FINAL WORK PLAN
REMEDIAL INVESTIGATION/ FEASIBILITY STUDY
SOLVENT FINISHERS
(Site No.:1-30-172)
Westbury, New York

Prepared for

New York State Department of Environmental Conservation
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Introduction

This Remedial Investigation/Feasibility Study (RI/FS) Work Plan for Solvent Finishers (herein referred to as the "Site") located at 601 Cantiague Rock Road in Westbury, Nassau County, New York was prepared by Camp Dresser and McKee Inc. (CDM) for the New York State Department of Environmental Conservation (NYSDEC) under the Engineering Services for Investigation and Design, Standby Contract No. D004437. Background and site information used in the development of this Work Plan was furnished by NYSDEC and from the record search conducted by CDM. The Site Characterization performed by CDM in 2009 under the same Standby Contract was used by NYSDEC and CDM to determine the RI/FS scope of work.

The Site is a former dry cleaning facility which is now owned by Rubie's Costume Company who utilizes the building to cut fabric for costumes. The Work Plan was developed in accordance with the "State Superfund Standby Contract Work Assignment D004437-33, Remedial Investigation, Solvent Finishers, Site No. 130172." The Work Plan also follows the guidelines set forth in the "*Final Division of Environmental Remediation (DER)-10 Technical Guidance for Site Investigation and Remediation, dated May 2010*".

1.1 Purpose and Objectives

The objective of this work assignment (WA) is to define the nature and extent of soil, groundwater, and soil vapor contamination at the Site that has been impacted by the dry-cleaning solvent, tetracholorethylene (PCE) which was previously discharged into an on-site dry well and on the ground surface. The RI will focus on delineation of horizontal and vertical extent of onsite soil and groundwater contamination and delineation of horizontal and vertical extent of the offsite groundwater plume. A vapor intrusion assessment will also be conducted during this RI to evaluate vapor intrusion at the site and surrounding area. The data collected during the RI will support the FS and remedy selection for site remediation. Field tasks include:

- Geophysical survey for Phase I and II field activities. The Phase I survey shall include the clearing of all utilities and subsurface obstructions at proposed boring locations and any additional locations identified during field activities. The Phase II survey shall include utilities clearance at proposed monitoring well locations;
- Targeted soil and groundwater sampling program using a Geoprobe capable of direct push technology (DPT) and auger drilling methods;
- Installation and sampling of soil vapor and sub-slab ports;
- Installation and sampling of monitoring wells; and
- Disposal of investigation derived waste (IDW).

1.2 Site Description and Background

1.2.1 Site Description

The Site is located at 601 Cantiague Rock Road in the Town of Oyster Bay, Nassau County, New York as shown on **Figure 1-1**. More specifically, the Site is bordered by the Cantiague Rock Road to the north and east, a movie theatre and BJs Wholesale Club to the south, and a BMW distribution center and dealership to the west. The facility is built on 3.78 acres and surrounded by paved areas for parking. The Site is currently occupied by Rubie's Costume Company (Rubies).

The property is surrounded by industrial, commercial, and residential properties. Located southeast of the Site is Building 609 which is occupied by For Animals in the Hospital Inc., Hassal Inc., and Kraft Foods Inc. Shames Drive Industrial Park is located southwest of the Site.

1.2.2 Operational and Remedial History

The site is currently owned by Rubies and operates as a fabric cutting facility for costumes. Prior to Rubies occupancy the site was operated by College House Inc., Solvent Finishers, International Laminations, and Suval Fabrications. Historically the site operated as a manufacturer of artificial leather and plastics (Suval Fabrications), an industrial dry cleaner (Solvent Finishers), a manufacturer of imprinted and embroidered sportswear (College House Inc) and now as a fabric cutting facility (Rubies). A records search and site characterization were performed under the guidance of the NYSDEC to determine the source(s) of PCE contamination found in groundwater down gradient from the site. The site characterization established the source of chlorinated solvent contamination and recommended further investigation to delineate the onsite and offsite contamination.

The site has been developed and used for industrial operations since as early as 1960. Based on historic Sanborne Fire Insurance maps and Nassau County property cards, the site was occupied by Suval Fabrications Inc., a manufacturer of artificial leather and plastics in 1960. Suval Fabrications occupied the site until at least 1966 when the secondary building was constructed (603 Cantiague Rock Road). A site sketch provided by Solvent Finishers to the County Health Department identifies the occupant of 603 Cantiague Rock Road as International Laminations. No additional information on International Laminations was found. It is not known when operations of Suval Fabrications Inc. ceased or when Solvent Finishers Inc. operations began. The earliest documented date indicating Solvent Finishers operated on site is October 1977.

During the period that Solvent Finishers operated as an industrial dry cleaner at the site; they reportedly used up to 11,000 gallons of tetrachloroethylene annually to clean large rolls of fabric on an automated system. Routine inspections by the Nassau County Department of Health (NCDOH) identified several violations pertaining to improper liquid waste discharge activities containing levels of PCE that exceed NYSDEC groundwater standards. Waste water was noted as being discharged

directly onto the ground surface and into onsite dry wells. A site survey from 1960 identified seven dry wells on the subject property.

On October 19, 1977, NCDOH sampled a discharge pipe at Solvent Finishers located in the rear of the facility under a grate (dry well). The result detected 20,000,000 parts per billion (ppb) of PCE in the effluent.

In April of 1978, NCDOH notified Solvent Finishers of the exceedingly-high levels of PCE identified. Mitigation meetings followed resulting in the installation of an in ground holding tank. The tank was designed to hold liquid waste containing PCE for pickup and removal by a licensed waste management firm. In August (1978), a draft New York State Pollutant Discharge Elimination System (SPDES) Permit was issued for this action. A final SPDES Permit however, was never issued.

In summer of 1978, Solvent Finishers installed a pump and automatic controls on the holding tank. This system was installed to prevent tank overflow; liquid waste would be pumped to the facility cooling tower when tank capacity became high. This system would treat the PCE via evaporation. Periodically, wastewater would be pumped out of the holding tank and transported off site by a licensed waste hauler.

NCDOH re-inspected the facility's liquid waste discharge operation from August through November 1978. Inspections indicated that the treatment system was ineffective and occasionally the holding tank and/or cooling tower would overflow onto the surface of the ground. Furthermore, a SPDES Permit for the circulation of waste water to the cooling tower was never submitted and therefore an official "Notice of Violation" was served to Solvent Finishers on December 1, 1978. Discharge of any liquid waste without a SPDES Permit is a direct violation of the New York State Environmental Law, Article 17 Title 8.

In January 1979, NCDOH returned to the site once again. NCDOH sampled the cooling tower and a puddle on the ground suspected to be boiler condensate and runoff. Analytical results detected 160.5 ppb of trichloroethylene (TCE) in the condensate runoff and 47.2 ppb of chloroform in the cooling tower.

On April 26, 1979, NCDOH issued a letter to the NYSDEC to inform them of Solvent Finishers past liquid waste discharge violations and investigative results. To explain the presence of PCE and TCE, NCDOH proposed that a residue was left from the discharge of contaminated liquid prior to the installation of the holding tank. The letter also stated that NCDOH was unaware of any provisions for containment of overflow from the cooling tower. NCDOH recommended monitoring for PCE regularly until Solvent Finishers demonstrated liquid discharge practices to a confined holding tank or cooling tower.

It is not known when occupancy by Solvent Finishers ceased, however it is known that from 1985 to 1995 The College House Inc. company operated at the subject property. At that time the property owner was the Skodnek Company as indicated on a 1985 permit application to erect a display sign on the property. The specifics of

operations while occupied by College House Inc. are not known. No other information regarding the College House Inc. was found.

Following tenancy by The College House Inc. Company, Rubies Costume Company (Rubies) took over occupancy at 601-603 Cantiague Rock Road. Rubies operates as a costume manufacturing company. At present, the facility is used only in cutting fabrics.

In 1998, while removing an abandoned cesspool and removing/replacing an onsite 8-foot diameter by 20-foot deep dry well, approximately 59 tons of PCE contaminated soil was excavated from the subject property. The excavated material was transported by a licensed waste hauler for disposal to the Horizon Landfill located in Quebec, Canada. Rubie's notification of intent to export allowed only 40 tons of PCE contaminated soil to be shipped. The United States Environmental Protection Agency (EPA) issued a "Notice of Violation" to Rubie's Costume Company for shipping 19 tons in exceedance of their notification to export. EPA's letter stated the following violations occurred: 1) Failure to submit a written notification of exceedance of the estimated quantity of hazardous waste specified in the original notification; 2) Failure to obtain consent of receiving country to changes in the notification of intent to export prior to shipment.

In 2009, a site characterization investigation was performed by CDM under the standby contract with NYSDEC. The investigation included membrane interface probe (MIP) screening, DPT soil and groundwater sampling, and soil vapor sampling on-site. The results of the investigation identified approximate source(s) locations of soil and groundwater contamination in the area. The former solvent holding tank, cooling tower and adjacent drywell are the approximate location of sources. Further investigation of soil and groundwater for delineation of vertical and horizontal extent of contamination onsite and offsite was recommended. Indoor air and sub-slab sampling was also recommended onsite and offsite to determine the potential for vapor intrusion.

1.3 Environmental Setting

The Site is relatively flat and lies at an approximate elevation of 160 feet above mean sea level (msl). The ground water table lies at an approximate elevation between 70 and 80 feet above msl at the Site (approximately 80 feet below ground surface (bgs)). During the Site Characterization in 2009, the water table onsite was observed at 85 feet bgs.

The water table generally parallels land surface. The groundwater rises from the western part of Long Island to form an east-west trending mound in Nassau County and western Suffolk Counties that is dissected by a low region in west-central Suffolk County beneath the Nissequogue and Connetquot River drainage basins.

1.3.1 Geology

Long Island is comprised of Cretaceous and Pleistocene unconsolidated deposits underlain by Early Paleozoic to Precambrian bedrock. The hydrogeology of Long Island has been well documented over the years by the United States Geological Survey (USGS) (Doriski and Wilde-Katz, 1983; Smolensky et al, 1989). Three major aquifers are present on Long Island: the upper glacial aquifer, the Magothy aquifer and the Lloyd aquifer.

Basement

Basement is composed of Precambrian to Early Paleozoic igneous or metamorphic consolidated bedrock. Unconformably overlying the basement is a thick succession of Late Cretaceous deposits: the Raritan and overlying Magothy Formations, both of fluvio-deltaic depositional origin. The Upper Cretaceous deposits are unconformably overlain by a veneer of Pliocene and Pleistocene deposits, chiefly of glacial origin.

Cretaceous

Raritan Formation: The Raritan Formation is divided into the basal Lloyd Sand Member and the overlying Raritan Clay Member. The Lloyd Sand rests unconformably on bedrock and is about 150 feet thick in the vicinity of the Site. The top of the Lloyd Sand is found at approximately 200-250 feet below msl. It is composed of white and grey fine to coarse sand and gravel, commonly with a clayey matrix. The contact with the overlying clay member is gradational.

The Raritan Clay Member is composed chiefly of bedded variegated clay and silt, locally containing interbedded sands. Lignite fragments and iron and pyrite nodules are common. The clay member is approximately 100 feet thick in the vicinity of the Site (Smolensky, et al. 1989). The Raritan Clay is the most widespread hydrologic confining layer on Long Island. The Raritan's updip erosional pinchout generally is located subparallel to the northern coast of Nassau County. The clay unit dips gently to the south-southeast.

Matawan Group-Magothy Formation (Magothy): The Magothy unconformably overlies the Raritan; the contact is commonly marked by a change from the solid clays of the Raritan Clay Member to coarse sands and gravels of the basal unit of the Magothy. The dominant Magothy lithology generally is fine to medium quartz sand, interbedded clayey sand with silt, clay, and gravel interbeds or lenses. Interbedded clay is more common towards the top of the formation. The thickness of the Magothy varies between 100 feet in the vicinity of the Site to over 800 feet beneath the barrier islands.

Cenozoic-Quaternary

After the Cretaceous, deep erosion of the land surface took place as a response to fluctuations in sea level. Sedimentological evidence indicates that sea level falls exposed the entire Atlantic continental margin during the Miocene epoch, which would have promoted rejuvenation and deep incision of rivers and streams across the Coastal Plain. Later deposition of abundant fluvial and glacial clastic deposits during

the Pliocene and Quaternary filled these incised buried valleys. The top of the Cretaceous sequence is marked by a highly irregular erosion surface upon which rests deposits of Pleistocene and, in some places, Pliocene age.

Deposits of Pleistocene age mantle the Cretaceous formations. Within the study area, the Pleistocene deposits include three depositional sequences: the fluvial Jameco Gravel and marine Gardiners Clay; and the much more widespread Late Pleistocene glacial deposits of the Wisconsin glacial stage. Undifferentiated gravels and clays described in buried valleys within southern Long Island have been attributed to the Jameco Gravel and Gardiners Clay units. The Jameco Gravel and Gardiners Clay formations are well-defined, mapable stratigraphic units beneath the southern margin of Long Island where they are of hydrogeological significance. These stratigraphic units are not recognized in the vicinity of the Site. The remainder of the Pleistocene succession belongs to the Wisconsin glacial stage Upper Glacial Deposits.

The thickness of the Pleistocene Upper Glacial Deposits in the study area varies but averages 100 feet. The thickness and distribution of the Pleistocene Upper Glacial Deposits were controlled by the older, now buried paleotopography discussed above. The pattern of stream and river valleys that dissected the surface of Long Island during the Cenozoic likely was later modified by Pleistocene overriding ice sheets and meltwater erosion and deposition.

1.3.2 Hydrogeology

The hydrogeology of Long Island has been well documented over the years by the USGS and others. Three major aquifers are present on Long Island: the Upper Glacial aquifer, the Magothy aquifer and the Lloyd aquifer.

Lloyd Aquifer

The Lloyd Sand Member of the Raritan Formation of the Late Cretaceous Age overlies the saprolitic bedrock surface and is Long Island's deepest aquifer. The Lloyd sand was deposited as a series of braided streams and deltaic deposits consisting of white and pale yellow sand with interbedded lenses of gravel and white clay (Smolensky et al, 1989). The aquifer does not outcrop on Long Island and is believed to extend to the north beneath Long Island Sound in eastern Nassau County and in Suffolk County, and offshore to the south, beyond the barrier beaches. The Lloyd aquifer is confined in most places, except where the overlying Raritan clay has been eroded away. The thickness of the Lloyd aquifer varies from 0 feet where it is not present along the north shore of Nassau County, to more than 500 feet in the southeastern areas of Nassau County. The average horizontal hydraulic conductivity is reported to be approximately 40 feet per day (ft/day) with a 10:1 vertical anisotropy.

Raritan Clay

Overlying the Lloyd aquifer is the Cretaceous Age clay member of the Raritan Formation, referred to as the Raritan clay. The Raritan clay is the major confining unit on Long Island, ranging between 150 and 250 feet in thickness. Like the Lloyd aquifer, the Raritan clay is absent from areas of northern Queens and northern Nassau County

where it had been eroded. The Raritan clay outcrops in parts of Queens, and is believed to be present north of the island beneath Long Island Sound, and south of the island, beneath the barrier islands. This confining unit consists of solid, multicolored, compact clay (gray, white, red, or tan) with interbedded lenses of sand. The average vertical hydraulic conductivity is reported to be approximately 0.001 ft/day.

Magothy Aquifer

The Magothy aquifer is an upward fining sequence of the Cretaceous Age Matawan Group consisting of fine to medium grained quartz sand, silt, clay, and gravel and is up to 1,100 feet thick. The base of the Magothy is very coarse, having been deposited in a high-energy environment involving stream and deltaic deposition. This high-energy deposition abruptly ended as fine sands, silts and clays form the majority of the unit. The Magothy Aquifer is unconfined in the site area. The Magothy aquifer is the principal water supply aquifer in Nassau and Suffolk Counties, attributing to its thickness. Its average horizontal hydraulic conductivity is reported to be approximately 50 ft/day with a vertical anisotropy of 100:1 (Smolensky et al, 1989).

Upper Glacial Aquifer

The upper glacial aquifer is the surficial unit on Long Island and is therefore entirely unconfined. Along the Harbor Hill and Ronkonkoma terminal moraines and parts of the north shore, the unit is composed of till consisting of poorly sorted clay, sand, gravel, and boulders. The till is generally poorly permeable and may contain perched water. The outwash deposits that are found are mainly between, and south of, the moraines. The outwash deposits are moderately to highly permeable, consisting of gray, brown, and yellow fine to very coarse sand and gravel. The upper glacial aquifer ranges up to 600 feet thick, however the saturated thickness is often much lower. The estimated average horizontal hydraulic conductivity generally exceeds 225 ft/day.

Ground Water

Based on Nassau County regional groundwater information obtained in the *Nassau County Groundwater Monitoring Program, 2002-2003* (NCDPW, 2005) the water table lies at an elevation of 70 to 80 feet above msl (approximately 80 ft bgs). Flow in the water table aquifer (Upper Glacial) is complicated by a groundwater divide located approximately 1,000 feet northeast of the site. In general, it is expected that groundwater flow at the site will be to the west/southwest, however because of its proximity to the groundwater divide there is a potential for flow to the north and south from the site as well. In addition, groundwater extraction from local public supply wells can also influence groundwater flow at the site.

Flow in the Magothy Aquifer is more towards the south/southwest near the site. Groundwater flow in the deeper Lloyd Aquifer is expected to be to the southwest.

1.4 Fate and Transport

PCE is a manufactured chemical that is widely used in the dry-cleaning industry. It is also used for degreasing and is found in consumer products including some paint and spot removers, water repellents, brake and wood cleaners, glues, and suede protectors. Other names for PCE include tetrachloroethene and perchloroethylene.

1.4.1 Fate of PCE

The fate of PCE is dominated by its volatility and degradation. PCE's presence in surface soils or surface water is usually short-lived, providing that a continuing source is not present.

In the atmosphere, PCE is expected to be present primarily in the vapor phase and not sorbed to particulates because of its high vapor pressure of 18 millimeters (mm) of mercury (Hg). Vapor-phase PCE will be degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals. Direct photolysis is not expected to be an important environmental fate process since PCE only absorbs light weakly in the environmental ultraviolet (UV) spectrum.

The dominant fate of PCE in soils is volatilization. Based on its K_{oc} value of 265 milliliters per gram (mL/g), PCE is moderately mobile in soils. Consequently, PCE has the potential to migrate through the soil into groundwater. PCE has a specific gravity greater than water (1.62) indicating that pure liquid phase PCE will sink when dissolved in groundwater. The solubility of PCE in water is 150 milligrams per Liter (mg/L). Biodegradation under anaerobic conditions in soil and groundwater may occur at a relatively slow rate with half lives on the order of months or longer. PCE in groundwater can undergo reductive dechlorination catalyzed by anaerobic bacteria. The PCE will tend to degrade to TCE. Subsequent degradation to *cis*-1,2-dichloroethene (DCE) or *trans*-1,2-DCE and then to vinyl chloride can also occur via anaerobic mechanisms. Vinyl chloride can further degrade to ethylene.

Volatilization is also an important fate process of PCE in surface waters based on its Henry's Law constant of 1.73×10^{-2} atmosphere meters cubed per mol (atm-m^3/mol). PCE is also not expected to adsorb to suspended solids and sediment in water based upon its K_{oc} value. The half-lives in soil and groundwater were reported to be 180-360 days and 270 days respectively. A reported K_{ow} value of 351 in fish suggests that the potential for PCE to bioconcentrate in aquatic organisms is low.

1.4.2 Transport of PCE

Liquid phase PCE discharged directly to the ground surface would be expected to migrate downward through the unsaturated zone in a relatively linear pattern, with minimal dispersion from the discharge location. The unsaturated zone at the site is expected to be primarily sandy material; however the presence of lower permeability silt and clay layers may be encountered which could complicate the migration pathway. The depth to groundwater at the site is about 80 feet bgs, so any PCE entering the unsaturated zone has a significant distance to travel before groundwater is encountered.

Significant soil vapor contamination may be present in the unsaturated zone. The vapor phase PCE vaporizes upward while the liquid phase migrates downward. Chlorinated solvents in the vapor phase can cause significant indoor air contamination due to residual unsaturated soil contamination or vaporization directly from the groundwater table interface.

Once liquid phase PCE encounters the water table, some of the solvent will become dissolved in the groundwater and begin to move in the direction of groundwater flow. If the quantity of solvent reaching the water table is sufficient, some of the solvent will remain in an undissolved state as a dense non-aqueous phase liquid (DNAPL) and, since PCE is denser than water, the solvent will continue to move downward under the influence of gravity. DNAPL will continue to sink until it encounters a lower permeability zone, which would slow or stop the downward migration. DNAPL could pool or accumulate on top of a lower permeability zone and remain stationary or move in the down-slope direction of the lower permeability zone. If sufficient DNAPL is pooled or trapped in the aquifer, it will act as a continual source of dissolved groundwater contamination. Movement of DNAPL in the saturated zone can be very complex, with movement controlled by the permeability of subsurface stratigraphic units, the shape and configuration of lower permeability zones, and/or the dip of bedding planes.

At the site, groundwater generally flows toward the south/southwest. However, movement of PCE in the saturated zone at the site may be complicated by the groundwater extraction in the area from several public supply wells.

Section 2
Scope of Work

2.1 Task 1 – Site Visit and Work Plan Development

A site visit was conducted on May 17, 2007 prior to site characterization activities. This Work Plan references procedures detailed in the CDM Generic Quality Assurance Project Plan (QAPP) dated March 2007 which has been provided to NYSDEC for Contract Number D-00437. The Generic QAPP presents methods that will be used to collect field data including project samples, and focuses on the analytical methods and quality assurance/quality control (QA/QC) procedures that will be used to analyze project samples, ensure the data are of known and acceptable quality, and manage the resultant data.

This Work Plan also includes a site specific Health and Safety Plan (HASP) presented in **Appendix A** and a Citizen Participation Plan (CPP) presented in **Appendix B**. The HASP describes the site health and safety for the field activities that will be performed and includes the Community Air Monitoring Plan (CAMP). The CPP provides the primary contacts for the site as well as various public entities and provides ways for citizens to be involved in the project.

The RI will be conducted at the site to delineate the vertical and horizontal extent of onsite and offsite soil, groundwater, and soil vapor contamination. The site characterization conducted by CDM in 2009 had established the approximate location of the source of contamination. This investigation is to refine the nature and extent of the contamination as well as to assist in the development of the FS. The RI will consist of two phases:

- Phase I: On-site and Off-site soil and groundwater vertical profiling, and sub-slab vapor sampling.
- Phase II: Monitoring well and soil gas installation and sampling (dependent upon the on results from Phase I)

The following sections summarize Phase I and II investigation activities.

2.2 Task 2 – Remedial Investigation Phase I

The Phase I investigation activities will include a geophysical survey, collection of DPT soil and groundwater vertical profile samples, and sub-slab vapor and indoor air samples. The objective is to provide groundwater and soil analyses for comparison to New York State (NYS) Class GA Groundwater Quality Standards and NYSDEC Soil Cleanup Objectives. Sub-slab vapor and indoor analyses will be assessed according to New York State Department of Health (NYSDOH) *Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York*, dated October 2006

The following section presents the field activities proposed for the Solvent Finishers RI Phase I. Field documentation and sampling procedures are provided in the CDM

Generic QAPP referenced above. All applicable procedures contained in the Generic QAPP will be followed.

2.2.1 Geophysical Survey

A geophysical survey utilizing ground penetrating radar (GPR), radio frequency (RF), and electromagnetic conductivity (EC) will be conducted at the site to identify underground utilities, water lines, underground storage tanks and/or any large anomalies such as conduits.

The geophysical survey will also be performed to clear boring locations prior to drilling, since the One-Call service does not mark out utilities beyond the street. Subsurface utilities will be marked within 15 feet of each proposed location to allow for relocation of borings should refusal be encountered during drilling. **Figure 2-1** displays proposed boring locations.

2.2.2 Subsurface Soil DPT Sampling

A total of 4 on-site (SB-02 through SB-05) and 3 off-site (SB-07, SB-10, and SB-15) soil borings will be advanced using DPT drilling methods. To ensure the appropriate depth is reached for delineation, a Geoprobe equipped for DPT and auger drilling methods will be utilized. Continuous split spoon samples will be installed at 3 on-site (SB-02, SB-04 and SB-05) locations from 20-80 feet bgs , one on-site location (SB-03) from 20 feet bgs to the clay layer (approximately 200 feet bgs), and 3 off-site locations (SB-07, SB-10, and SB-15) from 20-200 feet bgs. The approximate locations of the sampling points are shown on **Figure 2-1**. The lithology, absence/presence of contamination, and organic vapor (screened by photoionization detector (PID)) will be recorded for each subsurface soil sample. The direct push soil sampling procedure is provided in the Generic QAPP.

A total of two soil samples per on-site boring (SB-01 through SB-05) will be collected for laboratory analysis.

In order to identify the presence of chlorinated compounds as well as other potential contaminants that may be present in the subsurface at the site, soil samples collected during the investigation will be analyzed for Volatile Organic Compounds (VOCs) and Total Organic Carbon (TOC) by EPA Methods 8260B and 9060, respectively.

2.2.3 Groundwater DPT Vertical Profiling

A total of 5 on-site (SB-01 through SB-05) and 10 off-site (SB-06 through SB-15) groundwater vertical profiling locations will be advanced using DPT methods. To ensure the appropriate depth is reached for delineation, a Geoprobe equipped for DPT and auger drilling methods will be utilized. Groundwater samples shall be collected every 10 feet from 80 feet bgs to the depth of the clay layer, approximated at 200 feet bgs. At each location sampling will continue vertically until 2 consecutive clean intervals are encountered based on field observations and laboratory data (as available). Along offsite transects, profiling will start at the location along the centerline of the plume (SB-07, SB-10, and SB-15). Sampling will move outward along

each transect to delineate horizontally, as necessary. Proposed sampling locations are shown in **Figure 2-1**.

Groundwater samples will be analyzed by the laboratory for VOCs by SOM01.2-trace, in order to delineate to NYSDEC Class A Groundwater Standards.

2.2.4 Sub-slab Vapor Investigation

A total of three (3) permanent sub-slab soil vapor ports locations (SV01, 02 and 03) will be installed and sampled within the on-site building. The proposed sub-slab vapor ports are presented in **Figure 2-1**. Two (2) indoor air samples, one in west portion of the building co-located with SV-03 and one in the east portion co-located with SV-02, will be collected for VOCs analysis. One (1) outdoor ambient air sample will also be collected for VOCs analysis. All samples collected during the soil vapor investigation will be analyzed by EPA method TO-15.A minimum reporting limit of 0.25 microgram per cubic meter ($\mu g/m^3$) must be achieved for TCE, vinyl chloride and carbon tetrachloride and 1 $\mu g/m^3$ for the remaining analytes. All results must be reported in $\mu g/m^3$.
These samples will be collected in accordance with the *Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York*, dated October 2006 and the *Final Division of Environmental Remediation (DER)-10 Technical Guidance for Site Investigation and Remediation*, *dated May 2010*.

2.2.4.1 Sub-slab Vapor Sample Collection

Three permanent sub-slab vapor sampling points (SV-01 through SV-03) will be installed as indicated on the **Figure 2-1**.

The selected sub-slab soil vapor sample locations shall be placed away from floor penetrations. After the slab has been inspected, the location of any subsurface utilities determined, and the ambient air surrounding the proposed sampling location screened with a PID, a hammer drill will be used to advance a boring to a depth of approximately two inches beneath the building slab. A permanent port constructed of stainless steel tubing and fittings will be installed in the opening. The annular space between the borehole and the sample tubing will be filled and sealed with anchoring cement. Teflon tubing will be connected to the stainless steel sample port and utilized for sample collection. Flow rates for both purging and sample collection will not exceed 200 milliliters a minute (ml/min) to minimize ambient air infiltration during sampling. Approximately three dead air volumes of gas will be purged from the subsurface probe. PID readings will then be observed directly from the Teflon tubing and the highest reading shall be recorded on the appropriate field form. The end of the tubing will then be connected directly to the SUMMA canister's regulator intake valve.

The sub-slab soil vapor samples shall be collected with 6 Liter, laboratory-certified SUMMA canisters with 24-hour regulators and an initial vacuum of 25 inches Hg +/- 2 inches. A vacuum of 5 inches Hg +/- 1 inch must be present when the sample collection is completed. The sub-slab sample will be collected concurrently with the

indoor air and ambient air sample. The indoor and outdoor ambient air samples will also be collected with 6 Liter SUMMA canisters with 24-hour regulators.

The sample points will be marked with the proper sample identification and identified on the site map so that they can be located at a later date.

2.2.5 Investigative Derived Waste

Soil cuttings and purge water from each sampling location will be containerized in drums or other appropriate vessel and disposed off-site. All non-dedicated equipment, such as Teflon tubing, will be placed in containers, until an appropriate disposal method and facility can be identified. It is assumed that drums of non-hazardous waste will require off-site disposal. Investigation derived waste containers will be stored on-site at a location determined by NYSDEC until it can be removed by a licensed waste hauler.

2.2.6 Decontamination Procedures

All non-dedicated equipment and tools used to collect samples for chemical analysis will be decontaminated prior to and between each sample interval using an Alconox rinse and potable water rinse prior to reuse. Additional cleaning of the equipment with steam may be needed under some circumstances. Decontamination fluids will be discharged to the ground surface unless a visible sheen or odor is detected either on the equipment or the fluids, at which point the decontamination water will be staged in an appropriate container and disposed of appropriately.

2.3 Task 3 - Remedial Investigation Phase II

Phase II of the RI will be conducted based on the results of the Phase I Investigation. The purpose of the Phase II investigation will be to delineate and monitor the extent of groundwater and soil vapor contamination off-site. During the Phase II Investigation, 15 monitoring wells and 8 soil gas ports will be installed and sampled. The depths and locations of the wells and ports will be based on vertical profiling results. Groundwater sampling results will also be used to assist with the FS. Following is a description of the Phase II investigation tasks.

2.3.1 Installation of Monitoring Wells

2.3.1.1 Geophysical Survey

Prior to any intrusive activity, an underground utility clearance and notification will be performed. The first step, performed during mobilization, will consist of a phone call to Dig Safely New York by the driller. The second step will be performed using geophysics to identify buried utilities, tanks or other drilling hazards using a combination of GPR, RF, and EM methods.

2.3.1.2 Drilling

Up to 15 monitoring wells will be installed to an average depth of 175 feet. Drilling will be conducted using auger drilling methods to facilitate entry through tight sands and clay stringers. The lithological data to support drilling plans will be provided

after Phase I study completion. Split spoon samples may be collected continuously during drilling from the ground surface to the proposed well depth. Soils will be screened with a PID for indications of volatile organics, characterized and logged. Drilling procedures are detailed in the Generic QAPP.

2.3.1.3 Groundwater Monitoring Well Construction

Monitoring wells will be installed in cluster configurations in an effort to characterize the entire depth of the plume. One option may utilize a cluster of three, a shallow, intermediate and deep well. A well cluster will either be installed within one casing via an 8.25 inch inner diameter auger or individually via 4.25 inch inner diameter auger. The monitoring wells will be constructed of 2-inch diameter polyvinyl chloride (PVC) screen and casing with a 10-foot 0.02-slot screen for groundwater sampling and monitoring purposes. Other options may utilize smaller diameter casings in smaller boreholes, or the use of direct push equipment with small diameter casings or multichannel tubing. The wells will be finished with a stick-up casing, cap, and lock. A New York-licensed well driller will install the monitoring wells. The wells will be developed after installation and will be allowed to stabilize for at least two weeks prior to sampling

2.3.2 Monitoring Well Sampling

After well development and stabilization, the newly installed monitoring wells will be sampled. In accordance with procedures identified in the Generic QAPP, the monitoring wells will be purged and sampled using low-flow sampling methodology. When the groundwater parameters have stabilized and turbidity is less than 50 nephelometric turbidity units (NTUs), the sample shall be collected from the well using a down-hole pump. If a well should run dry, a sample may be collected following recharge. The samples will be placed in laboratory-provided glassware, in accordance with the Generic QAPP, properly preserved, and shipped.

Depth to water and the total depth of the well will be measured using a water level meter. The water level measurements will be used to update groundwater contour maps.

All groundwater samples will be analyzed for VOCs by EPA Method SOM01.2 (trace level), Iron and Manganese by EPA Method ILM05.4, Nitrate/Nitrite by EPA Method 353, TOC by EPA Method 9060. Fifty percent of the groundwater samples will also be analyzed for Alkalinity by EPA 310.1/.2, Sulfate by EPA 300/375, Sulfide by EPA 376.1/.2, Methane, Ethane, Ethene (MEE) by RSK 175.

2.3.3 Soil Gas Investigation

Soil gas samples will be collected at up to 8 off-site locations at varying depths. The shallowest depth being approximately 8 feet below site grade down to approximately 2 feet above the water table (approximated at 85 feet bgs). Locations for soil gas sampling will be based on the results of the vertical profile investigation. One (1) outdoor ambient air sample will also be collected for VOCs analysis. All samples collected during the soil vapor investigation will be analyzed by EPA method TO-15.

A minimum reporting limit of 1 µg/m^3 must be achieved for all analytes and all results must be reported in µg/m^3.

These samples will be collected in accordance with the *Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York*, dated October 2006 and the *Final Division of Environmental Remediation (DER)-10 Technical Guidance for Site Investigation and Remediation, dated May 2010*.

2.3.3.1 Soil Gas Sample Collection

Soil vapor samples will be collected at approximately 8 locations based on results of vertical profile sample results and in correspondence with NYSDEC and NYSDOH. Soil vapor points will be installed using DPT drilling methods.

Once the desired depth is reached, 3/8-inch Teflon®-lined tubing will be connected to a 6-inch double woven stainless steel sampling screen and placed in the borehole. The borehole will then be backfilled with sand to a minimum depth of 6 inches above the screen interval followed by 6-inches of dry bentonite. A bentonite slurry will then placed to the ground surface. The bentonite will be allowed to hydrate for a minimum of 24 hours prior to sample collection.

Prior to collection of soil vapor samples, the temporary soil vapor probes will be purged in accordance with the NYSDOH Soil Vapor Intrusion Guidance. One to three sample tubing volumes (i.e. volume of the sample probe and tube) will be purged at a flow rate that does not exceed 200 ml/min. PID readings will then be observed directly from the Teflon tubing and the highest reading shall be recorded on the appropriate field form. The samples will be collected using laboratory-certified clean SUMMA canisters with flow regulators and a vacuum of 25 inches Hg ± 2 inches. A vacuum of 5 inches Hg ± 1 inch must be present when sample collection is terminated. The soil vapor purging procedures are detailed further in the Generic QAPP.

Tracer gas will be used to evaluate short-circuiting of the sampling zone with ambient air. The soil vapor sampling locations will be evaluated with tracer gas in accordance with the NYSDOH Soil Vapor Intrusion Guidance. The tracer gas sampling procedure is provided in the Generic QAPP.

Samples will be collected using laboratory certified clean SUMMA canisters with regulators that will allow sample collection at two hours or less. Dedicated Teflon-lined tubing with an inside diameter of ¼ inch will be used at each sample location. The flow rate during sampling shall not exceed 200 ml/min to minimize outdoor air infiltration during sampling. During soil vapor sampling collection, an outdoor ambient air sample will also be collected.

Upon completion of sampling, the sample tubing will be removed and the temporary soil vapor probe location backfilled with bentonite. Each location will then be marked with a stake/flag labeled with the proper sample identification and illustrated on the site map so that it can be surveyed at a later date. Borings performed in paved or

concrete areas will be backfilled and refinished at the ground surface with concrete or cold patch.

2.3.4 Decontamination Procedures

The down-hole pump will be decontaminated between each monitoring well location with Alconox and reagent grade water. Decontamination procedures are further detailed in the Generic QAPP.

2.3.5 Investigation-Derived Waste

Purge water from the monitoring well installation, development, and sampling will be containerized in 55-gallon drums and analyzed to identify the appropriate disposal method. Soil cuttings from monitoring well installation, as well as personal protection equipment (PPE) and disposable equipment, such as Teflon tubing, will be containerized in 55-gallon drums, until an appropriate disposal method and facility can be determined in consultation with NYSDEC.

2.4 Laboratory Analysis and Validation

All samples will be analyzed by a NYSDOH-approved Environmental Laboratory Approval Program (ELAP) certified laboratory. A NYSDEC Analytical Services Protocol (ASP) Category B data deliverable will be provided for these analyses. All data shall also be submitted electronically in a standardized format consistent with EPA Region 2's Multimedia Electronic Data Deliverable (EDD). **Table 2-**1 presents a summary of the analytical program for the site.

All samples will be validated by an independent, qualified data validator in accordance with the NYSDEC DUSR guidance, and a usability analysis will be submitted to NYSDEC with the RI Report.

2.5 Site Survey

The locations of the soil borings, vertical profile locations, soil vapor ports, and newly installed monitoring wells will be surveyed by a New York State-licensed surveyor. The horizontal positions will be tied into the North American Datum (NAD) 1983 and UTM Zone 18N coordinate system. The vertical positions will be tied into the North American Vertical Datum (NAVD) 88. The measuring point associated with the wells shall be recorded to an accuracy of 0.01 feet vertically.

The well elevations, along with the depth to water measurements identified below, will be used to evaluate the direction of groundwater flow. Coordinates will be used to map the locations on aerial photography, obtained from the New York State Geographic Information System (GIS) Clearinghouse ortho imagery aerial photography.

2.6 Field Documentation Procedures

Field notebooks will be used during all on-site work. A dedicated field notebook will be maintained by the field technician overseeing the site activities. In addition to the notebook, any and all original sampling forms, and purge forms used during the field

activities, will be submitted to the NYSDEC as part of the final report. Field and sampling procedures, including installation of the sample boreholes, existing monitoring wells, etc., will be photo-documented.

2.7 Sample Identification

Each sample collected will be designated by an alphanumeric code that will identify the type of sampling location, matrix sampled, and the specific sample designation (identifier). Each sample shall begin with the NYSDEC Site Number for the Solvent Finishers site (130172). The following terminology shall be used for the samples collected during this investigation:

Soil:	130172-Boring ID-S -Depth
Water:	130172-Boring ID-GW-Depth 130172-Monitring Well ID-Sampling round number (R#)
Soil Vapor:	130172-SV-Location ID
Field Blanks:	130172-FB-DATE
Trip Blanks:	130172-TB-DATE

2.8 Task 4 - Remedial Investigation Report

A draft RI Report will be prepared that documents the work conducted, presents the results of the sample analysis and provides recommendations for further investigation, should it be warranted. Upon receipt of comments, CDM will revise the draft report, print the number of copies requested in the comment letter and submit to the final report to NYSDEC. For budgeting purposes, it has been assumed that four copies of the final report will be provided. In addition, one copy of the final report including text, tables, maps, photos, etc., will be submitted as a single book-marked pdf file. All electronic files will be submitted to NYSDEC on a compact disc. The site investigation data will be submitted in the most recent version of the NYSDEC EDD with the final report submission which is currently the USEPA Region 2 EDD dated November 2007.

2.9 Task 5 –Feasibility Study and Remedy Selection

An analysis of alternatives will be conducted using the data collected during the RI. The analysis will include the evaluation of remedies for the site based on RI results. The objectives of the analysis will be to identify a list of potential alternatives that may be used to remediate the on-site soil and groundwater. The alternatives analysis will be conducted in accordance with 6NYCRR Part 375-1.8. Each alternative will be evaluated based on technical feasibility, cost, overall protection of human health and the environment, and duration. A FS Report will be prepared detailing the results of the remedial alternatives analysis and provide a recommendation for a site remedy.

CDM will perform a comparison of remedial alternatives based on relevant factors including ease of implementation, applicability to the entire list of contaminants of concern, ability to achieve cleanup standards, environmental sustainability, cost, etc.

CDM will compare the remedial alternatives in the following steps:

1. Identify existing on-site and off-site sources. Evaluate the need for source control/removal prior to site plume remediation. If applicable, compare source control/removal alternatives separately from plume remediation.

2. Develop a list of applicable remedial alternatives, based on CDM experience, further literature review, and discussions with relevant technology vendors.

3. Compare and rank the source and plume remedial alternatives with respect to the relevant factors identified above. Select the most favorable remedial alternative.

Finally CDM will evaluate the need for collection of remedial technology focused data, such as groundwater tracer tests, bench-scale testing, and pilot testing of the selected alternative.

Section 3
Project Schedule

The following tabulation provides the proposed project schedule and key milestones for this work assignment. As currently planned, field work procurement will be initiated within two weeks of written receipt of final work plan approval. Field activity duration for the RI activities is estimated to be three months assuming no delays are experienced due to inclement weather, site access problems, or for other unforeseen reason

The scheduled submittal dates for deliverables are based on standard laboratory turnaround times of four weeks, and turnaround for data validation of three weeks.

Project Milestone	**Date**
Submit Task 1 – Scoping Document	October 12, 2010
Submit Task 1 – 2.11s	November 10, 2010
DEC Approval of 2.11s	November 30, 2010
Task 1 – Draft Field Sampling Plan and Health and Safety Plan Submitted	December 14, 2010
DEC/DOH Comment on Field Sampling Plan and Health and Safety Plan	February 3, 2011
Submit Task 1 - FINAL Field Sampling Plan and Health and Safety Plan	February 21, 2011
Notice to Proceed (NTP)	February 21, 2011
Commence Task 2 & 3- Field Work	March 14, 2011
Task 2 & 3 -Field Work Completed	June 17, 2011
Task 3 Submit Draft Site Remedial Investigation Report to NYSDEC for comment	September 15, 2011
NYSDEC Comments to Draft Report	20 Working Days after Draft Report Submitted
Task 3 Submit FINAL Site Remedial Investigation Report	20 Working Days after Approval of Draft Report
Task 4 Submit Draft Feasibility Report	February 1, 2012
Approve Draft Report	20 Working Days after Draft Report Submitted
Task 4 Submit FINAL Feasibility Report	20 Working Days after Approval of Draft Report

Section 4
Budget Estimates

Estimated Budget and Level of Effort (LOE) Summary
Solvent Finishers
Westbury, New York
Site No. 1-30-172

General Assumptions:

- Field work will be completed by June, 2011.
- Work will be performed in Level D.
- All costs are based upon the scope and schedule provided in this Work Plan. Costs associated with project delays or expedited schedules beyond CDM's control are not assumed.
- CDM will provide four hard copies by mail and one electronic file (pdf) by e-mail for each final report submitted to the NYSDEC. It is anticipated that all draft reports will be submitted as an electronic copy to be more sustainable. CDM will discuss with NYSDEC if the any of the final hard copies could be replaced by an electronic copy.

Task 1 –Work Plan Development

- Costs for the site visit are included in the costs shown.
- One comprehensive round of comments on the draft Work Plan will be addressed.
- Project management, subcontractor procurement, scheduling, budgeting, administrative activities are included in this task.

Task 2 & 3– Remedial Investigation Phase I and II

- It is assumed that NYSDEC shall obtain access to all drilling and sampling locations.
- It is assumed that there are no schedule delays due to inclement weather or equipment failure.
- It is assumed that there are no delays due to the site owner, tenants or public.
- It is assumed there will be one driller mobilization for this phase of the investigation.
- CDM will provide oversight during field activities, collect groundwater, soil and vapor samples, and maintain sample chain-of-custody.

- CDM assumes that all material, equipment and vehicles located in access areas will be removed to allow easy access to all sampling locations by direct push and drilling equipment.

- One PID unit will be utilized for health and safety monitoring.

- It is assumed that soil and groundwater IDW from soil borings, vertical profiling and monitoring installation will be containerized. CDM will contact the property owners to request that space for rolloff and Frac Tank storage be provided until characterization and disposal are completed. If space for IDW container staging is not provided, it is assumed that NYSDEC will provide assistance in locating a temporary staging area.

- It is assumed that soil and water IDW require analysis, transportation and non-hazardous disposal, and that up to 1 Frack Tank of IDW water, 3 rolloffs of IDW soil and 30 drum of PPE and Geoprobe sleeves require analysis, transportation and non-hazardous disposal for both Phase I and II activities.

- It is assumed that CDM will provide one CDM personnel on-site during Phase I and II field activities, except during monitoring well and vapor intrusion sampling.

- It is assumed that the geophysical survey will take two days in the field for Phase I and one day in the field for Phase II; one additional day of coordination for each Phase has been assumed.

- It is assumed that utility markouts, installation of 7 soil borings, three sub-slab soil vapor sampling locations, and 15 vertical profile locations will take up to 1 ½ months for Phase I activities. It is assumed that utility markouts, installation and sampling of 15 monitoring wells and 8 soil gas locations will take up to 1 ½ month. It is assumed that sampling and coordination of IDW disposal will take up to two additional days for Phase II activities.

Task 4 – Field Documentation and RI Report

- It is assumed that conference calls will be used to review the results, and that no meetings are required.

- It is assumed that only one round of consolidated comments will be received on the draft report.

- It is assumed that data management will be conducted using the EQuIS5 database software.

- For budgeting purposes, it is assumed that the report will include up to 7 boring logs, 15 well construction diagrams, three cross sections, and seven figures including a groundwater contour map and figures showing soil, groundwater and soil vapor data.

- During site work, digital photographs and field notes will be kept.

Task 5 – Feasibility Study Report

- Only conference calls are anticipated to be necessary for this phase. Meetings are not assumed to be required for this task.
- Only one round of comments received concurrently is anticipated on draft deliverables. The review comments will be consolidated by NYSDEC. It is assumed that comments are minimal in nature and no re-evaluation is required. It is assumed that all comments can be addressed within 8 hours.

Section 5
Staffing Plan

This project management organization for this project is to provide a clear delineation of functional responsibility and authority.

5.1 Program Manager – Michael A. Memoli, P.E., DEE

The primary responsibilities for program management activities rest with the Program Manager. The Program Manager, Mr. Memoli, will have ultimate contract responsibility for the project, including responsibility for the technical content of all engineering work. Mr. Memoli will direct, review and approve all project deliverables, schedule staff and resources, resolve scheduling conflicts and identify and solve potential program problems. He will be directly accountable to NYSDEC's Division of Hazardous Waste Remediation for program execution. He has authority to assign staff, negotiate and execute contracts and amendments, as well as execute subcontracts. The Program Manager will communicate directly with CDM's Project Manager.

5.2 Project Manager – Jessica R. Beattie, P.G.

The Project Manager, Ms. Jessica Beattie, will have the overall responsibility for the technical and financial aspects of this project. She will assign technical staff, maintain control of the project budget and schedule, prepare monthly progress reports, review and approve project invoices, evaluate the technical quality of the project deliverables as well as the adherence to QA/QC procedures and manage subcontractors. She will serve as CDM's point of contact for this project.

5.3 Program Quality Assurance Manager – Jeniffer M. Oxford

The Program Quality Assurance Officer, Ms. Jeniffer Oxford, will monitor QC activities of program management and technical staff, as well as identify and report needs of corrective action to the Program Manager. He will also conduct an internal review of all project deliverables prepared by CDM staff and sign off on the final investigation reports.

5.4 Health and Safety Officer – Christopher S. Marlowe, C.I.H., Q.E.P

The Program Health and Safety Officer, Mr. Chris Marlow, will review and make recommendations to the Subcontractors on health and safety plans for compliance with OSHA requirements. He will develop a Health and Safety plan for CDM and NYSDEC employees, handle over-sight activities, evaluate the performance of health and safety officers and maintain required health and safety records. He will report to the Program Manager

5.5 Field Manager/Health and Safety Site Supervisor/Coordinator – Melissa Koberle

The Field Manager, Ms. Melissa Koberle, will be responsible for overseeing and coordinating field activities. This will include, but is not limited to: overseeing the sampling activities, coordinating drill work, coordinating work with other subcontractors and monitoring health and safety conditions in accordance with the approved Health and Safety Plan. She is directly accountable to the Project Manager.

As the Health and Safety Site Supervisor/Coordinator, she will be responsible for ensuring that the Health and Safety Plan is implemented during field activities and that a copy of the site-specific Health and Safety Plan are maintained at the site at all times. She is also responsible for upgrading or downgrading personnel protection based on actual conditions at the time of the investigation. The Coordinator must also present an overview of the Health and Safety Plan to field personnel prior to initiating any field activities and is responsible for insuring that field personnel sign off on this plan. She will contact the Program Health and Safety Officer if any questions or issues arise during the field activities that she cannot answer.

Section 6
Subcontracting

CDM proposes to engage subcontractors to provide the following services for this work assignment:

6.1 Geophysical Survey (Utility Markout) – Advanced Geological Services

CDM will be using Advanced Geological Services (AGS) to perform the geophysical survey work. They are located at 3 Mystic Lane
Malvern, PA 19355.

6.2 Direct Push Drilling – Zebra Environmental Corp.

CDM will be using Zebra Environmental Corp (Zebra) as the direct push subcontractor. They are located at 30 N. Prospect Avenue, Lynbrook, New York 11563.

6.3 Monitoring Well Installation – Land, Air, Water Environmental Services Inc.

CDM will be using Land Air, Water Environmental Services Inc. (LAWES) (WBE) as the monitoring well installation subcontractor. They are located at Center Moriches, NY 11934.

6.4 Analytical Laboratory – Mitkem Corporation

CDM will be using Mitkem as the analytical laboratory subcontractor. They are located at 175 Metro Center Blvd Warwick, Rhode Island 02886.

6.5 Data Validation – Nancy Potak

CDM will be using Nancy Potak (WBE) as the data validation subcontractor. She is located at 1796 Craftsbury Road, Greensboro, Vermont 05841.

6.6 Surveying – YEC, Inc

CDM will be using YEC (MBE), Inc as the surveying subcontractor. They are located at 612 Corporate Way, Valley Cottage, New York 10989.

6.7 IDW Disposal – SeaCoast Environmental Services, Inc.

CDM will be using SeaCoast Environmental Services, Inc. as the IDW disposal subcontractor. They are located at 716 Newman Springs Road, PMB 292, Lincroft, New Jersey 07738.

Section 7
MBE/WBE Utilization Plan

To meet the requirements of the MBE/WBE program, CDM has prepared the following utilization plan:

Total Dollar Value of the work assignment	**$575,989**
MBE Percentage Goal	15%
MBE Dollar Value Goal	$86,398
WBE Percentage Goal	5%
WBE Dollar Value Goal	$28,799
Combined MBE/WBE Percentage Goal	20%
Combined MBE/WBE Dollar Value Goal	$115,198

Minority and woman-owned firms are expected to participate as follows:

Services to be Provided	Description of Services	Subcontractor Name and Contact Information	Proposed Subcontract Price
MBE - Survey	Site Survey	YEC, Inc Ed Chen (845) 268-3203	$5,148
WBE - Data Validation	DUSR	Nancy Potak (802) 533-9206	$4,142
WBE – Land, Air, Water Environmental Services, Inc.	Monitoring Well and Soil Gas Port Installation	John Lamprecht (631) 847-2112	$134,499
		TOTAL	$143,789

Acronyms

AGS	Advanced Geological Services
atm-m^3/mol	atmosphere meters cubed per mol
ASP	Analytical Services Protocol
bgs	below ground surface
CAMP	Community Air Monitoring Plan
CPP	Citizen Participation Plan
CDM	Camp Dresser and McKee
DCE	dichloroethene
DER	Division of Environmental Remediation
DNAPL	dense non-aqueous phase liquid
DPT	direct push technology
EC	electromagnetic conductivity
EDD	Electronic Data Deliverable
ELAP	Environmental Laboratory Approval Program
EPA	United States Environmental Protection Agency
FS	Feasibility Study
ft/day	feet per day
GIS	global information system
GPR	ground penetrating radar
HASP	health and safety plan
Hg	mercury
IDW	investigation derived waste
LAWES	Land, Air, Water Environmental Services, Inc.
LOE	level of effort
MBE	minority owned business
MEE	methane, ethane, ethene
mg/L	micrograms per liter
MIP	membrane interface probe
mL/g	milliliter per gram
ml/min	milliliter per minute
mm	millimeter
msl	mean sea level
NAD	North American Datum
NAVD	North American Vertical Datum
NCDOH	Nassau County Department of Health
NCDPW	Nassau County Department of Public Works
NTU	nephelometric turbidity units
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PCE	tetrachloroethylene
PPE	personal protective equipment
PID	photoionization detector
ppb	parts per billion
PVC	polyvinyl chloride

QA/QC	quality control/quality assurance
QAPP	quality assurance project plan
RF	radio frequency
RI	Remedial Investigation
SPDES	State Pollutant Discharge Elimination System
TCE	trichloroethylene
TOC	total organic carbon
$\mu g/m^3$	microgram per meters cubed
USGS	United States Geological Survey
UV	ultraviolet
VOCs	volatile organic compounds
WA	Work Assignment
WBE	woman owned business

Tables

Table 2-1
Analytical Program Summary
Solvent Finishers
Westbury, New York

Analytical Parameter	Sample Matrix	Number of Samples	Analytical Method	Field Duplicates (a)	MS/MSDs	Ambient Air Sample (b)	Field Blank (c)	Trip Blanks (d)	Container (e)	Sample Preservation	Holding Time
TASK 2 - REMEDIAL INVESTIGATION PHASE I											
GROUNDWATER SAMPLES											
VOCs	Groundwater	195	SOM01.2-Trace	10	10	–	15	15	3 - 40ml clear glass vial with Teflon septum	HCl to pH <2; Cool to 4°C	14 days[g]
SOIL SAMPLES											
VOCs	SOIL	8	EPA 8260B	1	0	–	1	0	(3) 40 mL glass vials with magnetic stir bars and PTFE lined septa/open top screw caps	Cool to 4°C	14 days
TOC	SOIL	8	EPA 9060	1	0	–	1	0	(1) 8-oz glass jar	Cool to 4°C	14 days
SUB-SLAB SOIL VAPOR, SOIL VAPOR, INDOOR AND OUTDOOR AIR SAMPLES											
VOCs	Vapor	12	EPA TO-15	1	(f)	2	–	–	6-liter SUMMA canister	None	30 days
TASK 3 - REMEDIAL INVESTIGATION PHASE II											
GROUNDWATER SAMPLES (monitoring wells)											
VOCs	Groundwater	15	SOM01.2-Trace	1	0	–	4	4	3 - 40ml clear glass vial with Teflon septum	HCl to pH <2; Cool to 4°C	14 days
Sulfide	Groundwater	8	EPA 376.1/.2	1	0	–	0	–	(1) 1 L HDPE	Sodium acetate and NaOH to pH>9; Cool to 4°C	7 days
Sulfate	Groundwater	8	EPA 300/375	1	0	–	0	–	(1) 250 mL HDPE	Cool to 4°C	28 days
Methane, Ethane, Ethene	Groundwater	8	RSK 175	1	0	–	0	–	(3) 40 ml VOA vials w/Teflon lined septum	HCl to pH <2; Cool to 4°C	14 days
Alkalinity	Groundwater	8	EPA 310.1	1	0	–	0	–	100ml polyethylene or glass	Cool to 4°C	14 days
Nitrate/Nitrite	Groundwater	15	EPA 353	1	0	–	0	–	250ml polyethylene	Cool to 4°C, H_2SO_4 to pH<2	28 days
Total Organic Carbon	Groundwater	15	EPA 9060	1	0	–	0	–	(1) 250 mL amber glass bottle or protect from light	Cool to 4°C, H_2SO_4 to pH<2	28 days
Dissolved Iron	Groundwater	15	ILM05.4	1	0	–	0	–	300ml polyethylene or glass	Cool to 4°C, HNO_3 to pH<2	6 months
Dissolved Manganse	Groundwater	15	ILM05.4	1	0	–	0	–	300ml polyethylene or glass	Cool to 4°C, HNO_3 to pH<2	6 months

Notes:
(a) A minimum of 5% of all samples will be collected in duplicate. A duplicate of each sample type will be collected for sub-slab and indoor air samples (3 samples represents a set of duplicate samples)
(b) Ambient air samples will be collected at each structure where indoor air sampling is being conducted.
(b) Groundwater field blanks are collected at a frequency of 1 per day.
(d) Trip blanks are collected at a frequency of 1 per sample cooler or 1 per every five days.
(e) Cannister should be used within 15 days of being shipped to the field for sample collection.
(f) SUMMA canisters containing samples are not spiked in the field.
(g) 24-Hour turnaround time is requested.

Figures

N

Figure 1-1
Site Location
Solvent Finishers
Westbury, New York

CDM

Legend

- Historic Monitoring Well
- Historic Soil Vapor Sampling Location
- Historic Solvent Finishers MIP Locations
- Proposed Soil Boring and Vertical Profile Location
- Contingency Soil Boring and Vertical Profile Location
- * SB-15: Background Location To Be Determined
- Proposed Sub-Slab Vapor Sampling Location

N

0 150 300 600

Feet

CDM

Figure 2-1
Proposed Sample Locations
Solvent Finishers
Westbury, New York

Appendix A

Health and Safety Plan (HASP)

HEALTH AND SAFETY PLAN FORM
CDM Health and Safety Program

This document is for the exclusive use of CDM and its subcontractors

CDM (Camp Dresser & McKee)
PROJECT DOCUMENT #:

PROJECT NAME	Solvent Finishers Site Site No. 130172	**PROJECT#**	0897-59173	**REGION**	PSG NER
SITE ADDRESS	601 Cantiague Rock Road Jericho, Nassau County, New York	**CLIENT ORGANIZATION** **CLIENT CONTACT** **CLIENT CONTACT PHONE #**		NYSDEC Robert DeCandia (518) 402-9710	

( ) AMENDMENT TO EXISTING APPROVED H&SP?
( ) H&SP AMENDMENT NUMBER? _____ **( ) DATE OF PREVIOUS H&SP APPROVAL** _____

OBJECTIVES OF FIELD WORK:
(e.g. collect surface soil samples):

1) Site Survey for Phase I and Phase II activities. 2) Soil boring installation and split spoon sampling on-site and off-site locations. 3) Groundwater profiling and sampling via hydro-punch technology. 4) Monitoring wells installation. 5) Groundwater sampling of monitoring wells. 6) Soil vapor sampling

SITE TYPE: *Check as many as applicable*

Active	(**X**)	Landfill	( )	Unknown	( )
Inactive	( )	Uncontrolled	( )	Military	( )
Secure	(**X**)	Industrial	(**X**)	Other (specify)	(**X**)
Unsecure	( )	Recovery	( )	**Commercial**	
Enclosed space	( )	Well Field	( )		

All requirements described in the **CDM Health and Safety Manual** are incorporated in this health and safety plan by reference.

PERSONNEL AND RESPONSIBILITIES **NAMES OF WORK CREW MEMBERS**	**Company / Division / Office**	**Current Training & Medical?**	**Project or Site Responsibilities**	**Tasks On Site?**
Melissa Koberle	CDM/ERD	B-S	Deputy Project Manager	1-2-3-4-5-6
Jessica Beattie	CDM/ERD	B-S	Project Manager	1-2-3-4-5-6
Chris Marlowe	CDM/ERD	C	H&S Manager	No
Pat Connelly	CDM/ERD	B-S	H&S Coordinator/Field Manager	1-2-3-4-5-6

BACKGROUND REVIEW: (**X**) Complete ( ) Incomplete

HEALTH AND SAFETY PLAN FORM	*This document is for the exclusive*	**CDM** (Camp Dresser & McKee)
CDM Health and Safety Program	*use of CDM and its subcontractors*	**PROJECT DOCUMENT #:**

SITE MAP: *Show Exclusion, Contamination Reduction, and Support Zones. Indicate Evacuation and Reassembly Points*

Exclusion Zone

Contamination Reduction Zone

Support Zone/Staging Area

SB - soil boring
MW - monitoring well
SV - soil vapor point
MIP - membrane interface probe

HEALTH AND SAFETY PLAN FORM | *This document is for the exclusive* | **CDM** (Camp Dresser & McKee)
CDM Health and Safety Program | *use of CDM and its subcontractors* | **PROJECT DOCUMENT #:**

HISTORY: *Summarize conditions that relate to hazard. Include citizen complaints, spills, previous investigations or agency actions, known injuries, etc.*

Solvent Finishers dry-cleaning facility used 11,000 gallons of tetrachloroethylene (PCE) yearly to assist in cleaning large rolls of fabric on an automated system. In 1978, soil samples from a dry-well located in the rear of the facility taken by Nassau County Department of Health (NCDOH) revealed PCE concentrations at 20,000 ppm. A further investigation was conducted by NCDOH which indicated that PCE was being discharged directly into the dry-well and ground surface. A State Pollution Discharge Elimination System (SPDES) permit was granted to Solvent Finishers in August of 1979, permitting them to discharge into an inground holding tank for storage and removal by a license waste scavenger. Any liquid waste discharged which exceeded the capacity of the holding tank would be mechanically pumped into a cooling tower. Re-inspections of this system later in the year indicated that the waste handling operation was not effective and on occasion the tank and/or cooling tower would overflow onto the surface of the ground. Due to continous overflow of waste discharge events the soil became severly contaminated. In the 1990's, Rubies Costume Company bought Solvent Finishers. From October 1998-1999, Rubies Costume Company excavated 59 tons of PCE contaminated soil. EPA issued a "Notice of Violation" for exceeding the allowed 40 tons. There are no records of follow up sampling or investigations. Source of chlorinated solvent was confirmed by the Site Characterization study by CDM, 2009.

WASTE TYPES: ( ) Liquid ( ) Solid ( ) Sludge ( ) Gas ( ) Unknown (**X**) Other, specify: **contaminated groundwater**

WASTE CHARACTERISTICS: *Check as many as applicable.*

( ) Corrosive ( ) Flammable ( ) Radioactive
( ) Toxic (**X**) Volatile ( ) Reactive
( ) Inert Gas ( ) Unknown
(**X**) Other: **PCE in groundwater, soil vapor and subsurface soil**

WORK ZONES:

The exclusion zone will include all points within 10 feet of the investigation activities or a sampling location. The contamination reduction zone will consist of a ten foot radius outside of the exclusion zone. The support zone will be a 10 foot radius outside of the CRZ. All zones are mobile, established in consideration of the prevailing wind direction and will be established and moved as work crew advances to new locations.

HAZARDS OF CONCERN: *Check as many as applicable.*

(X) Heat Stress CDM Guideline
(X) Cold Stress CDM Guideline
( ) Explosive/Flammable
( ) Oxygen Deficient
( ) Radiological
( ) Biological
( ) Other: _____
( ) Other: _____
(X) Noise CDM Guideline
( ) Inorganic Chemicals
(X) Organic Chemicals
(X) Motorized Traffic
(X) Heavy Machinery:Drill Rig
(X) Slips & Falls CDM Guideline

FACILITY'S PAST AND PRESENT DISPOSAL METHODS AND PRACTICES:

The Site's past disposal methods include discharging into an inground holding tank and cooling tower. However, the liquid waste discharged often overflowed the holding tank and cooling tower onto ground surface. The Site also has past experience of disposing liquid waste directly to ground surface.

This plan incorporates CDM's procedure for: *(Click on the relevant topics to download the hazard guideline. Delete irrelevant topics.)*

Housekeeping
Manual Material Handling
Traffic and Work Zone Safety
Tools and Power Equipment
Working Around Heavy Equipment
Working Safely Around Geoprobes
Hazardous Waste Site Controls
Working Safely Around Drill Rigs
Hazardous Waste Site Decontamination

DESCRIPTION AND FEATURES: *Include principal operations and unusual features (containers, buildings, dikes, power lines, hillslopes, rivers, etc.)*

The Solvent Finishers Site was a former dry-cleaning operation, located at 601-603 Cantiague Rock Road, Town of Oyster Bay, Nassau County, New York. The building was built on 3.78 acres in 1960. The facility is bordered by a movie theatre and BJ Wholesale Club to the South, Cantiague Rock Road to the North and East, and Brush Hollow Road and a BMW distribution center and dealership to the West. Presently the building is located within a high commercial/industrial area. Heavy traffic and noise is a concern. Residential areas as well as recreational baseball fields are located to the northeast. The topography is mainly flat and covered by asphalt. Groundwater contours prepared for Nassau County's Groundwater Monitoring Program based on water levels collected in public wells in 2001, 2002, and 2003 indicates that the groundwater in the Upper Glacial aquifer (water table) in the Site area generally flows to the Southwest, but that there may be a Northwest component to the groundwater flow.

SURROUNDING POPULATION: (X) Residential (X) Industrial (X) Commercial ( ) Rural (X) Urban OTHER:

HAZARDOUS MATERIAL SUMMARY: ***Highlight or bold waste types and estimate amounts by category.***

CHEMICALS: *Amount/Units:*	**SOLIDS:** *Amount/Units:*	**SLUDGES:** *Amount/Units:*	**SOLVENTS:** *Amount/Units:*	**OILS:** *Amount/Units:*	**OTHER:** *Amount/Units:*
Acids	Flyash	Paints	Ketones	Oily Wastes	Laboratory
Pickling Liquors	Mill or Mine Tailings	Pigments	Aromatics	Gasoline	Pharmaceutical
Caustics	Asbestos	Metals Sludges	Hydrocarbons	Diesel Oil	Hospital
Pesticides	Ferrous Smelter	POTW Sludge	Alcohols	Lubricants	Radiological
Dyes or Inks	Non-Ferrous Smelter	Distillation Bottoms	**Halogenated (chloro, bromo)**	Polynuclear Aromatics	Municipal
Cyanides	Metals	Aluminum	Esters	PCBs	Construction
Phenols	Dioxins		Ethers	Heating Oil	Munitions
Halogens					
Other - *specify*	Other - *specify*	Other - *specify*	Other - *specify* **PCE**	Other - *specify*	Other - *specify*

KNOWN CONTAMINANTS	HIGHEST OBSERVED CONCENTRATION	PEL/TLV *ppm or mg/m3* *(specify)*	IDLH *ppm or mg/m3* *(specify)*	Warning Concentration *(in ppm)*	SYMPTOMS & EFFECTS OF ACUTE EXPOSURE	PHOTO IONIZATION POTENTIAL
Tetrachloroethylene (PCE)	20000 ppm*/ wastewater	25 ppm	150 ppm	47 ppm	Irritated eyes, nose, throat, flushed face & neck, dizziness	9.32

* 20,000ppm of PCE was detected in a wastewater sample collected from a discharge pipe located under an on site grate. The sample was collected in 1977 by the Nassau County Department of Health. No formal sampling or investigation has been conducted on site since that time. No formal sampling or investigation has been conducted on site since that time. This HASP will cover the activities associated with the initital site characterization

1,1 Dichloroethylene	U / GW	1 ppm	>500 ppm	1.1 ppm	No acute effects	<11.0
1,2 Dichloroethylene	U / GW	200 ppm	1,000 ppm	1.1 ppm	Irritated eyes, CNS depression	10
Trichloroethylene	U / GW	50 ppm	1,000 ppm	82 ppm	Vertigo, visual disturbance, headache, drowsiness	9.45
Vinyl Chloride	U / GW	1 ppm	Carc.	NA	Weakness, stomach pain, cancer	10.00

NA = Not Available **NE = None Established** **U = Unknown**

Verify your access to an MSDS for each chemical you will use at the site.

S = Soil SW = Surface Water T = Tailings W = Waste TK = Tanks SD = Sediment
A = Air GW = Ground Water SL = Sludge D = Drums L = Lagoons OFF = Off-Site

HEALTH AND SAFETY PLAN FORM **CDM Health and Safety Program**	*This document is for the exclusive use of CDM and its subcontractors*	**CDM** (Camp Dresser & McKee) **PROJECT DOCUMENT #:**	
SPECIFIC TASK DESCRIPTIONS	**Disturbing the Waste?**	**TASK - SPECIFIC HAZARDS**	**HAZARD & SCHEDULE**
1 **Survey Sampling Locations**	**Non-intrusive**	Heat & Cold Stress, Motorized Traffic, Slips & Falls	**Low Hazard** March-June 2011
2 **Subsurface Soil Sampling**	**Intrusive**	Heat & Cold Stress, Motorized Traffic, Slips & Falls, Heavy Machinery:Drill Rig, Organic Chemicals	**Low Hazard** March-June 2011
3 **Groundwater profiling and sampling via hydro-punch technology**	**Intrusive**	Heat & Cold Stress, Motorized Traffic, Slips & Falls, Heavy Machinery:Drill Rig, Organic Chemicals	**Low Hazard** March-June 2011
4 **Monitoring Well Installation**	**Intrusive**	Heat & Cold Stress, Motorized Traffic, Slips & Falls, Heavy Machinery:Drill Rig, Organic Chemicals	**Low Hazard** March-June 2011
5 **Groundwater sampling of monitoring wells**	**Intrusive**	Heat & Cold Stress, Motorized Traffic, Slips & Falls, Organic Chemicals	**Low Hazard** March-June 2011
6 **Soil vapor sampling**	**Intrusive**	Heat & Cold Stress, Motorized Traffic, Slips & Falls, Heavy Machinery:Drill Rig, Organic Chemicals	**Low Hazard** March-June 2011
SPECIALIZED TRAINING REQUIRED: 40 hour HAZWOPER Training and annual 8 hour refresher		**SPECIAL MEDICAL SURVEILLANCE REQUIREMENTS:** Annual Medical Refresher	
OVERALL HAZARD EVALUATION: ( ) High ( ) Medium (**X**) Low ( ) Unknown *(Where tasks have different hazards, evaluate each.)*			
JUSTIFICATION: The contamination is isolated to a sole aquifer and the VOC concentration is considered low for human health hazards.			
FIRE/EXPLOSION POTENTIAL: ( ) High ( ) Medium (**X**) Low ( ) Unknown			

HEALTH AND SAFETY PLAN FORM | *This document is for the exclusive* | **CDM** (Camp Dresser & McKee)

CDM Health and Safety Program | *use of CDM and its subcontractors* | **PROJECT DOCUMENT #:**

PROTECTIVE EQUIPMENT: *Specify by task. Indicate type and/or material, as necessary. Group tasks if possible. Use copies of this sheet if needed.*

BLOCK A

TASKS: (1) 2 - 3 - 4 (5 - 6) 7 - 8 - 9 - 10
LEVEL: A - B - C (D - Modified)
(X) Primary ( ) Contingency

Respiratory: (X) Not needed
( ) SCBA, Airline:
( ) APR:
( ) Cartridge:
( ) Escape Mask:
( ) Other:

Head and Eye: ( ) Not needed
(X) Safety Glasses:
( ) Face Shield:
( ) Goggles:
( ) Hard Hat:
( ) Other:

Boots: ( ) Not needed
(X) Steel-Toe ( ) Steel Shank
( ) Rubber **(X) Leather**
( ) Overboots:

Prot. Clothing: (X) Not needed
( ) Encapsulated Suit:
( ) Splash Suit
( ) Apron:
( ) Tyvek Coverall or
( ) Saranex Coverall
( ) Cloth Coverall:
(X) Other: Work Clothes

Gloves: ( ) Not needed
(X) Undergloves: latex
(X) Gloves: Nitrile
( ) Overgloves:

Other: specify below
( ) Tick Spray
( ) Flotation Device If Over Water
( ) Hearing Protection
(X) Sun Screen

BLOCK B

TASKS: 1 (2 - 3 - 4) 5 - 6 - 7 - 8 - 9 - 10
LEVEL: A - B - C (D - Modified)
( ) Primary (X) Contingency

Respiratory: ( ) Not needed
( ) SCBA, Airline:
( ) APR:
( ) Cartridge:
( ) Escape Mask:
( ) Other:

Head and Eye: ( ) Not needed
(X) Safety Glasses:
( ) Face Shield:
( ) Goggles:
(X) Hard Hat:
( ) Other:

Boots: ( ) Not needed
(X) Steel-Toe
( ) Rubber **(X) Leather**
( ) Overboots: Latex

Prot. Clothing: ( ) Not needed
( ) Encapsulated Suit:
( ) Splash Suit
( ) Apron:
( ) Tyvek Coverall or
( ) Saranex Coverall
( ) Cloth Coverall:
(X) Other: Work Clothes

Gloves: ( ) Not needed
( ) Undergloves:
(X) Undergloves: latex
(X) Gloves: Nitrile

Other: specify below
( ) Tick Spray
( ) Float. Device If Over Water
(X) Hearing Protection
(X) Sun Screen

BLOCK C

TASKS: 1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10
LEVEL: A - B - C - D - Modified
( ) Primary (X) Contingency

Respiratory: ( ) Not needed
( ) SCBA, Airline:
( ) APR:
( ) Cartri
( ) Escape
( ) Other:

Head and Eye: ( ) Not needed
( ) Safety Glasses:
( ) Face Shield:
( ) Goggles:
( ) Hard Hat:
( ) Other

Boots: ( ) Not needed
( ) St) S Shan
( ) R er
( ) Overboots:

Prot. Clothing: ( ) Not needed
( ) Encapsulated Suit:
( ) Splash Suit
( ) Apron:
rall
overall
rall:
( ) Other:

Gloves: ( ) Not needed
( ) Undergloves:
( ) Gloves:
( ) Overgloves:

w
e
( ) Hearing Protection
( ) Sun Screen

BLOCK D

TASKS: 1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10
LEVEL: A - B - C - D - Modified
( ) Primary ( ) Contingency

Respiratory: ( ) Not needed
( ) SCBA, Airline:
( ) APR:
( ) Cartridge:
( ) Escape Mask:
( ) Other:

Head and Eye: ( ) Not needed
( ) Safety Glasses:
( ) Face Shield:
( ) Goggles:
( ) Hard Hat:
( ) Other:

Boots: ( ) Not needed
( ) Steel-Toe ( ) Steel Shank
( ) Rubber ( ) Leather
( ) Overboots:

Prot. Clothing: ( ) Not needed
( ) Encapsulated Suit:
( ) Splash Suit
( ) Apron:
( ) Tyvek Coverall
( ) Saranex Coverall
( ) Cloth Coverall:
( ) Other:

Gloves: ( ) Not needed
( ) Undergloves:
( ) Gloves:
( ) Overgloves:

Other: specify below
( ) Tick Spray
( ) Flotation Device
( ) Hearing Protection
( ) Sun Screen

This health and safety plan form constitutes hazard analysis per 29 CFR 1910.132

HEALTH AND SAFETY PLAN FORM	*This document is for the exclusive*	**CDM** (Camp Dresser & McKee)
CDM Health and Safety Program	*use of CDM and its subcontractors*	**PROJECT DOCUMENT #:**

MONITORING EQUIPMENT: *Specify by task. Indicate type as necessary. Attach additional sheets if needed.*

INSTRUMENT	TASK	ACTION GUIDELINES		COMMENTS
Combustible		0-10% LEL	*No explosion hazard*	( ) Not Needed
Gas Indicator	1-2-3-4-5-6-7-8	10-25% LEL	*Potential explosion hazard; notify SHSC*	
		>25% LEL	*Explosion hazard; interrupt task/evacuate*	Needed for all drilling activities which includes hydropunch technology and soil vapor sampling.
		21.0% O2	*Oxygen normal*	
		<21.0% O2	*Oxygen deficient; notify SHSC*	
		<19.5% O2	*Interrupt task/evacuate*	
Radiation		3 x Background:	*Notify HSM*	(X) Not Needed
Survey Meter	1-2-3-4-5-6-7-8	>2mR/hr:	*Establish REZ*	
Photoionization	*Specify:*	0-2 ppm: Level D	2-	( ) Not Needed
Detector		20 ppm: Level D. checkfor vinyl chloride.		Monitor breathing zone continuously. Compare action levels to time-averaged breathing zone measurements.
10.6 eV Lamp	1-2-3-4-5-6-7-8	> 5 ppm Leave Area . Call HSM		
Type OVM				
Flame Ionization	*Specify:*			(X) Not Needed
Detector	1-2-3-4-5-6-7-8			
Type_____				
Single Gas	*Specify:*	0-0.5 ppm: Level D	>	(X) Not Needed
Type Vinyl Chloride	1-2-3-4-5-6-7-8	0.5 ppm Leave Area . Call HSM		Team will draw vinyl chloride detector when PID readings rise.
Respirable	*Specify:*			( ) Not Needed
Dust Monitor		If team observes visible concentrations of airborne dustor dry, windy conditions that dust, team will leave area.		
	1-2-3-4-5-6-7-8			
Type_____				
Other	*Specify:*	If team notices unusual odors or irritation of the eye or throat, they will leave the area.		( ) Not Needed
	1-2-3-4-5-6-7-8			
Type_____				
Other	*Specify:*			( ) Not Needed
Type_____	1-2-3-4-5-6-7-8			
Type_____				

HEALTH AND SAFETY PLAN FORM **CDM Health and Safety Program**	*This document is for the exclusive use of CDM and its subcontractor.*	**CDM** (Camp Dresser & McKee) **PROJECT DOCUMENT #:**

DECONTAMINATION PROCEDURES

ATTACH SITE MAP INDICATING EXCLUSION, DECONTAMINATION, & SUPPORT ZONES AS PAGE TWO

Personnel Decontamination	**Sampling Equipment Decontamination**	**Heavy Equipment Decontamination**
Summarize below or attach diagram;	*Summarize below or attach diagram;*	*Summarize below or attach diagram;*
Team member will remove their protective clothing in the following order: 1. Equipment drop 2. Glove Removal 3. Hand and face wash. ( ) Not Needed	Sampling equipment will be decontaminated by: 1. Gross mechanical removal of dirt. 2. Alconox/Water wash. 3. Potable water rinse. 4. Distilled water rinse. For soil sampling equipment a isopropanol, nitric acid, and methanol rinse will be included see QAPP Worksheet #17. ( ) Not Needed	Drill rigs and/or geoprobes used for hydropunch and soil vapor sampling will be decontaminated by: 1. Gross mechanical removal of dirt. 2. Alconox/Water wash. 3. Potable water rinse. Heavily contaminated equipment will be steam cleaned. ( ) Not Needed
Containment and Disposal Method	**Containment and Disposal Method**	**Containment and Disposal Method**
Disposable protective equipment will be disposed of in CDM dumpster, unless heavily contaminated. If heavily contaminated, disposable equipment will be contained in drums and left on site for proper disposal.	Sampling equipment cleaning water solutions will be allowed to drain to the groundwater. If heavily contaminated, disposable equipment will be contained in drums and left on site for proper disposal.	Decontamination fluids will be released to the ground, unless heavily contaminated. If heavily contaminated, contractor will contain the waste in drums, and left on site for proper disposal.

HAZARDOUS MATERIALS TO BE BROUGHT ONSITE

Preservatives		*Decontamination*		*Calibration*	
(X) Hydrochloric Acid	( ) Zinc Acetate	**(X) Alconox ™**	( ) Hexane	**(X) 100 ppm isobutylene**	**(X) Hydrogen Sulfide**
( ) Nitric Acid	( ) Ascorbic Acid	( ) Liquinox ™	**(X) Isopropanol**	**(X) Methane**	**(X) Carbon Monoxide**
( ) Sulfuric Acid	( ) Acetic Acid	**(X) Acetone**	**(X) Nitric Acid**	( ) Pentane	**(X) pH Standards**
( ) Sodium Hydroxide	( ) Other:	**(X) Methanol**	( ) Other:	( ) Hyrogen	**(X) Conductivity Std**
		( ) Mineral Spirits		( ) Propane	( ) Other:

HEALTH AND SAFETY PLAN FORM *This document is for the exclusive* **CDM** (Camp Dresser & McKee)

CDM Health and Safety Program *use of CDM and its subcontractors* **PROJECT DOCUMENT #:**

EMERGENCY CONTACTS	
Water Supply	NA
EPA Release Report #:	800 / 424 - 8802
CDM 24-Hour Emergency #:	NSG 732 / 539 - 8128
Facility Management	
Other (specify)	
CHEMTREC Emergency #:	800 / 424 - 9300

SAFETY NARRATIVE: *Summarize below*

If CDM work team observes hazards for which they have not prepared, they will withdraw from the area and call the CDM Project Manager.

SHSC will designate evacuation routes. Teams will cease work if they see lightning or thunder storms in the area.

CDM may rely on instruments operated by contractor personnel only upon HSM approval. If contractor directs a higher level of protection than this plan does, CDM personnel will wear that level. CDM personnel may choose to wear more potection than directed by this plan.

Contractor will be expected to inspect its equipment and certify its suitability for the project to the CDM site health and safety coordinator.

*As per NYSDEC Draft DER-10 Technical Guidance for Site Investigation and Remediation, continuous monitoring at each borehole/MIP location, and hydropunch location will be sufficient to meet the requirements of the Community Air Monitoring Program

HEALTH AND SAFETY PLAN APPROVALS (H&S Mgr must sign each plan)

Prepared by	Jayank Srivastava	Date	12/7/2010
HSC Signature		Date	
HSM Signature	Chris Marlowe	Date	Dec 10, 2010

EMERGENCY CONTACTS	NAME	PHONE
Health and Safety Manager	Chris Marlowe	732 / 590 - 4632
Site Safety Coordinator	Pat Connelly	212/785 - 9160
Client Contact	Robert DeCandia	(518) 402-9710
Other *(specify)*		
Environmental Agency	NYSDEC Region 1	631-444-0204
State Spill Number	New York	(800) 457 - 7362
Fire Department		911
Police Department		911
State Police		911
Health Department	Nassau County	516-571-3314
Poison Control Center	Nationwide	800 / 222 - 1222
Occupational Physician	Dr. Jerry Berke	800 / 350 - 4511

MEDICAL EMERGENCY		PHONE
Hospital Name:	Nassau County Medical Center	516-572-0123
Hospital Address	2201 Hempstead Turnpike East, East Meadow, NY 1154	
Name of Contact at Hospital:		
Name of 24-Hour Ambulance:		
Route to Hospital:		

Head northwest on Cantiague Rock Rd toward Saratoga Dr
Turn Left at Brush Hollow Rd
Turn left onto the Wantagh Pkwy S ramp
Merge onto Wantagh State Pkwy
Take the exit toward Hempstead Bethpage Turnpike/Hempstead Turnpike
Turn left at Hempstead Bethpage Turnpike/ Hempstead Turnpike

Distance to Hospital 5.6 mi

HEALTH AND SAFETY PLAN FORM
CDM Health and Safety Program
ROUTE TO HOSPITAL MAP:

This document is for the exclusive use of CDM and its subcontractors

CDM (Camp Dresser & McKee)
PROJECT DOCUMENT #:

HEALTH AND SAFETY PLAN SIGNATURE FORM

CDM Health and Safety Plan

All site personnel must sign this form indicating receipt of the H&SP. Keep this original on site. It becomes part of the permanent project files. Send a copy to the Health and Safety Manager (HSM).

SITE NAME/NUMBER: Solvent Finishers Site Number 130172

DIVISION/LOCATION: 601 Cantiague Rock Road, Jericho, Nassau County, New York

CERTIFICATION:

I understand, and agree to comply with, the provisions of the above referenced H&SP for work activities on this project. I agree to report any injuries, illnesses or exposure incidents to the site Health and Safety Coordinator (SHSC). I agree to inform the SHSC about any drugs (legal and illegal) that I take within three days of site work.

PRINTED NAME	SIGNATURE	DATE

New York State Department of Health
Generic Community Air Monitoring Plan

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent 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 directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical-specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for volatile organic compounds (VOCs) and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate NYSDEC/NYSDOH staff.

Continuous monitoring will be required for all <u>ground intrusive</u> activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. "Periodic" monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a **continuous** basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

- If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

All 15-minute readings must be recorded and be available for State (DEC and DOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

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

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

- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

All readings must be recorded and be available for State (DEC and DOH) personnel to review.

June 20, 2000

P:\Bureau\Common\CommunityAirMonitoringPlan (CAMP)\GCAMPR1.DOC

Appendix B

Citizen Participation Plan (CPP)

CITIZEN PARTICIPATION PLAN
SOLVENT FINISHERS
(Site No.:1-30-172)
Westbury, New York

Prepared for

New York State Department of Environmental Conservation
Investigation and Design Engineering Services
Standby Contract No. D004437
Work Assignment No. D004437-33

Prepared by

Camp Dresser & McKee
Raritan Plaza I, Raritan Center
Edison, New Jersey

February 2011

Contents

Section 1
Introduction

This Citizen Participation Plan (CPP) for Solvent Finishers (herein referred to as the "Site") located at 601 Cantiague Rock Road in Westbury, Nassau County, New York was prepared by Camp Dresser and McKee Inc. (CDM) for the New York State Department of Environmental Conservation (NYSDEC) under the Engineering Services for Investigation and Design, Standby Contract No. D004437. Background and site information used in the development of this Work Plan was furnished by NYSDEC and from the record search conducted by CDM. The Site Characterization performed by CDM in 2009 under the same Standby Contract was used by NYSDEC and CDM to determine the Remedial Investigation/Feasibility Study (RI/FS) scope of work.

The Site is a former dry cleaning facility which is now owned by Rubie's Costume Company who utilizes the building to cut fabric for costumes. The Work Plan was developed in accordance with the "State Superfund Standby Contract Work Assignment D004437-33, Remedial Investigation, Solvent Finishers, Site No. 130172." The Work Plan also follows the guidelines set forth in the "*Final Division of Environmental Remediation (DER)-10 Technical Guidance for Site Investigation and Remediation, dated May 2010*".

1.1 Purpose and Objectives

The purpose of this CPP is to facilitate the remedial process and enable citizens to participate in decisions that affect their health, environment, and social well being. The CPP encourages dialogue to promote the exchange of information among the affected and interested public, government agencies, and other interested parties that strengthens trust among the parties, increases understanding of site and community issues and concerns, and improves decision making. The objective of this CPP is to inform the interested public on current investigation activities being conducted at the Solvent Finishers Site.

The objective of the RI/FS is to define the nature and extent of soil, groundwater, and soil vapor contamination at the Site that has been impacted by the dry-cleaning solvent, tetracholorethylene (PCE) which was previously discharged into an on-site dry well and on the ground surface. The RI will focus on delineation of horizontal and vertical extent of onsite soil and groundwater contamination and delineation of horizontal and vertical extent of the offsite groundwater plume. A vapor intrusion assessment will also be conducted during this RI to evaluate vapor intrusion at the site and surrounding area. The data collected during the RI will support the FS and remedy selection for site remediation. Field tasks include:

- Geophysical survey for Phase I and II field activities. The Phase I survey shall include the clearing of all utilities and subsurface obstructions at proposed boring locations and any additional locations identified during field activities. The Phase II survey shall include utilities clearance at proposed monitoring well locations;

- Targeted soil and groundwater sampling program using a Geoprobe capable of direct push technology (DPT) and auger drilling methods;
- Installation and sampling of soil vapor and sub-slab ports;
- Installation and sampling of monitoring wells; and
- Disposal of investigation derived waste (IDW).

1.2 Site Description and Background

1.2.1 Site Description

The Site is located at 601 Cantiague Rock Road in the Town of Oyster Bay, Nassau County, New York as shown on **Figure 1-1**. More specifically, the Site is bordered by the Cantiague Rock Road to the north and east, a movie theatre and BJs Wholesale Club to the south, and a BMW distribution center and dealership to the west. The facility is built on 3.78 acres and surrounded by paved areas for parking. The Site is currently occupied by Rubie's Costume Company (Rubies).

The property is surrounded by industrial, commercial, and residential properties. Located southeast of the Site is Building 609 which is occupied by For Animals in the Hospital Inc., Hassal Inc., and Kraft Foods Inc. Shames Drive Industrial Park is located southwest of the Site.

1.2.2 Operational and Remedial History

The site is currently owned by Rubies and operates as a fabric cutting facility for costumes. Prior to Rubies occupancy the site was operated by College House Inc., Solvent Finishers, International Laminations, and Suval Fabrications. Historically the site operated as a manufacturer of artificial leather and plastics (Suval Fabrications), an industrial dry cleaner (Solvent Finishers), a manufacturer of imprinted and embroidered sportswear (College House Inc) and now as a fabric cutting facility (Rubies). A records search and site characterization were performed under the guidance of the NYSDEC to determine the source(s) of PCE contamination found in groundwater down gradient from the site. The site characterization established the source of chlorinated solvent contamination and recommended further investigation to delineate the onsite and offsite contamination.

The site has been developed and used for industrial operations since as early as 1960. Based on historic Sanborne Fire Insurance maps and Nassau County property cards, the site was occupied by Suval Fabrications Inc., a manufacturer of artificial leather and plastics in 1960. Suval Fabrications occupied the site until at least 1966 when the secondary building was constructed (603 Cantiague Rock Road). A site sketch provided by Solvent Finishers to the County Health Department identifies the occupant of 603 Cantiague Rock Road as International Laminations. No additional information on International Laminations was found. It is not known when operations of Suval Fabrications Inc. ceased or when Solvent Finishers Inc. operations

began. The earliest documented date indicating Solvent Finishers operated on site is October 1977.

During the period that Solvent Finishers operated as an industrial dry cleaner at the site; they reportedly used up to 11,000 gallons of tetrachloroethylene annually to clean large rolls of fabric on an automated system. Routine inspections by the Nassau County Department of Health (NCDOH) identified several violations pertaining to improper liquid waste discharge activities containing levels of PCE that exceed NYSDEC groundwater standards. Waste water was noted as being discharged directly onto the ground surface and into onsite dry wells. A site survey from 1960 identified seven dry wells on the subject property.

On October 19, 1977, NCDOH sampled a discharge pipe at Solvent Finishers located in the rear of the facility under a grate (dry well). The result detected 20,000,000 parts per billion (ppb) of PCE in the effluent.

In April of 1978, NCDOH notified Solvent Finishers of the exceedingly-high levels of PCE identified. Mitigation meetings followed resulting in the installation of an in ground holding tank. The tank was designed to hold liquid waste containing PCE for pickup and removal by a licensed waste management firm. In August (1978), a draft New York State Pollutant Discharge Elimination System (SPDES) Permit was issued for this action. A final SPDES Permit however, was never issued.

In summer of 1978, Solvent Finishers installed a pump and automatic controls on the holding tank. This system was installed to prevent tank overflow; liquid waste would be pumped to the facility cooling tower when tank capacity became high. This system would treat the PCE via evaporation. Periodically, wastewater would be pumped out of the holding tank and transported off site by a licensed waste hauler.

NCDOH re-inspected the facility's liquid waste discharge operation from August through November 1978. Inspections indicated that the treatment system was ineffective and occasionally the holding tank and/or cooling tower would overflow onto the surface of the ground. Furthermore, a SPDES Permit for the circulation of waste water to the cooling tower was never submitted and therefore an official "Notice of Violation" was served to Solvent Finishers on December 1, 1978. Discharge of any liquid waste without a SPDES Permit is a direct violation of the New York State Environmental Law, Article 17 Title 8.

In January 1979, NCDOH returned to the site once again. NCDOH sampled the cooling tower and a puddle on the ground suspected to be boiler condensate and runoff. Analytical results detected 160.5 ppb of trichloroethylene (TCE) in the condensate runoff and 47.2 ppb of chloroform in the cooling tower.

On April 26, 1979, NCDOH issued a letter to the NYSDEC to inform them of Solvent Finishers past liquid waste discharge violations and investigative results. To explain the presence of PCE and TCE, NCDOH proposed that a residue was left from the discharge of contaminated liquid prior to the installation of the holding tank. The

letter also stated that NCDOH was unaware of any provisions for containment of overflow from the cooling tower. NCDOH recommended monitoring for PCE regularly until Solvent Finishers demonstrated liquid discharge practices to a confined holding tank or cooling tower.

It is not known when occupancy by Solvent Finishers ceased, however it is known that from 1985 to 1995 The College House Inc. company operated at the subject property. At that time the property owner was the Skodnek Company as indicated on a 1985 permit application to erect a display sign on the property. The specifics of operations while occupied by College House Inc. are not known. No other information regarding the College House Inc. was found.

Following tenancy by The College House Inc. Company, Rubies Costume Company (Rubies) took over occupancy at 601-603 Cantiague Rock Road. Rubies operates as a costume manufacturing company. At present, the facility is used only in cutting fabrics.

In 1998, while removing an abandoned cesspool and removing/replacing an onsite 8-foot diameter by 20-foot deep dry well, approximately 59 tons of PCE contaminated soil was excavated from the subject property. The excavated material was transported by a licensed waste hauler for disposal to the Horizon Landfill located in Quebec, Canada. Rubie's notification of intent to export allowed only 40 tons of PCE contaminated soil to be shipped. The United States Environmental Protection Agency (EPA) issued a "Notice of Violation" to Rubie's Costume Company for shipping 19 tons in exceedance of their notification to export. EPA's letter stated the following violations occurred: 1) Failure to submit a written notification of exceedance of the estimated quantity of hazardous waste specified in the original notification; 2) Failure to obtain consent of receiving country to changes in the notification of intent to export prior to shipment.

In 2009, a site characterization investigation was performed by CDM under the standby contract with NYSDEC. The investigation included membrane interface probe (MIP) screening, DPT soil and groundwater sampling, and soil vapor sampling on-site. The results of the investigation identified approximate source(s) locations of soil and groundwater contamination in the area. The former solvent holding tank, cooling tower and adjacent drywell are the approximate location of sources. Further investigation of soil and groundwater for delineation of vertical and horizontal extent of contamination onsite and offsite was recommended. Indoor air and sub-slab sampling was also recommended onsite and offsite to determine the potential for vapor intrusion.

1.3 Environmental Setting

The Site is relatively flat and lies at an approximate elevation of 160 feet above mean sea level (msl). The ground water table lies at an approximate elevation between 70 and 80 feet above msl at the Site (approximately 80 feet below ground surface (bgs)).

During the Site Characterization in 2009, the water table onsite was observed at 85 feet bgs.

The water table generally parallels land surface. The groundwater rises from the western part of Long Island to form an east-west trending mound in Nassau County and western Suffolk Counties that is dissected by a low region in west-central Suffolk County beneath the Nissequogue and Connetquot River drainage basins.

1.3.1 Geology

Long Island is comprised of Cretaceous and Pleistocene unconsolidated deposits underlain by Early Paleozoic to Precambrian bedrock. The hydrogeology of Long Island has been well documented over the years by the United States Geological Survey (USGS) (Doriski and Wilde-Katz, 1983; Smolensky et al, 1989). Three major aquifers are present on Long Island: the upper glacial aquifer, the Magothy aquifer and the Lloyd aquifer.

Basement

Basement is composed of Precambrian to Early Paleozoic igneous or metamorphic consolidated bedrock. Unconformably overlying the basement is a thick succession of Late Cretaceous deposits: the Raritan and overlying Magothy Formations, both of fluvio-deltaic depositional origin. The Upper Cretaceous deposits are unconformably overlain by a veneer of Pliocene and Pleistocene deposits, chiefly of glacial origin.

Cretaceous

Raritan Formation: The Raritan Formation is divided into the basal Lloyd Sand Member and the overlying Raritan Clay Member. The Lloyd Sand rests unconformably on bedrock and is about 150 feet thick in the vicinity of the Site. The top of the Lloyd Sand is found at approximately 200-250 feet below msl. It is composed of white and grey fine to coarse sand and gravel, commonly with a clayey matrix. The contact with the overlying clay member is gradational.

The Raritan Clay Member is composed chiefly of bedded variegated clay and silt, locally containing interbedded sands. Lignite fragments and iron and pyrite nodules are common. The clay member is approximately 100 feet thick in the vicinity of the Site (Smolensky, et al. 1989). The Raritan Clay is the most widespread hydrologic confining layer on Long Island. The Raritan's updip erosional pinchout generally is located subparallel to the northern coast of Nassau County. The clay unit dips gently to the south-southeast.

Matawan Group-Magothy Formation (Magothy): The Magothy unconformably overlies the Raritan; the contact is commonly marked by a change from the solid clays of the Raritan Clay Member to coarse sands and gravels of the basal unit of the Magothy. The dominant Magothy lithology generally is fine to medium quartz sand, interbedded clayey sand with silt, clay, and gravel interbeds or lenses. Interbedded clay is more common towards the top of the formation. The thickness of the Magothy

varies between 100 feet in the vicinity of the Site to over 800 feet beneath the barrier islands.

Cenozoic-Quaternary

After the Cretaceous, deep erosion of the land surface took place as a response to fluctuations in sea level. Sedimentological evidence indicates that sea level falls exposed the entire Atlantic continental margin during the Miocene epoch, which would have promoted rejuvenation and deep incision of rivers and streams across the Coastal Plain. Later deposition of abundant fluvial and glacial clastic deposits during the Pliocene and Quaternary filled these incised buried valleys. The top of the Cretaceous sequence is marked by a highly irregular erosion surface upon which rests deposits of Pleistocene and, in some places, Pliocene age.

Deposits of Pleistocene age mantle the Cretaceous formations. Within the study area, the Pleistocene deposits include three depositional sequences: the fluvial Jameco Gravel and marine Gardiners Clay; and the much more widespread Late Pleistocene glacial deposits of the Wisconsin glacial stage. Undifferentiated gravels and clays described in buried valleys within southern Long Island have been attributed to the Jameco Gravel and Gardiners Clay units. The Jameco Gravel and Gardiners Clay formations are well-defined, mapable stratigraphic units beneath the southern margin of Long Island where they are of hydrogeological significance. These stratigraphic units are not recognized in the vicinity of the Site. The remainder of the Pleistocene succession belongs to the Wisconsin glacial stage Upper Glacial Deposits.

The thickness of the Pleistocene Upper Glacial Deposits in the study area varies but averages 100 feet. The thickness and distribution of the Pleistocene Upper Glacial Deposits were controlled by the older, now buried paleotopography discussed above. The pattern of stream and river valleys that dissected the surface of Long Island during the Cenozoic likely was later modified by Pleistocene overriding ice sheets and meltwater erosion and deposition.

1.3.2 Hydrogeology

The hydrogeology of Long Island has been well documented over the years by the USGS and others. Three major aquifers are present on Long Island: the Upper Glacial aquifer, the Magothy aquifer and the Lloyd aquifer.

Lloyd Aquifer

The Lloyd Sand Member of the Raritan Formation of the Late Cretaceous Age overlies the saprolitic bedrock surface and is Long Island's deepest aquifer. The Lloyd sand was deposited as a series of braided streams and deltaic deposits consisting of white and pale yellow sand with interbedded lenses of gravel and white clay (Smolensky et al, 1989). The aquifer does not outcrop on Long Island and is believed to extend to the north beneath Long Island Sound in eastern Nassau County and in Suffolk County, and offshore to the south, beyond the barrier beaches. The Lloyd aquifer is confined in most places, except where the overlying Raritan clay has been eroded away. The thickness of the Lloyd aquifer varies from 0 feet where it is not present along the

north shore of Nassau County, to more than 500 feet in the southeastern areas of Nassau County. The average horizontal hydraulic conductivity is reported to be approximately 40 feet per day (ft/day) with a 10:1 vertical anisotropy.

Raritan Clay

Overlying the Lloyd aquifer is the Cretaceous Age clay member of the Raritan Formation, referred to as the Raritan clay. The Raritan clay is the major confining unit on Long Island, ranging between 150 and 250 feet in thickness. Like the Lloyd aquifer, the Raritan clay is absent from areas of northern Queens and northern Nassau County where it had been eroded. The Raritan clay outcrops in parts of Queens, and is believed to be present north of the island beneath Long Island Sound, and south of the island, beneath the barrier islands. This confining unit consists of solid, multicolored, compact clay (gray, white, red, or tan) with interbedded lenses of sand. The average vertical hydraulic conductivity is reported to be approximately 0.001 ft/day.

Magothy Aquifer

The Magothy aquifer is an upward fining sequence of the Cretaceous Age Matawan Group consisting of fine to medium grained quartz sand, silt, clay, and gravel and is up to 1,100 feet thick. The base of the Magothy is very coarse, having been deposited in a high-energy environment involving stream and deltaic deposition. This high-energy deposition abruptly ended as fine sands, silts and clays form the majority of the unit. The Magothy Aquifer is unconfined in the site area. The Magothy aquifer is the principal water supply aquifer in Nassau and Suffolk Counties, attributing to its thickness. Its average horizontal hydraulic conductivity is reported to be approximately 50 ft/day with a vertical anisotropy of 100:1 (Smolensky et al, 1989).

Upper Glacial Aquifer

The upper glacial aquifer is the surficial unit on Long Island and is therefore entirely unconfined. Along the Harbor Hill and Ronkonkoma terminal moraines and parts of the north shore, the unit is composed of till consisting of poorly sorted clay, sand, gravel, and boulders. The till is generally poorly permeable and may contain perched water. The outwash deposits that are found are mainly between, and south of, the moraines. The outwash deposits are moderately to highly permeable, consisting of gray, brown, and yellow fine to very coarse sand and gravel. The upper glacial aquifer ranges up to 600 feet thick, however the saturated thickness is often much lower. The estimated average horizontal hydraulic conductivity generally exceeds 225 ft/day.

Ground Water

Based on Nassau County regional groundwater information obtained in the *Nassau County Groundwater Monitoring Program, 2002-2003* (NCDPW, 2005) the water table lies at an elevation of 70 to 80 feet above msl (approximately 80 ft bgs). Flow in the water table aquifer (Upper Glacial) is complicated by a groundwater divide located approximately 1,000 feet northeast of the site. In general, it is expected that groundwater flow at the site will be to the west/southwest, however because of its

proximity to the groundwater divide there is a potential for flow to the north and south from the site as well. In addition, groundwater extraction from local public supply wells can also influence groundwater flow at the site.

Flow in the Magothy Aquifer is more towards the south/southwest near the site. Groundwater flow in the deeper Lloyd Aquifer is expected to be to the southwest.

1.4 Fate and Transport

PCE is a manufactured chemical that is widely used in the dry-cleaning industry. It is also used for degreasing and is found in consumer products including some paint and spot removers, water repellents, brake and wood cleaners, glues, and suede protectors. Other names for PCE include tetrachloroethene and perchloroethylene.

1.4.1 Fate of PCE

The fate of PCE is dominated by its volatility and degradation. PCE's presence in surface soils or surface water is usually short-lived, providing that a continuing source is not present.

In the atmosphere, PCE is expected to be present primarily in the vapor phase and not sorbed to particulates because of its high vapor pressure of 18 millimeters (mm) of mercury (Hg). Vapor-phase PCE will be degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals. Direct photolysis is not expected to be an important environmental fate process since PCE only absorbs light weakly in the environmental ultraviolet (UV) spectrum.

The dominant fate of PCE in soils is volatilization. Based on its K_{oc} value of 265 milliliters per gram (mL/g), PCE is moderately mobile in soils. Consequently, PCE has the potential to migrate through the soil into groundwater. PCE has a specific gravity greater than water (1.62) indicating that pure liquid phase PCE will sink when dissolved in groundwater. The solubility of PCE in water is 150 milligrams per Liter (mg/L). Biodegradation under anaerobic conditions in soil and groundwater may occur at a relatively slow rate with half lives on the order of months or longer. PCE in groundwater can undergo reductive dechlorination catalyzed by anaerobic bacteria. The PCE will tend to degrade to TCE. Subsequent degradation to *cis*-1,2-dichloroethene (DCE) or *trans*-1,2-DCE and then to vinyl chloride can also occur via anaerobic mechanisms. Vinyl chloride can further degrade to ethylene.

Volatilization is also an important fate process of PCE in surface waters based on its Henry's Law constant of 1.73×10^{-2} atmosphere meters cubed per mol (atm-m^3/mol). PCE is also not expected to adsorb to suspended solids and sediment in water based upon its K_{oc} value. The half-lives in soil and groundwater were reported to be 180-360 days and 270 days respectively. A reported K_{ow} value of 351 in fish suggests that the potential for PCE to bioconcentrate in aquatic organisms is low.

1.4.2 Transport of PCE

Liquid phase PCE discharged directly to the ground surface would be expected to migrate downward through the unsaturated zone in a relatively linear pattern, with minimal dispersion from the discharge location. The unsaturated zone at the site is expected to be primarily sandy material; however the presence of lower permeability silt and clay layers may be encountered which could complicate the migration pathway. The depth to groundwater at the site is about 80 feet bgs, so any PCE entering the unsaturated zone has a significant distance to travel before groundwater is encountered.

Significant soil vapor contamination may be present in the unsaturated zone. The vapor phase PCE vaporizes upward while the liquid phase migrates downward. Chlorinated solvents in the vapor phase can cause significant indoor air contamination due to residual unsaturated soil contamination or vaporization directly from the groundwater table interface.

Once liquid phase PCE encounters the water table, some of the solvent will become dissolved in the groundwater and begin to move in the direction of groundwater flow. If the quantity of solvent reaching the water table is sufficient, some of the solvent will remain in an undissolved state as a dense non-aqueous phase liquid (DNAPL) and, since PCE is denser than water, the solvent will continue to move downward under the influence of gravity. DNAPL will continue to sink until it encounters a lower permeability zone, which would slow or stop the downward migration. DNAPL could pool or accumulate on top of a lower permeability zone and remain stationary or move in the down-slope direction of the lower permeability zone. If sufficient DNAPL is pooled or trapped in the aquifer, it will act as a continual source of dissolved groundwater contamination. Movement of DNAPL in the saturated zone can be very complex, with movement controlled by the permeability of subsurface stratigraphic units, the shape and configuration of lower permeability zones, and/or the dip of bedding planes.

At the site, groundwater generally flows toward the west/southwest. However, movement of PCE in the saturated zone at the site may be complicated by the groundwater extraction in the area from several public supply wells.

Section 2
Scope of Work

2.1 Task 1 – Site Visit and Work Plan Development

A site visit was conducted on May 17, 2007 prior to site characterization activities. This Work Plan references procedures detailed in the CDM Generic Quality Assurance Project Plan (QAPP) dated March 2007 which has been provided to NYSDEC for Contract Number D-00437. The Generic QAPP presents methods that will be used to collect field data including project samples, and focuses on the analytical methods and quality assurance/quality control (QA/QC) procedures that will be used to analyze project samples, ensure the data are of known and acceptable quality, and manage the resultant data.

This Work Plan also includes a site specific Health and Safety Plan (HASP) presented in **Appendix A** and a Citizen Participation Plan (CPP) presented in **Appendix B**. The HASP describes the site health and safety for the field activities that will be performed and includes the Community Air Monitoring Plan (CAMP). The CPP provides the primary contacts for the site as well as various public entities and provides ways for citizens to be involved in the project.

The RI will be conducted at the site to delineate the vertical and horizontal extent of onsite and offsite soil, groundwater, and soil vapor contamination. The site characterization conducted by CDM in 2009 had established the approximate location of the source of contamination. This investigation is to refine the nature and extent of the contamination as well as to assist in the development of the FS. The RI will consist of two phases:

- Phase I: On-site and Off-site soil and groundwater vertical profiling, and sub-slab vapor sampling.
- Phase II: Monitoring well and soil gas installation and sampling (dependent upon the on results from Phase I)

The following sections summarize Phase I and II investigation activities.

2.2 Task 2 – Remedial Investigation Phase I

The Phase I investigation activities will include a geophysical survey, collection of DPT soil and groundwater vertical profile samples, and sub-slab vapor and indoor air samples. The objective is to provide groundwater and soil analyses for comparison to New York State (NYS) Class GA Groundwater Quality Standards and NYSDEC Soil Cleanup Objectives. Sub-slab vapor and indoor analyses will be assessed according to New York State Department of Health (NYSDOH) *Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York*, dated October 2006

The following section presents the field activities proposed for the Solvent Finishers RI Phase I. Field documentation and sampling procedures are provided in the CDM

Generic QAPP referenced above. All applicable procedures contained in the Generic QAPP will be followed.

2.2.1 Geophysical Survey

A geophysical survey utilizing ground penetrating radar (GPR), radio frequency (RF), and electromagnetic conductivity (EC) will be conducted at the site to identify underground utilities, water lines, underground storage tanks and/or any large anomalies such as conduits.

The geophysical survey will also be performed to clear boring locations prior to drilling, since the One-Call service does not mark out utilities beyond the street. Subsurface utilities will be marked within 15 feet of each proposed location to allow for relocation of borings should refusal be encountered during drilling. **Figure 2-1** displays proposed boring locations.

2.2.2 Subsurface Soil DPT Sampling

A total of 4 on-site (SB-02 through SB-05) and 3 off-site (SB-07, SB-10, and SB-15) soil borings will be advanced using DPT drilling methods. To ensure the appropriate depth is reached for delineation, a Geoprobe equipped for DPT and auger drilling methods will be utilized. Continuous split spoon samples will be installed at 3 on-site (SB-02, SB-04 and SB-05) locations from 20-80 feet bgs , one on-site location (SB-03) from 20 feet bgs to the clay layer (approximately 200 feet bgs), and 3 off-site locations (SB-07, SB-10, and SB-15) from 20-200 feet bgs. The approximate locations of the sampling points are shown on **Figure 2-1**. The lithology, absence/presence of contamination, and organic vapor (screened by photoionization detector (PID)) will be recorded for each subsurface soil sample. The direct push soil sampling procedure is provided in the Generic QAPP.

A total of two soil samples per on-site boring (SB-01 through SB-05) will be collected for laboratory analysis.

In order to identify the presence of chlorinated compounds as well as other potential contaminants that may be present in the subsurface at the site, soil samples collected during the investigation will be analyzed for Volatile Organic Compounds (VOCs) and Total Organic Carbon (TOC) by EPA Methods 8260B and 9060, respectively.

2.2.3 Groundwater DPT Vertical Profiling

A total of 5 on-site (SB-01 through SB-05) and 10 off-site (SB-06 through SB-15) groundwater vertical profiling locations will be advanced using DPT methods. To ensure the appropriate depth is reached for delineation, a Geoprobe equipped for DPT and auger drilling methods will be utilized. Groundwater samples shall be collected every 10 feet from 80 feet bgs to the depth of the clay layer, approximated at 200 feet bgs. At each location sampling will continue vertically until 2 consecutive clean intervals are encountered based on field observations and laboratory data (as available). Along offsite transects, profiling will start at the location along the centerline of the plume (SB-07, SB-10, and SB-15). Sampling will move outward along

each transect to delineate horizontally, as necessary. Proposed sampling locations are shown in **Figure 2-1**.

Groundwater samples will be analyzed by the laboratory for VOCs by SOM01.2-trace, in order to delineate to NYSDEC Class A Groundwater Standards.

2.2.4 Sub-slab Vapor Investigation

A total of three (3) permanent sub-slab soil vapor ports locations (SV01, 02 and 03) will be installed and sampled within the on-site building. The proposed sub-slab vapor ports are presented in **Figure 2-1**. Two (2) indoor air samples, one in west portion of the building co-located with SV-03 and one in the east portion co-located with SV-02, will be collected for VOCs analysis. One (1) outdoor ambient air sample will also be collected for VOCs analysis. All samples collected during the soil vapor investigation will be analyzed by EPA method TO-15.A minimum reporting limit of 0.25 microgram per cubic meter ($\mu g/m^3$) must be achieved for TCE, vinyl chloride and carbon tetrachloride and 1 $\mu g/m^3$ for the remaining analytes. All results must be reported in $\mu g/m^3$.
These samples will be collected in accordance with the *Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York*, dated October 2006 and the *Final Division of Environmental Remediation (DER)-10 Technical Guidance for Site Investigation and Remediation*, *dated May 2010*.

2.2.4.1 Sub-slab Vapor Sample Collection

Three permanent sub-slab vapor sampling points (SV-01 through SV-03) will be installed as indicated on the **Figure 2-1**.

The selected sub-slab soil vapor sample locations shall be placed away from floor penetrations. After the slab has been inspected, the location of any subsurface utilities determined, and the ambient air surrounding the proposed sampling location screened with a PID, a hammer drill will be used to advance a boring to a depth of approximately two inches beneath the building slab. A permanent port constructed of stainless steel tubing and fittings will be installed in the opening. The annular space between the borehole and the sample tubing will be filled and sealed with anchoring cement. Teflon tubing will be connected to the stainless steel sample port and utilized for sample collection. Flow rates for both purging and sample collection will not exceed 200 milliliters a minute (ml/min) to minimize ambient air infiltration during sampling. Approximately three dead air volumes of gas will be purged from the subsurface probe. PID readings will then be observed directly from the Teflon tubing and the highest reading shall be recorded on the appropriate field form. The end of the tubing will then be connected directly to the SUMMA canister's regulator intake valve.

The sub-slab soil vapor samples shall be collected with 6 Liter, laboratory-certified SUMMA canisters with 24-hour regulators and an initial vacuum of 25 inches Hg +/- 2 inches. A vacuum of 5 inches Hg +/- 1 inch must be present when the sample collection is completed. The sub-slab sample will be collected concurrently with the

indoor air and ambient air sample. The indoor and outdoor ambient air samples will also be collected with 6 Liter SUMMA canisters with 24-hour regulators.

The sample points will be marked with the proper sample identification and identified on the site map so that they can be located at a later date.

2.2.5 Investigative Derived Waste

Soil cuttings and purge water from each sampling location will be containerized in drums or other appropriate vessel and disposed off-site. All non-dedicated equipment, such as Teflon tubing, will be placed in containers, until an appropriate disposal method and facility can be identified. It is assumed that drums of non-hazardous waste will require off-site disposal. Investigation derived waste containers will be stored on-site at a location determined by NYSDEC until it can be removed by a licensed waste hauler.

2.2.6 Decontamination Procedures

All non-dedicated equipment and tools used to collect samples for chemical analysis will be decontaminated prior to and between each sample interval using an Alconox rinse and potable water rinse prior to reuse. Additional cleaning of the equipment with steam may be needed under some circumstances. Decontamination fluids will be discharged to the ground surface unless a visible sheen or odor is detected either on the equipment or the fluids, at which point the decontamination water will be staged in an appropriate container and disposed of appropriately.

2.3 Task 3 - Remedial Investigation Phase II

Phase II of the RI will be conducted based on the results of the Phase I Investigation. The purpose of the Phase II investigation will be to delineate and monitor the extent of groundwater and soil vapor contamination off-site. During the Phase II Investigation, 15 monitoring wells and 8 soil gas ports will be installed and sampled. The depths and locations of the wells and ports will be based on vertical profiling results. Groundwater sampling results will also be used to assist with the FS. Following is a description of the Phase II investigation tasks.

2.3.1 Installation of Monitoring Wells

2.3.1.1 Geophysical Survey

Prior to any intrusive activity, an underground utility clearance and notification will be performed. The first step, performed during mobilization, will consist of a phone call to Dig Safely New York by the driller. The second step will be performed using geophysics to identify buried utilities, tanks or other drilling hazards using a combination of GPR, RF, and EM methods.

2.3.1.2 Drilling

Up to 15 monitoring wells will be installed to an average depth of 175 feet. Drilling will be conducted using auger drilling methods to facilitate entry through tight sands and clay stringers. The lithological data to support drilling plans will be provided

after Phase I study completion. Split spoon samples may be collected continuously during drilling from the ground surface to the proposed well depth. Soils will be screened with a PID for indications of volatile organics, characterized and logged. Drilling procedures are detailed in the Generic QAPP.

2.3.1.3 Groundwater Monitoring Well Construction

Monitoring wells will be installed in cluster configurations in an effort to characterize the entire depth of the plume. One option may utilize a cluster of three, a shallow, intermediate and deep well. A well cluster will either be installed within one casing via an 8.25 inch inner diameter auger or individually via 4.25 inch inner diameter auger. The monitoring wells will be constructed of 2-inch diameter polyvinyl chloride (PVC) screen and casing with a 10-foot 0.02-slot screen for groundwater sampling and monitoring purposes. Other options may utilize smaller diameter casings in smaller boreholes, or the use of direct push equipment with small diameter casings or multichannel tubing. The wells will be finished with a stick-up casing, cap, and lock. A New York-licensed well driller will install the monitoring wells. The wells will be developed after installation and will be allowed to stabilize for at least two weeks prior to sampling

2.3.2 Monitoring Well Sampling

After well development and stabilization, the newly installed monitoring wells will be sampled. In accordance with procedures identified in the Generic QAPP, the monitoring wells will be purged and sampled using low-flow sampling methodology. When the groundwater parameters have stabilized and turbidity is less than 50 nephelometric turbidity units (NTUs), the sample shall be collected from the well using a down-hole pump. If a well should run dry, a sample may be collected following recharge. The samples will be placed in laboratory-provided glassware, in accordance with the Generic QAPP, properly preserved, and shipped.

Depth to water and the total depth of the well will be measured using a water level meter. The water level measurements will be used to update groundwater contour maps.

All groundwater samples will be analyzed for VOCs by EPA Method SOM01.2 (trace level), Iron and Manganese by EPA Method ILM05.4, Nitrate/Nitrite by EPA Method 353, TOC by EPA Method 9060. Fifty percent of the groundwater samples will also be analyzed for Alkalinity by EPA 310.1/.2, Sulfate by EPA 300/375, Sulfide by EPA 376.1/.2, Methane, Ethane, Ethene (MEE) by RSK 175.

2.3.3 Soil Gas Investigation

Soil gas samples will be collected at up to 8 off-site locations at varying depths. The shallowest depth being approximately 8 feet below site grade down to approximately 2 feet above the water table (approximated at 85 feet bgs). Locations for soil gas sampling will be based on the results of the vertical profile investigation. One (1) outdoor ambient air sample will also be collected for VOCs analysis. All samples collected during the soil vapor investigation will be analyzed by EPA method TO-15.

A minimum reporting limit of 1 µg/m^3 must be achieved for all analytes and all results must be reported in µg/m^3.

These samples will be collected in accordance with the *Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York*, dated October 2006 and the *Final Division of Environmental Remediation (DER)-10 Technical Guidance for Site Investigation and Remediation, dated May 2010*.

2.3.3.1 Soil Gas Sample Collection

Soil vapor samples will be collected at approximately 8 locations based on results of vertical profile sample results and in correspondence with NYSDEC and NYSDOH. Soil vapor points will be installed using DPT drilling methods.

Once the desired depth is reached, 3/8-inch Teflon®-lined tubing will be connected to a 6-inch double woven stainless steel sampling screen and placed in the borehole. The borehole will then be backfilled with sand to a minimum depth of 6 inches above the screen interval followed by 6-inches of dry bentonite. A bentonite slurry will then placed to the ground surface. The bentonite will be allowed to hydrate for a minimum of 24 hours prior to sample collection.

Prior to collection of soil vapor samples, the temporary soil vapor probes will be purged in accordance with the NYSDOH Soil Vapor Intrusion Guidance. One to three sample tubing volumes (i.e. volume of the sample probe and tube) will be purged at a flow rate that does not exceed 200 ml/min. PID readings will then be observed directly from the Teflon tubing and the highest reading shall be recorded on the appropriate field form. The samples will be collected using laboratory-certified clean SUMMA canisters with flow regulators and a vacuum of 25 inches Hg ± 2 inches. A vacuum of 5 inches Hg ± 1 inch must be present when sample collection is terminated. The soil vapor purging procedures are detailed further in the Generic QAPP.

Tracer gas will be used to evaluate short-circuiting of the sampling zone with ambient air. The soil vapor sampling locations will be evaluated with tracer gas in accordance with the NYSDOH Soil Vapor Intrusion Guidance. The tracer gas sampling procedure is provided in the Generic QAPP.

Samples will be collected using laboratory certified clean SUMMA canisters with regulators that will allow sample collection at two hours or less. Dedicated Teflon-lined tubing with an inside diameter of ¼ inch will be used at each sample location. The flow rate during sampling shall not exceed 200 ml/min to minimize outdoor air infiltration during sampling. During soil vapor sampling collection, an outdoor ambient air sample will also be collected.

Upon completion of sampling, the sample tubing will be removed and the temporary soil vapor probe location backfilled with bentonite. Each location will then be marked with a stake/flag labeled with the proper sample identification and illustrated on the site map so that it can be surveyed at a later date. Borings performed in paved or

concrete areas will be backfilled and refinished at the ground surface with concrete or cold patch.

2.3.4 Decontamination Procedures

The down-hole pump will be decontaminated between each monitoring well location with Alconox and reagent grade water. Decontamination procedures are further detailed in the Generic QAPP.

2.3.5 Investigation-Derived Waste

Purge water from the monitoring well installation, development, and sampling will be containerized in 55-gallon drums and analyzed to identify the appropriate disposal method. Soil cuttings from monitoring well installation, as well as personal protection equipment (PPE) and disposable equipment, such as Teflon tubing, will be containerized in 55-gallon drums, until an appropriate disposal method and facility can be determined in consultation with NYSDEC.

2.4 Laboratory Analysis and Validation

All samples will be analyzed by a NYSDOH-approved Environmental Laboratory Approval Program (ELAP) certified laboratory. A NYSDEC Analytical Services Protocol (ASP) Category B data deliverable will be provided for these analyses. All data shall also be submitted electronically in a standardized format consistent with EPA Region 2's Multimedia Electronic Data Deliverable (EDD). **Table 2-**1 presents a summary of the analytical program for the site.

All samples will be validated by an independent, qualified data validator in accordance with the NYSDEC DUSR guidance, and a usability analysis will be submitted to NYSDEC with the RI Report.

2.5 Site Survey

The locations of the soil borings, vertical profile locations, soil vapor ports, and newly installed monitoring wells will be surveyed by a New York State-licensed surveyor. The horizontal positions will be tied into the North American Datum (NAD) 1983 and UTM Zone 18N coordinate system. The vertical positions will be tied into the North American Vertical Datum (NAVD) 88. The measuring point associated with the wells shall be recorded to an accuracy of 0.01 feet vertically.

The well elevations, along with the depth to water measurements identified below, will be used to evaluate the direction of groundwater flow. Coordinates will be used to map the locations on aerial photography, obtained from the New York State Geographic Information System (GIS) Clearinghouse ortho imagery aerial photography.

2.6 Field Documentation Procedures

Field notebooks will be used during all on-site work. A dedicated field notebook will be maintained by the field technician overseeing the site activities. In addition to the notebook, any and all original sampling forms, and purge forms used during the field

activities, will be submitted to the NYSDEC as part of the final report. Field and sampling procedures, including installation of the sample boreholes, existing monitoring wells, etc., will be photo-documented.

2.7 Sample Identification

Each sample collected will be designated by an alphanumeric code that will identify the type of sampling location, matrix sampled, and the specific sample designation (identifier). Each sample shall begin with the NYSDEC Site Number for the Solvent Finishers site (130172). The following terminology shall be used for the samples collected during this investigation:

Soil:	130172-Boring ID-S -Depth
Water:	130172-Boring ID-GW-Depth 130172-Monitring Well ID-Sampling round number (R#)
Soil Vapor:	130172-SV-Location ID
Field Blanks:	130172-FB-DATE
Trip Blanks:	130172-TB-DATE

2.8 Task 4 - Remedial Investigation Report

A draft RI Report will be prepared that documents the work conducted, presents the results of the sample analysis and provides recommendations for further investigation, should it be warranted. Upon receipt of comments, CDM will revise the draft report, print the number of copies requested in the comment letter and submit to the final report to NYSDEC. For budgeting purposes, it has been assumed that four copies of the final report will be provided. In addition, one copy of the final report including text, tables, maps, photos, etc., will be submitted as a single book-marked pdf file. All electronic files will be submitted to NYSDEC on a compact disc. The site investigation data will be submitted in the most recent version of the NYSDEC EDD with the final report submission which is currently the USEPA Region 2 EDD dated November 2007.

2.9 Task 5 –Feasibility Study and Remedy Selection

An analysis of alternatives will be conducted using the data collected during the RI. The analysis will include the evaluation of remedies for the site based on RI results. The objectives of the analysis will be to identify a list of potential alternatives that may be used to remediate the on-site soil and groundwater. The alternatives analysis will be conducted in accordance with 6NYCRR Part 375-1.8. Each alternative will be evaluated based on technical feasibility, cost, overall protection of human health and the environment, and duration. A FS Report will be prepared detailing the results of the remedial alternatives analysis and provide a recommendation for a site remedy.

CDM will perform a comparison of remedial alternatives based on relevant factors including ease of implementation, applicability to the entire list of contaminants of concern, ability to achieve cleanup standards, environmental sustainability, cost, etc.

CDM will compare the remedial alternatives in the following steps:

1. Identify existing on-site and off-site sources. Evaluate the need for source control/removal prior to site plume remediation. If applicable, compare source control/removal alternatives separately from plume remediation.

2. Develop a list of applicable remedial alternatives, based on CDM experience, further literature review, and discussions with relevant technology vendors.

3. Compare and rank the source and plume remedial alternatives with respect to the relevant factors identified above. Select the most favorable remedial alternative.

Finally CDM will evaluate the need for collection of remedial technology focused data, such as groundwater tracer tests, bench-scale testing, and pilot testing of the selected alternative.

Section 3
Project Schedule

The following tabulation provides the proposed project schedule and key milestones for this work assignment. As currently planned, field work procurement will be initiated within two weeks of written receipt of final work plan approval. Field activity duration for the RI activities is estimated to be three months assuming no delays are experienced due to inclement weather, site access problems, or for other unforeseen reason

The scheduled submittal dates for deliverables are based on standard laboratory turnaround times of four weeks, and turnaround for data validation of three weeks.

Project Milestone	**Date**
Submit Task 1 – Scoping Document	October 12, 2010
Submit Task 1 – 2.11s	November 10, 2010
DEC Approval of 2.11s	November 30, 2010
Task 1 – Draft Field Sampling Plan and Health and Safety Plan Submitted	December 14, 2010
DEC/DOH Comment on Field Sampling Plan and Health and Safety Plan	December 28, 2010
Submit Task 1 - FINAL Field Sampling Plan and Health and Safety Plan	January 11, 2011
Notice to Proceed (NTP)	January 25, 2011
Commence Task 2 & 3- Field Work	March 1, 2011
Task 2 & 3 -Field Work Completed	June 1, 2011
Task 3 Submit Draft Site Remedial Investigation Report to NYSDEC for comment	September 1, 2011
NYSDEC Comments to Draft Report	20 Working Days after Draft Report Submitted
Task 3 Submit FINAL Site Remedial Investigation Report	20 Working Days after Approval of Draft Report
Task 4 Submit Draft Feasibility Report	February 1, 2012
Approve Draft Report	20 Working Days after Draft Report Submitted
Task 4 Submit FINAL Feasibility Report	20 Working Days after Approval of Draft Report

Section 4
Contacts

4.1 Key Project Contacts

It is the expressed intent of NYSDEC and the Town of Jericho, NY to provide information to the public in a timely, complete, and accurate manner. Towards this end, the State has compiled a list of individuals to whom the public can address specific requests for information. These contacts are both local and state public officials and are knowledgeable of the proposed investigative activities. This list of contacts is provided below:

Environmental Concerns
Robert DeCandia
Environmental Engineer
Project Manager
NYSDEC Division of Environmental Remediation
625 Broadway, 11th Floor
Albany, NY 12233-7015
(518) 402-9621

Health Concerns
Charlotte Bethoney
New York State Department of Health
Public Health Specialist
Acting Section Chief, Southern Section
Bureau of Environmental Exposure Investigation
(518) 402-7880

Citizen of Participation
William Fonda
NYSDEC Division of Environmental Remediation
Region 1 Office
Loop Road, Building 40
Stony Brook, NY 11790-2356
(631) 444-0350

4.2 Repository

Four document repositories have been established to provide the public with convenient access to important project documents and other information. A copy of the documents relevant to the Remedial Investigation and Feasibility Study, including the Work Plan, will be placed in the repositories to allow interested citizens and groups to review these documents.

All documents pertaining to this site will be available for public review at the following repository locations:

1.) ***NYSDEC Division of Environmental Remediation***
625 Broadway, 11th Floor
Albany, NY 12233-7017
Attn: Robert DeCandia
By appointment only
(518) 402-9261

2.) ***NYSDEC Region 1 Office – Division of Environmental Remediation***
50 Circle Road
Stony Brook, NY 11790
Attn: William Fonda
Hours: M-F 8:30am- 4:45 pm
Phone: (631) 444-0350

3.) ***Westbury Memorial Public Library***
445 Jefferson Street
Westbury, NY 11590
Hours: M 11:00am- 9:00pm
T-F 9:00am- 9:00pm
Sat* 9:00am- 5:00pm
Sun* 1:00pm-5:00pm
*summer hours differ, please check Phone: (516) 333-0176
Website: http://www.westburylibrary.org

4.) ***Jericho Public Library***
1 Merry Lane
Jericho, NY 11753
Hours: M T Th F 9:00am- 9:00pm
W 9:00am- 9:00pm
Sat* 9:00am- 5:00pm
Sun 12:00pm-5:00pm
*summer hours differ, please check
Phone: (516) 935-6790
Website: http://www.jericholibrary.org

Section 5
Citizen Participation Activities

5.1 Fact Sheet and Mailing List

A Fact Sheet detailing the availability of the RI/FS Work Plan will be sent out to the residents and other interested parties on the mailing list. This mailing will include information about the document repositories, a brief explanation of the investigation, and the name and address of NYSDEC Citizen Participation Specialist, NYSDEC Project Manager and NYS Department of Heath contact. Parties who express interest in being placed on or removed from the mailing list will be added or removed as requested.

The Fact Sheet will also serve as an invitation for the public to provide input on the Work Plan or other project related documents via written or oral comments. Additional activities, such as public meeting and/or Fact Sheet after the site investigation is completed will be added as appropriate.