	PIPE	--	PREFABRICATED/SKID MOUNTED SYSTEM TO BE DETERMINED BY VENDOR
26	TEE	--	PREFABRICATED/SKID MOUNTED SYSTEM TO BE DETERMINED BY VENDOR
27	BLOWER	--	SIEMENS REGENERATIVE VACUUM BLOWER - 2.3 HP, TEFC, 1 PHASE , 230 VOLTS, 60 HZ 150 CFM AT 70' H20 MODEL NUMBER:2BH1500-
46	CONTROL PANEL	--	SIMPLEX NEMA 3R CONTROL PANEL INCLUDED IN PREFABRICATED/SKID MOUNTED SYSTEM TO BE DETERMINED BY VENDOR
34 AN 38	CARBON #1	2	RATED FOR 100 CFM (TIGG MODEL ECONOSORB-V)
47	PRESSURE GAUGE	1	0-80 INCHES OF WATER PRESSURE
48	VACUUM GAUGE	1	0-80 INCHES OF WATER VACUUM
49	SAMPLING PORTS	3	1/4 INCH DIAMETER VALVE TAPPED INTO PIPE
50	VELOCITY PORT	2	1/4 INCH DIAMETER BUSHING WITH CAP TAPPED INTO PIPE
51	TEMPERATURE GAUGE	1	0-200 DEGREES FERINHEIGHT
52	SHED	1	SUNCAST MODEL GS8000

NOTES:

SHED MUST HAVE AT LEAST THE FOLLOWING MINIMUM DIMENSIONS:
LENGTH = 52 INCHES
DEPTH = 40 INCHES
HEIGHT = 6 FEET
MINIMUM DOORWAY OPENING = 50 INCHES

CARILLON CLEANERS SVE SYSTEM
VACUUM GRADE LINE