SUPPLEMENTAL REMEDIAL INVESTIGATION WORK PLAN

73rd Avenue Shopping Center, Fresh Meadows, New York
Site No. C241050

Submitted to:

New York State Department of Environmental Conservation
Division of Environmental Remediation
1 Hunters Point Plaza
Long Island City, New York 11101-5407

Prepared for:

MacArthur Holding B, Inc.
140 South Dearborn Street, Suite 1100
Chicago, Illinois 60603

Prepared by:

MACTEC Engineering and Consulting of Delaware
1787 Sentry Parkway West, Suite 120, Blue Bell, Pennsylvania 19422

MACTEC Project 3485050051

May 2011

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

1.0 INTRODUCTION

1.1 Overview

MACTEC Engineering and Consulting of Delaware (MACTEC), on behalf of the MacArthur Holding B, Inc. (MHB), has prepared this Supplemental Remedial Investigation Work Plan (SRIWP) for that part of the 73rd Avenue Shopping Center in Fresh Meadows, New York known as the 73rd Avenue Shopping Center (Site). The New York Express Cleaners have not been in operation at the Site since it was damaged in a fire about two years ago. This SRIWP has been prepared in accordance with the Interim Remedial Measure Workplan (IRMW) dated June 2005, and the New York State Department of Environmental Conservation (NYSDEC) comment letter on the Soil Sampling Workplan dated May 17, 2010, and the NYSDEC comment letter on the Groundwater Sampling Workplan and Revised Soil Sampling Workplan for Post Remediation Soil Sampling dated September 16, 2010. Included in the SRIWP, as appendices, are the following plans:

- Community Air Monitoring Plan (CAMP) – Appendix A
- Quality Assurance Project Plan (QAPP) – Appendix B
- Health and Safety Plan (HASP) – Appendix C

The objectives of the SRIWP are as follows:

1. Delineate the vertical and horizontal extent of soil contamination beneath the Site as a result of chemicals typically associated with dry cleaning operations and to determine the quality of the soil beneath the Site relative to the NYSDEC Brownfields Program. The results of the post-remediation sampling will be compared to the NYSDEC Groundwater Soil Cleanup Objectives (GSCO) and the Restricted Commercial Soil Cleanup Objectives (SCO).
2. Collect groundwater samples from the five monitoring wells that had previously been installed at the Site in 2004 to determine the quality of the groundwater relative to the NYSDEC Brownfields Program. The analytical results of the groundwater samples will be compared to the NYSDEC New York Ambient Water Quality Standards.
3. Collect two soil vapor samples in the parking lot of the 73rd Avenue Shopping Center approximately twelve to fifteen feet east of the eastern wall of the building occupied by Preschool of America, which is located adjacent to the southwestern corner of the parking lot of the shopping center.

MHB and MACTEC understand that the results of the proposed supplemental investigation will be used by the NYSDEC to assist in determining what needs to be done to complete the work at the Site under the Brownfields Program, and may need to be used for a threat assessment of the Site.

1.2 SRIWP Organization

This SRIWP presents background information on the Site, information on the setting of the Site, and the procedures and methods to be used to perform post-remediation confirmatory soil sampling and groundwater sampling at the Site. The SRIWP contains the following sections:

1.0 Introduction. This section includes a brief overview of the SRIWP and its organization.

2.0 Background. This section contains site background information, including a summary of remedial response actions.

3.0 Physical Setting. This section contains a summary of the site geology, hydrogeology, topography, and surface water bodies.

4.0 Soil Sampling Procedures and Methods. This section summarizes the procedures to be used for collecting the post-remediation confirmatory soil samples and the methods of laboratory analysis.

5.0 Groundwater Sampling Procedures and Methods. This section summarizes the procedures to be used for collecting the groundwater samples and the methods of laboratory analysis.

6.0 Soil Vapor Sampling Procedures and Methods. This section summarizes the procedures to be used for collecting the soil vapor samples and the methods of laboratory analysis.

7.0 Report. This section summarizes what information will be presented in the report that will be prepared following the completion of the field activities and laboratory analysis.

8.0 Schedule. This section presents an outline of the anticipated schedule for implementation and completion of the SRIWP.

9.0 Environmental Professional Certification.

2.0 SITE BACKGROUND

2.1 Site Location

The 73rd Avenue Shopping Center is a small shopping center located on 73rd Avenue and 188th Street in Fresh Meadows, New York. The shopping center is currently comprised of a Chinese food store, a nail salon, a branch of CitiBank, a Blockbuster Video store, a Rite Aid Pharmacy store, and the former New York Express Dry Cleaners (New York Express), which had operated retail dry cleaning on their premises. New York Express was located at the north end of the shopping center and is adjacent to the Rite Aid Pharmacy. Figure 1 presents a site location map and Figure 2 presents a site plan.

2.2 Summary of Remedial Response Actions

In August of 1997, a Phase II Environmental Site Assessment (ESA) of the Site was conducted. The scope of work of the Phase II ESA included the advancement of soil borings, and the collection and laboratory analysis of soil samples and a groundwater sample from the area adjacent to New York Express. Soil samples were collected with a Geoprobe direct push macro-sampler and a hollow stem auger-drilling rig was utilized to collect a groundwater sample. Groundwater was encountered at approximately 40 feet below ground surface (bgs). The results of laboratory analysis indicated detectable concentrations of tetrachloroethene (PCE) and trichloroethene (TCE) in the soil and groundwater samples. During the Phase II ESA activities, an apparent abandoned fuel oil underground storage tank (UST) was identified behind the Site. See Tables I through IV, August 6 and 14, 1997 (Post UST Closure Evaluation) and Tables I through V, August 7 and 14, 1997 (Phase II Assessment) in Appendix E for summaries of the analytical results of soil samples.

On November 21 and November 26, 1997, a subsurface assessment of the former UST area, which is located adjacent to the northwestern corner of New York Express, was conducted. The subsurface assessment included the advancement of soil borings and the collection of soil and groundwater samples. The samples were analyzed for petroleum constituents consistent with the New York State Department of Environmental Conservation (NYSDEC) STARS Memo #1 guidance policy and for chlorinated volatile organic compounds (VOCs). The analytical results for the soil samples indicated the presence of PCE, TCE, cis-1,2-dichloroethene (cis-DCE), petroleum-related VOCs, and semi-volatile organic compounds (SVOCs) in the soil samples. PCE, TCE, cis-DCE, and petroleum-related VOCs (naphthalene and sec-butyl benzene) were also detected in the

groundwater samples. See Tables 1 through 3 (Fluor Daniel GTI) in Appendix E for summaries of the analytical results of soil samples collected between November 21 and November 26, 1997.

The concentrations of PCE and TCE in the post-excavation confirmatory soil samples collected during the UST removal activities, and in several of the soil boring samples, exceeded the NYSDEC Technical and Administrative Guidance Memorandum (TAGM) - Determination of Soil Clean-up Objectives and Clean-up Standards, which were the soil standards in use at the time. Concentrations of petroleum-related VOCs and SVOCs detected in soil samples exceeded the STARS Memo #1 Total Concentration Leaching Procedure (TCLP) Alternative Guidance Values (total concentration) for petroleum-impacted soils. The concentrations of PCE and TCE detected in several of the groundwater samples from the Phase II ESA and the subsequent investigations exceeded New York State Ambient Water Quality Standards and Guidance Values.

In an April 21, 2000 letter, the NYSDEC recommended that "a compound specific soil gas sampling program" be conducted in the basement of the dry cleaning facility. A workplan for soil and soil gas sampling was directed to the NYSDEC dated August 1, 2000. In a November 1, 2000 letter, the NYSDEC stated that the New York State Department of Health (NYSDOH) and the NYSDEC had reviewed the plan. They requested that the assessment include the loading dock areas at the Key Food store, which was a previous tenant in the shopping center, and that soil gas samples be analyzed in the field as well as at a NYSDOH-approved laboratory. Based upon subsequent discussions, assessment activities were limited to the basement of the Dry Cleaners and did not include the Key Food store loading dock.

On April 10, 2001, soil sampling, soil gas sampling, and soil gas field screening were conducted. PCE and TCE were detected in soil and soil gas samples collected near the apparent source area and under the basement floor slab of New York Express, but at concentrations below TAGM Criteria. The results were summarized in a letter report entitled *Report of Soil and Soil Gas Sampling* dated July 5, 2001. See Table 2 (Report of Soil and Soil Gas Sampling): Soil Gas and Soil Laboratory Analytical Results in Appendix E for a summary of results.

On March 13, 2002, the NYSDEC and MHB executed a Voluntary Cleanup Agreement for the remediation of the Site.

A Remedial Investigation/Remedial Action Workplan (RI/RAW) was prepared in 2003. The workplan was conditionally approved for implementation by NYSDEC in April 2004 and finalized in June 2004. The RI/RAW was implemented during the period from May to October 2004. The results of the RI were summarized in a report dated November 17, 2004.

During the period from May to October 2004, five groundwater monitoring wells (MW-1 through MW-4, and MW-6), two soil vapor extraction wells, six vapor monitoring wells and three shallow soil gas wells were installed at the Site. Appendix D contains the construction logs of the monitoring wells that have been installed at the Site. A soil vapor extraction (SVE) pilot test was also completed to determine the site-specific data necessary for design of a SVE system.

Four soil samples were collected from selected well locations during well installation and analyzed for VOCs. Concentrations of PCE were reported in four soil samples from VMP 4 – 5-10 feet, VMP-4 – 15-20 feet, VMP 5 – 0-5 feet, and VMP 5 – 15-20 feet at 45 mg/kg, 16 mg/kg, 49 mg/kg and 22 mg/kg, respectively. Concentrations of TCE were detected in three soil samples from VMP 4 – 5-10 feet, VMP 5 – 0-5 feet, and VMP 5 – 15-20 feet, at 4.7 mg/kg, 0.24 mg/kg, and 0.26 mg/kg, respectively. TCE was not detected in soil sample VMP 4 – 15-20 above the method detection limits. Only VMP 4 – 5-10 feet (4.7 mg/kg) exceeded the NYSDEC TAGM for TCE of 0.7 mg/kg. See Table 5-1 (MACTEC E&C Project No. 3485040034) in Appendix E for a summary of detected VOCs in soil samples.

Two rounds of groundwater samples were collected in September and October 2004 from the five groundwater monitoring wells installed adjacent to the Site. The September 2004 groundwater sample results indicated concentrations of PCE in all of the samples, and TCE and cis-DCE in some of the samples. PCE was detected at concentrations above the New York Ambient Water Quality Standards or New York Ambient Water Quality Guidance Values of 0.7 µg/L in wells MW-1 (50 µg/L), MW-2 (7.4 µg/L), MW-3 (7 µg/L), MW-4 (20 µg/L) and MW-6 (24 µg/L). Concentrations of cis-DCE reported in wells MW-1 (62 µg/L) and MW-4 (16 µg/L) also exceeded the New York Ambient Water Quality Standard of 5 µg/L. The TCE concentration in MW-1 (12 µg/L) exceeded the New York Ambient Water Quality Standard of 5 µg/L. See Tables 5-2 and 5-3 (MACTEC E&C Project No. 3485040034) in Appendix E for summaries of detected VOCs in groundwater samples and Tables 5-4 and 5-5 (MACTEC E&C Project No. 3485040034) for detected biogeochemical parameters in the groundwater samples. See Figure 5-1 in Appendix E for September 2004 groundwater sample results. See Figures 4-5 and 4-6 (MACTEC E&C Project No.

3485040034) in Appendix E for groundwater contour maps and Table 4-5 (MACTEC E&C Project No. 3485040034) in Appendix E for a summary of groundwater level data.

The October 2004 groundwater sample results indicated that PCE concentrations exceeded the New York Ambient Water Quality Guidance Value of 0.7 µg/L in wells MW-1 (14 µg/L), MW-2 (2.5 µg/L), MW-3 (2.2 µg/L), MW-4 (7.4 µg/L) and MW-6 (2.1 µg/L). The concentration of cis-DCE reported in wells MW-1 (68 µg/L), MW-2 (12 µg/L), MW-3 (9 µg/L) and MW-4 (40 µg/L) exceeded the New York Ambient Water Quality Standard of 5 µg/L. The TCE concentration reported in wells MW-1 (64 µg/L), MW-2 (13 µg/L), MW-3 (16 µg/L), MW-4 (32 µg/L) and MW-6 (19 µg/L) exceeded the New York Ambient Water Quality Standard of 5 µg/L.

Soil gas samples were collected from the vapor monitoring wells and shallow soil gas sampling points (SG series of points). Laboratory results for PCE near the source area were as high as 590,000 parts per billion by volume (ppbv) in VMP-5 and 170,000 ppbv in VMP-4. VMP-3, the most distant well from the assumed source, had a concentration of 3,600 ppbv, while VMP-6 and SG-8, which are both less than 50 feet from the source area, had concentrations of 1,600 ppbv and 79 ppbv, respectively. Cis-DCE was the next highest compound detected at 160,000 ppbv in well VMP-5 and 20,000 ppbv in well VMP-4. Overall, the total of detected VOCs in each of the vapor monitoring points was 807,300 ppbv in VMP-5, 204,500 ppbv in VMP-4, 50,640 ppbv in VMP-1, 22,250 ppbv in SG-9, 16,430 ppbv in VMP-2, 4,000 ppbv in VMP-3, 2,120 ppbv in VMP-6, and 79 ppbv in SG-8. See Table 4-2 (MACTEC E&C Project No. 3485040034) in Appendix E for summaries of the results of soil gas samples.

During a SVE test, a portable SVE system was connected to one of the two vapor extraction wells and field data were collected for air flow rates, vacuum influence, and VOC concentrations. Significant vacuum influence was measured in all test wells, indicating a relatively large radius of influence (approximately 110 feet). These data are consistent with the sandy subsurface soils observed during the drilling activities. See Table 4-3 and Table 4-4 (MACTEC E&C Project No. 3485040034) in Appendix E for summaries of the SVE pilot test data.

Vapor monitoring wells VMP-4 and VMP-5, which are located approximately 6 feet and 18 feet from vapor extraction well SVE-1, respectively, demonstrated the greatest vacuum effect (7.9 inches water column [in. w.c.] and 5.2 in. w.c., respectively). Soil vapor extraction well SVE-2 measured 2.9 in. w.c. at a distance of 38 feet. The remaining wells VMP-1, VMP-6, VMP-2 and

VMP-3 are located at 39 feet, 47 feet, 65 feet, and 110 feet, respectively, and measured 1.6 in. w.c., 1.5 in. w.c., 1.2 in. w.c., and 0.3 in. w.c., respectively.

The vacuum influence appeared to decrease linearly with increasing distance from SVE-1 to a distance of 40 feet. However, over the next 70 feet, the rate of measured vacuum loss decreases sharply as evidenced by the vacuum influence measured at VMP-2 (65 feet) and VMP-3 (110 feet). Vacuum influence was discernable almost immediately in all vapor-monitoring wells. Influent gas analysis demonstrated a steady decline in PCE levels from 520,000 $\mu g/m^3$ at 25 minutes to 83,000 $\mu g/m^3$ at 115 minutes. Cis-DCE, TCE, chloroform, and 1, 1-dichloroethene, exhibited similar declines. See Table 4-4 (MACTEC E&C Project No. 3485040034) in Appendix E.

The November 2004 Remedial Investigation report, which summarized the field activities, field data, and laboratory results, concluded the following: VOC contamination continued to exist in the area of the former UST at concentrations consistent with prior reports, and soil vapor extraction (SVE) would be an appropriate method of remediation.

An SVE system was designed based on the testing with the portable SVE system. In January 12, 2006, a SVE system was installed at the Site to remediate the chlorinated solvent impacted sand in the area of concern. The system was designed to extract soil vapor from two extraction wells, SVE-1 and SVE-2. SVE-1 is located approximately 15 feet west of the New York Express boiler room on the asphalt pavement and SVE-2 is located on the sidewalk along the northern side of the dry cleaners. The SVE wells are approximately 38 feet in depth and are screened at approximately 6 feet to 38 feet bgs. A Rotron® six horsepower regenerative blower is used for the vacuum extraction of soil vapor. The SVE system operates at approximately 80 in. w.c. to 100 in. w.c. and produces 80 standard cubic feet per minute (scfm).

On April 19, 2005, the NYSDEC accepted the Site into the Brownfields Program.

Indoor air quality (IAQ) sampling and sub slab soil vapor sampling have been conducted in the basement spaces of the CitiBank, Blockbuster Video store, and the Rite Aid Pharmacy during the heating seasons of 2006, 2007, 2008, 2009, and 2010. The results of the last SVE influent sampling, which was conducted in September 2009, and the last IAQ and sub slab sampling, which was conducted in late March 2010, are presented in Tables 1 and 2 and are summarized below:

- Comparison of the historical SVE influent sample results in Table 1 indicate that there has been a significant reduction in the level of VOCs in the samples since system operation started. PCE decreased from 81,374 µg/m^3 on October 7, 2004 to 1,670 µg/m^3 on September 29, 2009; while, TCE decreased from 6,449 µg/m^3 to 93 µg/m^3 and cis-DCE from 5,700 µg/m^3 to 80.1 µg/m^3 during the same period. The October 7, 2004 SVE influent sample was collected during the pilot study after the vacuum was applied to SVE-1 for 115 minutes.

- The IAQ samples evidenced no exceedances of the NYSDOH indoor air guideline of 100 µg/m^3 for PCE and 5µg/m^3 for TCE. The basements are used for various retail products inventory management and have occasional visits from employees.

Based on the March 2010 sampling results, any residual PCE or TCE below the Site does not appear to be causing an indoor air quality problem, and the analytical results of the SVE system influent samples demonstrate that the SVE system has been successful in significantly reducing PCE and TCE concentrations.

3.0 PHYSICAL SETTING

3.1 Regional Geology

The present configuration of Long Island is primarily the result of the last ice age, the Wisconsin, which ended about ten thousand years ago. Two advances of the Wisconsin ice sheet during the Upper Pleistocene of the Quaternary Period caused the island to be blanketed with till, ice contact stratified drift, and outwash deposits. The terminal moraines and the north shore are composed primarily of stratified drift, with some till. The area between the moraines and south of them are mostly the outwash deposits. The surficial geology of Central and South Long Island is of glaciofluvial origin.

The Pleistocene glacial deposits overlie older, gently dipping Cretaceous sediments. The surface of the Cretaceous sediments in the northern part of Long Island shows indications of erosion by Pleistocene glaciation. The Cretaceous sediments crop out in northwestern Queens County near the East River and slope southward. Consequently, the overlying formations form a southward-dipping wedge that attains a maximum thickness of 1,050 feet in the southeast corner of Queens County. The maximum thickness of unconsolidated deposits in Kings County is about 800 feet.

The Raritan Formation of Late Cretaceous age overlies older bedrock. The Raritan Formation consists of the Lloyd Sand Member and an upper, unnamed clay member. Overlying the Raritan Formation is the Magothy Formation and Matawan Group, undifferentiated, which are also of Late Cretaceous age. Overlying the Cretaceous sediments are the Jameco Gravel of Pleistocene age, the Gardiners Clay of Pleistocene age, upper Pleistocene glacial deposits of Wisconsin age, and a thin soil mantle of Holocene age. Holocene beach deposits make up most of the Rockaway Peninsula and Coney Island in the south, and Holocene salt marsh deposits underlie the south shore bay areas. Historical fill (i.e. artificial fill) was placed in the low and swampy shoreline areas.

3.2 Hydrogeology

The Holocene deposits occur in relatively small areas of Kings and Queens and are not significant groundwater-bearing units. The four main groundwater-bearing units on Long Island are the Pleistocene Upper Glacial Aquifer and Jameco Gravel, and the Cretaceous Magothy and Lloyd Aquifers.

Groundwater occurs and flows within the Pleistocene sediments that underlie the Site. The direction of groundwater flow is to the northwest towards the nearest bodies of surface water, and appears to mimic the local topography.

3.3 Site Topography

Based on a review of the USGS topographic map for the area, the elevation at the Site is approximately 70 feet above mean sea level (msl). The topography of the Site is downward sloping primarily from southeast to northwest.

3.4 Surface Water

Meadow and Willow Lakes are approximately two and three-quarter miles west of the Site, respectively. Kissena Lake is located a mile and one-half northwest of the Site. Shallow ground water typically flows towards the nearest stream, river, or other surface water body.

4.0 SOIL SAMPLING PROCEDURES AND METHODS

Soil sampling will be conducted adjacent to the former UST location. The highest concentrations of the VOC PCE, TCE, and cis-DCE were previously detected in soil samples collected in this area. Elevated concentrations of SVOC were also detected in soil samples collected in this area. Metals analysis, polychlorinated biphenyl (PCB) analysis and pesticide and herbicide analysis, all of which are now required under the NYSDEC Brownfields Program, were not conducted because the Site was not in the program during the performance of the previous investigations and NYSDEC did not require such analyses. Soil samples collected under this SRIWP will be submitted for the following analyses:

- VOC analysis in accordance with USEPA Method 8260
- SVOC analysis in accordance with USEPA Method 8270
- PCB analysis in accordance with USEPA Method 8082
- Metals analysis in accordance with USEPA Method 6010B/7000
- TCL Pesticides in accordance with USEPA Method 8081A
- Herbicides (full list) in accordance with SW Method 846/USEPA Method 8151A

The soil sampling procedures and sampling strategy for the SRIWP are presented below.

The post-remediation confirmatory soil-sampling program will use an auger-drilling rig operated by a New York certified drilling contractor to advance soil borings and collect soil samples. MACTEC will supervise the mark out of the Site by a private utility location contractor prior to any drilling activity, supervise the drilling activities, make and record field observations and measurements, log the borings, and collect soil samples for laboratory analysis.

MACTEC will supervise the advancement of four borings to groundwater, which occurs at a depth of approximately 40 feet below the ground surface (bgs). Previous borings (B-1, B-2, and B-3) were advanced and sampled in this area, but were sampled only to approximately 21 to 32 feet bgs. The four borings to be advanced under this RSSW will be designated SB-1 through SB-4. The proposed locations of the borings are presented on Figure 2. These boring locations are consistent with the locations of the previous borings (B-1, B-2, and B-3). Borings cannot be advanced within the former UST excavation since this area is currently occupied by the SVE

system. At each boring location, continuous soil samples will be collected with a stainless steel hollow barrel sampler. As a soil sample is retrieved, the soil will be screened with a Mini Rae Model 2000 photo-ionization detector (PID), visually inspected, and classified as to lithology. The PID will measure the concentrations of VOC vapors in the soil in parts per million (ppm). The PID screening and the visual inspection will assist in the field determination of VOC contamination and the selection of soil samples for laboratory analysis. The lithology of the soil, PID measurements, and other field observations will be recorded by MACTEC in a site-dedicated project field book. Boring logs will be prepared from the field observations and measurements.

Based on the field screening with the PID and/or the analytical results of the soil samples collected from the initial four borings, step-out borings will be advanced to delineate the horizontal extent of soil contamination. If further delineation is needed, the lateral step-out distance for any additional borings will be approximately ten feet from the previous boring. The first set of step-out borings for SB-2, SB-3, and SB-4 will be advanced east of these borings and/or north of SB-2 and SB-1 (No step-out borings will be advanced in the building). The first set of step-out borings will be designated with an "A" so that after SB-1 is advanced, the first step out boring, if needed, will be designated SB-1A. Additional step-out borings will be advanced east and north of the first set of step-out borings, if soil contamination is not delineated by the first set of step-out borings. The second set of step-out borings will be designated with a "B."

A minimum of three soil samples from each boring location will be collected and submitted for VOC and SVOC laboratory analysis: the soil sample that indicates the highest PID measurement; the soil sample collected from the deepest location or just above the groundwater table, and; the soil sample collected from a depth within a foot of the bottom of the previous UST. Soil samples selected for laboratory VOC analysis will be collected in four-ounce glass jars and accompany the VOC samples. Soil samples selected for SVOC laboratory analysis will be collected with stainless steel spatulas and trowels in 500-milliliter glass containers. Soil samples for the analysis of metals, PCB, and pesticides and herbicides will be collected from the fill material that underlies the Site since these parameters would most likely be encountered in the fill. The fill appears to occur from several feet bgs to approximately 10 feet bgs. The metals, PCB, and pesticide and herbicide samples will be collected with stainless steel spatulas and trowels in 1300-milliliter glass containers. All soil samples will be representative of the Site's condition (i.e.

native material or fill material), and soil samples will not be collected from materials previously used to backfill the excavation area.

Upon collection, the soil samples will be placed in a chilled cooler. Non-disposable drilling and soil sampling equipment will be decontaminated prior to its use at each location. Sample containers will be laboratory-supplied. A trip blank and a duplicate sample will be used for quality assurance/quality control (QA/QC). Chain-of-custody protocol and documentation will be adhered to throughout the handling, packaging, and delivery of the samples to the analytical laboratory. The soil samples will be submitted to Accutest Laboratories, Inc., which is a New York certified laboratory (New York State certification number 10983).

5.0 GROUNDWATER SAMPLING PROCEDURES AND METHODS

There are currently five monitoring wells at the Site. The monitoring wells are designated MW-1 through MW-4, and MW-6. Monitoring well MW-5 was abandoned. All five of the monitoring wells will be sampled in the proposed groundwater-sampling event. Figure 2 presents the locations of the monitoring wells. The monitoring well logs are in Appendix D. See Table 4-1 in Appendix E for a summary of well construction details.

Prior to groundwater sampling the monitoring wells will be redeveloped to remove any sediment that may have entered them since the wells were last sampled in October 2004. An overpump method will be used to redevelop the wells. The wells will each be pumped until the groundwater is relatively free of sediment and discoloration. It is estimated that approximately 50 gallons of groundwater will be pumped from the wells during redevelopment. The groundwater pumped from the wells will be treated on site with granular activated carbon and discharged to the paved surface of the parking lot.

A low flow purging and sampling method consistent with the USEPA Region I Low Stress Purging and Sampling Procedure for the collection of Groundwater Samples from Monitoring Wells, July 30, 1996, will be used to collect groundwater samples at the Site. The first step will be to gauge the depth to groundwater with an electronic water level indicator. Next, a stainless steel submersible pump and dedicated tubing will be lowered into each well. The tubing will be connected to an electronic multi-parameter meter in order to measure the stabilization of the groundwater in each well as it is being purged. The purge flow rate will be approximately 200 to 500 milliliters per minute (ml/min) and will be adjusted depending on the drawdown of the groundwater in the well. The following field parameters will be measured with the multi-parameter meter: dissolved oxygen (DO), conductivity, pH, oxidation/reduction potential (ORP), and temperature. Turbidity measurements will be made with a field turbidity meter. These field measurements and the groundwater level in the well will be measured at three-minute intervals. When the measurements indicate stabilization, a groundwater sample will be collected through the tubing.

Groundwater samples will be collected for volatile organic compound (VOC) analysis in accordance with USEPA Method 8260 The groundwater sample will be collected in labeled 40-

milliliter (ml) glass vials, with Teflon septum and preserved with hydrochloric acid. The groundwater sample will be collected with care to eliminate the formation of any air bubbles within the vials. The groundwater samples will be placed in an iced cooler for preservation immediately upon collection. They will remain chilled until delivery to the laboratory.

In addition to the groundwater samples that will be collected at each of the monitoring wells during the sampling event, quality assurance/quality control (QA/QC) samples will also be collected. A trip blank will be submitted for VOC analysis in accordance with USEPA Method 8260 for each shipment from the Site. A duplicate groundwater sample will be collected from one of the monitoring wells and submitted for VOC analysis.

All field measurements will be recorded by field personnel in a site-dedicated, waterproof, bound field book. Chain-of-custody documentation will be adhered to throughout the handling, packaging, and delivery of the samples to the laboratory.

Non-disposable groundwater purging and sampling equipment will be decontaminated with a tap water and Liquinox scrub and distilled water rinse, prior to its use at each well location.

The groundwater samples will be submitted to Accutest Laboratories, Inc. (Accutest), a New York-certified laboratory (New York Certification Number 10983), located in Dayton, New Jersey.

6.0 SOIL GAS SAMPLING PROCEDURES AND METHODS

Soil vapor sampling will be conducted in the southwestern corner of the Site's parking lot near the southeastern exterior wall of the building occupied by Preschool of America, which is located next to the parking lot of the shopping center. The purpose of the soil vapor sampling is to evaluate the potential for soil vapor migration and offsite exposure to PCE and TCE following the SVE remediation of the soil in the apparent source area adjacent to the former New York Express. The likelihood of soil vapor migration and offsite exposure is probably small because of the following site specific conditions:

- The highest concentrations of PCE, TCE, and cis-DCE were previously detected in soil samples collected in the apparent source area, which is approximately 200 feet northeast of the Preschool of America building.
- The analytical results of the SVE system influent samples demonstrate that the SVE system has been successful in significantly reducing PCE and TCE concentrations in the apparent source area soil.
- The March 2010 sampling results of IAQ sampling and sub slab soil vapor sampling that was conducted in the basement spaces of the CitiBank, Blockbuster Video store, and the Rite Aid Pharmacy, which are located near the apparent source area, indicate that any residual PCE or TCE in the soil does not appear to be causing an indoor air quality problem.
- Relatively low concentrations of PCE and TCE were detected in groundwater samples collected from monitoring wells near the apparent source area and groundwater flow, which can often affect the migration direction of soil vapor, is from the apparent source area to the northwest, away from the Preschool of America building.

The soil vapor sampling procedures and sampling strategy for the SRIWP are presented below.

Two permanent soil vapor sampling points will be installed within the asphalt paved parking lot of the southwestern corner of the Site. Figure 2 presents the proposed locations of the soil vapor samples. The installation of the soil vapor sampling points beneath the surface confinement of the asphalt pavement will help ensure that the soil vapor samples are representative. The soil vapor sampling points will be installed approximately 12 to 15 feet east of the exterior wall of the

building occupied by Preschool of America where they will be away from any fill material that may be surrounding the building and where they should not be influenced by the heating, ventilation, and air conditioning (HVAC) systems of the building or mechanical equipment within the building, such as clothes dryers or exhaust fans or vents. The installation of the soil vapor sampling points will use a direct push Geoprobe® type of drilling rig operated by a New York certified drilling contractor, who will advance the small diameter borings for the points and will construct the points. Each of the soil vapor probes will be constructed in the same manner to minimize possible discrepancies. MACTEC will supervise the mark out of the Site by a private utility location contractor prior to any drilling activity, supervise the drilling activities, make and record field observations and measurements in a site-dedicated project field book, and collect the soil vapor samples for laboratory analysis.

The methodology for the installation of the permanent soil vapor sampling points will proceed according to the following general steps:

- A 2-inch diameter borehole will be drilled to a depth of 8 feet below the ground surface to ensure that the soil vapor monitoring point is below the footer of the building.
- A 2-foot length of 1-inch diameter Schedule 40 polyvinyl chloride (PVC) 0.010-inch factory slotted well screen will be affixed to a 6-foot length of 1-inch diameter PVC solid pipe and placed into the 2-inch diameter borehole such that the screened section extends from 6 to 8 feet below the ground surface.
- Clean coarse quartz sand will be poured into the annular space around the screened section and approximately 2 to 4 inches above the screen.
- A bentonite seal that is several inches thick will be placed into the annular space around the solid PVC pipe above the sand filter pack.
- The remaining annular space around the solid PVC pipe will be backfilled with clean soil and a bentonite seal that is several inches thick will be placed above the backfill.
- The soil vapor sampling point will be completed to grade with a flush mounted manway.
- A connector will be connected to the top of the 1-inch diameter solid PVC pipe.
- A hex socket plug will be inserted into the connector and the completed point will be placed such that it is slightly below the surface of the asphalt pavement.
- The connector on the probe will then be connected to a male fitting and attached to a length of ¼-inch Teflon® tubing and the tubing will be connected to the Summa® canister.

The soil vapor samples will be collected in 6-liter Summa® canisters at a rate of 100 ml/minute to achieve the laboratory's minimum reporting limits. The soil vapor samples will be submitted for VOC analysis in accordance with USEPA Method TO-15. Chain-of-custody protocol and documentation will be adhered to throughout the handling, packaging, and delivery of the samples to the analytical laboratory. The soil samples will be submitted to Accutest Laboratories, Inc., which is a New York certified laboratory (New York State certification number 10983).

Prior to the collection of the soil vapor samples, MACTEC will utilize helium gas to check the integrity of the sampling methodology, in accordance with the New York State Department of Health (NYSDOH) Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006). The area immediately surrounding the sample point will be covered with a polyethylene bag, or equivalent. The sample tubing will be connected to the purge pump through the plastic bag. The tracer gas tubing will also penetrate the plastic bag. The bag will be sealed with tape. A small inert plastic container (e.g., a 5-gallon bucket) can be used in lieu of the polyethylene bag in areas where the bag cannot be taped to a solid surface. To seal the container to the ground surface hydrated bentonite or modeling clay will be placed in a ring around the soil vapor monitoring point in a diameter slightly larger than the diameter of the opening of the bucket. A heavy weight will be placed on the container to ensure and maintain a tight seal. Prior to setting the seal, two holes will be drilled through the bottom of the bucket, one for the sample tubing and one for the tracer gas tubing. Each hole will be sealed with silicone sealant prior to sampling.

When the sample purge is started, the flow of the helium tracer gas will also be initiated. A portable helium analyzer will be used to monitor the purge pump exhaust for signs of the tracer gas. According to the NYSDOH guidance, if helium is detected in the purge pump exhaust at concentrations greater than 10 percent, then the probe seal should be enhanced to reduce the infiltration of outdoor air. Tracer gas flow will be controlled to maintain nearly atmospheric pressure around the sampling connections. If helium is detected in the purge exhaust the procedure will be stopped and the sample probe will be resealed. The tracer test procedure will then be repeated to ensure the integrity of the clay seal.

Care shall be exercised during the sample collection procedures to minimize the possibilities of sampling errors. Personnel will avoid actions such as fueling vehicles, using permanent marking pens, or wearing perfumes or colognes that could cause sample interference.

Laboratory-supplied and certified pre-cleaned Summa® canisters and fittings will be used for soil vapor sampling. New Teflon tubing and hose fittings will be used where sample tubing is required. Sample handling procedures including chain of custody, holding times and temperatures, field blanks and field duplicates will be used to document the field sampling QA/QC.

One field duplicate will be collected during the sampling event. To ensure proper sample duplication a "Y" fitting will be implemented with the sample probe connected to one end of the fitting and two Summa® canisters connected to the other ends of the fitting. The flow controller for the duplicate canister will be set to one-half the flow of the field sample canisters. Thus, the combined flow rates of the duplicate samples will equal the flow rate of one field sample. The canisters will be opened and closed simultaneously during sampling to ensure accurate splitting. The duplicate sample will be analyzed for VOCs in order to fulfill quality control requirements.

7.0 REPORT

A letter report that presents the procedures of the soil, groundwater, and soil vapor sampling, the location of the soil borings, monitoring wells, and temporary soil vapor sampling points, summaries of the analytical results of the soil, groundwater, and soil vapor samples, a summary of groundwater elevations, boring logs, a groundwater contour map, and the laboratory soil sample, groundwater sample, and soil vapor analytical reports will be prepared and submitted to the NYSDEC and NYSDOH. The analytical results will be compared to the Groundwater SCO and Restricted Commercial SCO listed in 6 NYSCRR Part 375 Table 375-6.8(b). The Groundwater SCO for PCE and TCE are 1.3 mg/kg and 0.47 mg/kg, respectively. The Restricted Commercial SCO for PCE and TCE are 150 mg/kg and 200 mg/kg, respectively. The analytical results of the soil vapor sampling will be reviewed with the New York State Department of Health (NYSDOH).

8.0 SCHEDULE

Upon the NYSDEC approval of the SRIWP, MACTEC will arrange for the markout of the Site by a private utility location contractor and will schedule a driller. MACTEC anticipates that the utility markout will be conducted within 30 days of NYSDEC approval. The soil and groundwater sampling will be implemented within 14 days of the completion of the utility markout. The soil and groundwater sampling field activities should be completed over fourteen days, assuming step-out advancement of soil boring and sampling is limited and can be conducted on the basis of field observations and not the results of laboratory analysis. Soil, groundwater, and soil vapor samples will be submitted to Accutest for laboratory analysis within one to two days of collection so that the holding times for the VOC samples are not compromised. The typical laboratory turnaround period for soil and groundwater samples is twenty days. Upon receipt of the analytical results of the soil samples, MACTEC will prepare a report on the SRIWP. MACTEC estimates that a final report will be submitted to the NYSDEC within 120 days of NYSDEC approval of the SRIWP.

9.0 ENVIRONMENTAL PROFESSIONAL CERTIFICATION

I certify that I am currently a Qualified Environmental Professional as defined in 6 NYCRR Part 375 and that this Supplemental Remedial Investigation Work Plan (SRIWP) was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

David Side

5/5/2011

David M. Side, P.G.
Principal Geologist

Date

TABLES

Table 1: Summary of SVE Influent Analytical Results
73rd Avenue Shopping Center
Fresh Meadows, NY

Sample ID	Influent 1	Influent 2	Influent 3	SVE influent	SVE influent	SVE influent	SVE influent
Date	10/7/2004	10/7/2004	10/7/2004	10/31/2007	3/7/2008	2/16/2009	9/29/2009
Benzene	ND (320)	ND (320)	ND (100)	ND (5.1)	17	ND (2.6)	ND (2.6)
Chloromethane	ND (2100)	ND (2100)	ND (1000)	ND (3.3)	9.3	ND (1.7)	ND (1.7)
1,1-Dichloroethene	99	59.5	ND	ND (6.5)	ND (4.5)	ND (3.2)	ND (3.2)
cis-1,2-Dichloroethene	103085	59472	5700	156.2	54	27	80.1
Chloroform	384.5	204	12	2.3	ND(7.8)	4.1	11
Chlorodibromomethane	42.6	ND (42.6)	ND (42.6)	NA	NA	ND (6.8)	ND (6.8)
Toluene	376.8	ND (376.8)	ND (376.8)	4.5	7.1	ND (3.0)	ND (3.0)
trans-1,2-Dichloroethene	1942.8	872.3	317.2	10.3	ND (6.3)	1.7	5.6
Tetrachloroethene	508589	250904	81374	2089	773	356	1670
Trichloroethene	45144	22572	6449	223	92	38	93
Methyl ethyl ketone	NA	NA	NA	6.8	ND (4.7)	ND (2.4)	3.5
Tetrahydrofuran	NA	NA	NA	3.8	ND (4.7)	ND (2.4)	ND (2.4)
m,p-Xylene	NA	NA	NA	6.1	12	ND (3.5)	ND (3.5)
Xylenes (total)	NA	NA	NA	6.1	12	ND (3.5)	ND (3.5)

All concentrations are in ug/m^3
NA not applicable
ND (0.054) indicates compound was not detected at the given minimum detection limit (MDL)

Prepared by: JG
Checked by: DMS

Table 2: Summary of IAQ and Sub-Slab Results
73rd Avenue Shopping Center
Fresh Meadows, NY

	NYSDOH Air Background Values (ug/m^3)	NYSDOH Air Guideline Values (ug/m^3)	Citibank								
			IAQ					Subslab			
			2/16/2006	1/17/2007	3/10/2008	3/17/2009	3/30/2010	1/17/2007	3/11/2008	3/17/2009	3/30/2010
Compound (ug/m^3)											
Vinyl Chloride	<0.9	na	nd (0.54)	nd (0.040)	nd (0.51)	nd (0.51)	nd (0.51)	nd (0.040)	nd (4.1)	dn (2.0)	nd (0.51)
Trichloroethene	<1.2-1.2	5	0.70	0.64	0.81 J	nd (0.21)	1	1.8	nd (8.6)	nd (0.86)	0.70
Tetrachloroethene	<1.9-5.9	100	11	15	18	13	12	140	6.3 J	23	129

	NYSDOH Air Background Values (ug/m^3)	NYSDOH Air Guideline Values (ug/m^3)	Blockbuster									
			IAQ						Subslab			
			2/16/2006	2/16/2006 (dup)	1/17/2007	3/10/2008	3/17/2009	3/30/2010	1/17/2007	3/11/2008	3/17/2009	3/30/2010
Compound (ug/m^3)												
Vinyl Chloride	<0.9	na	nd (0.47)	nd (0.47)	0.15	nd (0.51)	nd (0.51)	nd (0.51)	nd (0.14)	nd (4.1)	nd (2.0)	nd (0.51)
Trichloroethene	<1.2-1.2	5	5.1	5.1	14	53	2.5	1.2	29	7	nd (0.86)	5.9
Tetrachloroethene	<1.9-5.9	100	12	12	20	12	5.7	2.8	620	53	6.8	243

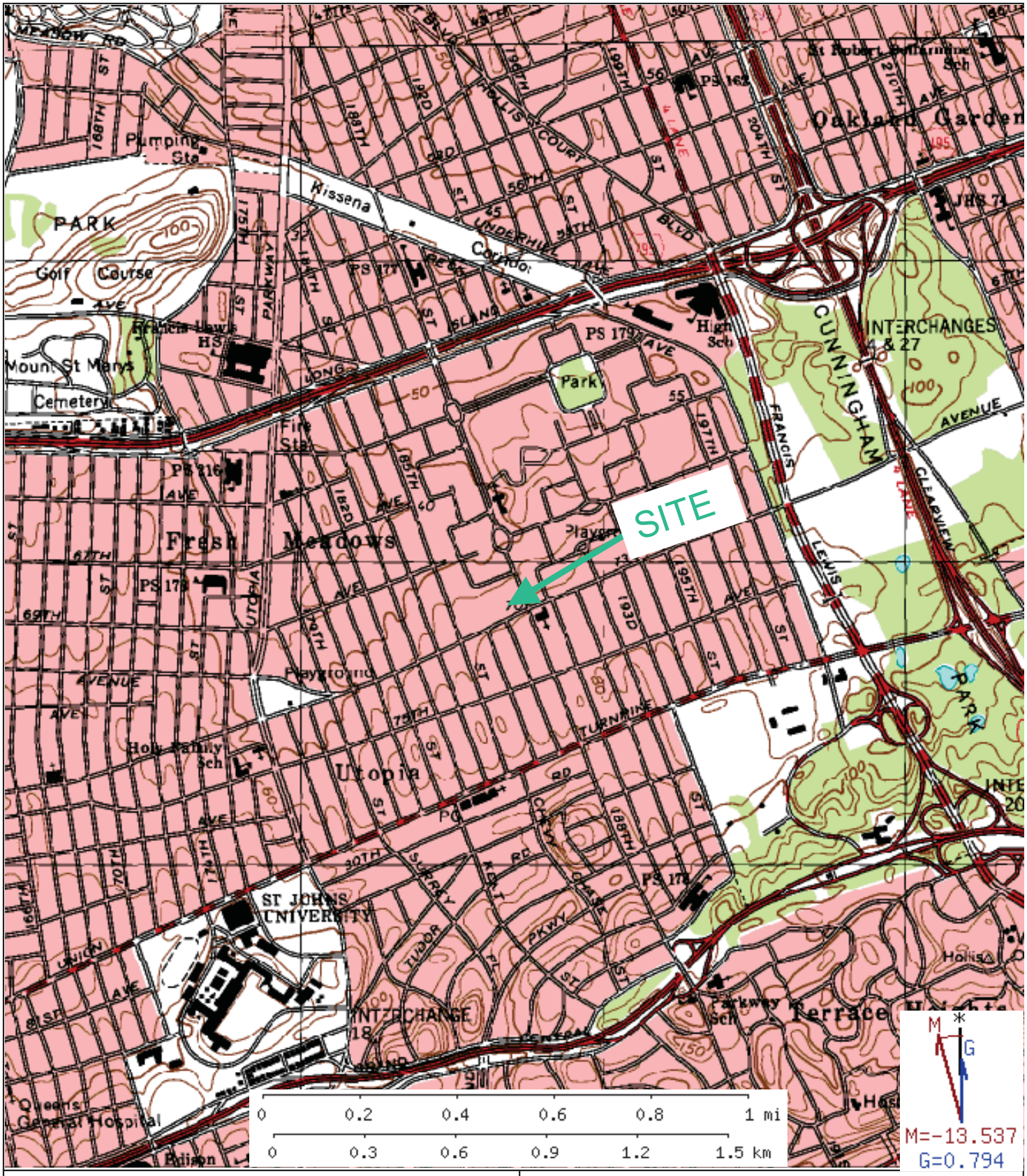
	NYSDOH Air Background Values (ug/m^3)	NYSDOH Air Guideline Values (ug/m^3)	Rite Aid									
			IAQ					Subslab				
			2/16/2006	1/17/2007	3/10/2008	3/17/2009	3/30/2010	1/17/2007	1/17/2007 (dup)	3/11/2008	3/17/2009	3/30/2010
Compound (ug/m^3)												
Vinyl Chloride	<0.9	na	2.5	nd (0.043)	nd (0.51)	nd (0.51)	nd (0.51)	nd (0.042)	nd (0.042)	nd (280)	nd (2.0)	nd (1.4)
Trichloroethene	<1.2-1.2	5	2.7	3.7	3.7	7	0.43	4.2	4.1	nd (590)	10	12
Tetrachloroethene	<1.9-5.9	100	8.8	130	82.7	10	0.60	180	180	nd (750)	191	557

na not applicable
nd (0.054) indicates compound was not detected at the given minimum detection limit (MDL)
J indicates an estimated value
IAQ Indoor Air Quality

Prepared by: JG

Checked by: DMS

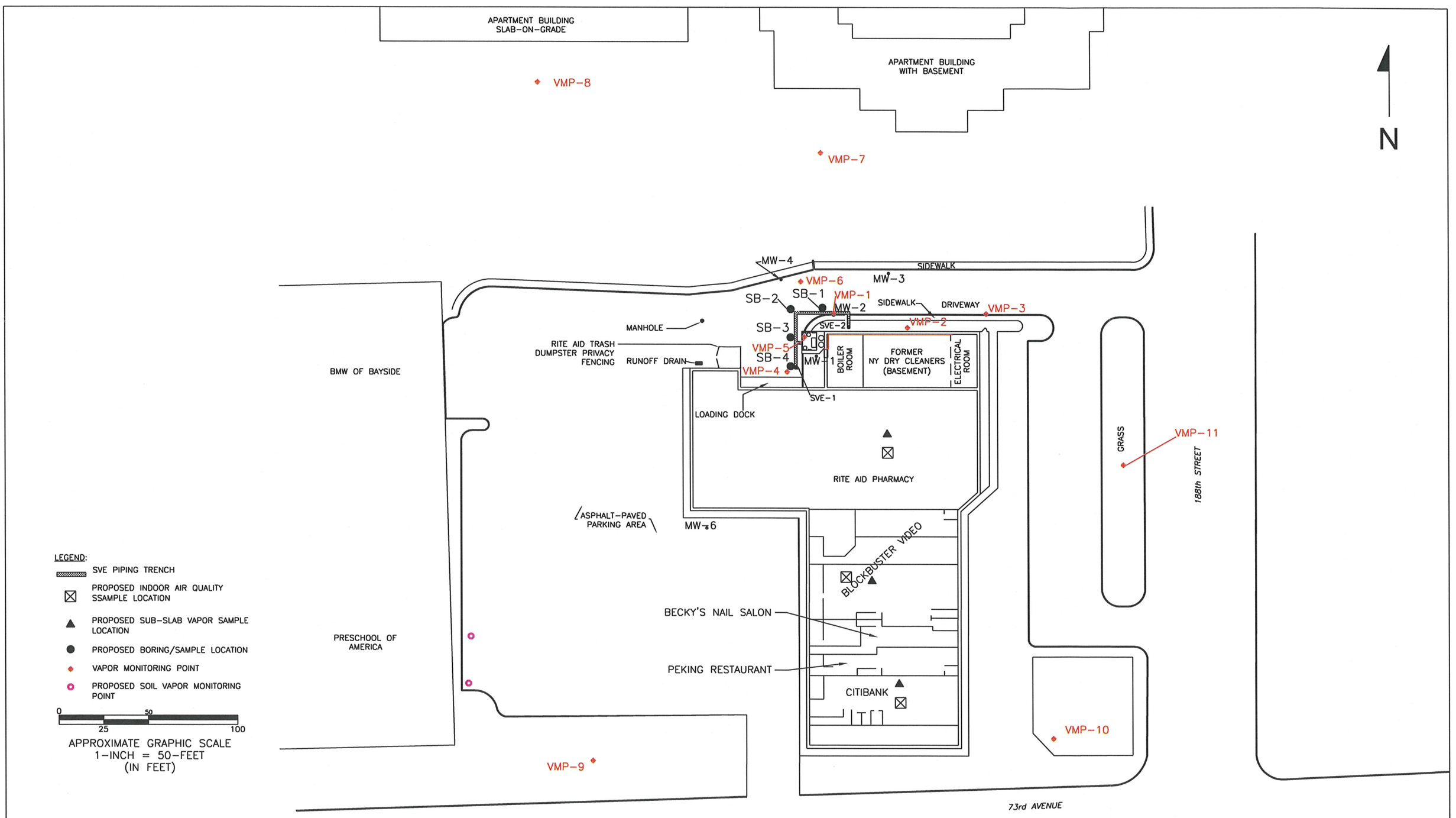
FIGURES



MACTEC

1787 Sentry Parkway West
Blue Bell, Pennsylvania 19422

FIGURE 1
SITE LOCATION MAP
73rd AVENUE SHOPPING CENTER
69-60 188th STREET, QUEENS, NEW YORK
MACTEC PROJECT NO.: 3485050051 DRN BY DS
CHKD BY JG



MACTEC
Engineering and Consulting of Delaware

FIGURE 2
SITE PLAN
Supplemental Remedial Investigation Work Plan
73rd Avenue Shopping Center
Project No. 3485050051

DATE: 01/18/2010
DRAWN BY: ND
CHECKED BY: DS

APPENDIX A

COMMUNITY AIR MONITORING PLAN (CAMP)

Appendix A
COMMUNITY AIR MONITORING PLAN
73rd Avenue Shopping Center
Fresh Meadows, New York
MACTEC Project Number 3485050051
March 2011

Overview

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.

This generic CAMP will be sufficient to cover that part of the 73rd Avenue Shopping Center in Fresh Meadows, New York known as the 73rd Avenue Shopping Center (Site). A separate site-specific CAMP or supplement is not required. Special requirements for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities is not necessary.

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

Community Air Monitoring Plan

Because tetrachloroethene (PCE), trichloroethene (TCE), cis-1,2-dichloroethene (cis-DCE), petroleum-related VOCs, and semi-volatile organic compounds (SVOCs) have previously been detected in soil and groundwater samples collected at the Site, real-time air monitoring for VOCs and particulate levels at the perimeter of the work area will be implemented. Radiological contamination has not been identified as a concern at the Site.

Continuous monitoring for VOCs and particulates will be conducted for the advancement of soil borings at the Site.

Periodic monitoring for VOCs will be required during the collection of soil samples and the collection of groundwater samples from existing monitoring wells. Monitoring during sample collection will consist of taking a reading upon arrival at a sample location, monitoring while opening the caps of the monitoring wells, and monitoring during well purging, and taking a reading prior to leaving a sample location.

VOC Monitoring, Response Levels, and Actions

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

1. 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 will be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities will resume with continued monitoring.

2. 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 will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities will 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.

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

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

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations will be monitored continuously at the upwind and downwind perimeters of the immediate work area at temporary particulate monitoring stations. The particulate monitoring will 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 will 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.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques will be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m3 above the upwind level and provided that no visible dust is migrating from the work area.

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m3 above the upwind level, work will be stopped and a re-evaluation of activities initiated. Work will resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m3 of the upwind level and in preventing visible dust migration.

3. All readings will be recorded and be available for State (NYSDEC and NYSDOH) and County Health personnel to review.

(Final DER-10 Page 206 of 226 Technical Guidance for Site Investigation and Remediation May 2010)

APPENDIX B

QUALITY ASSURANCE PROJECT PLAN (QAPP)

APPENDIX B:

QUALITY ASSURANCE PROJECT PLAN
73rd Avenue Shopping Center
Fresh Meadows, New York
MACTEC Project Number 3485050051
March 2011

1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) Plan has been prepared for that part of the 73rd Avenue Shopping Center in Fresh Meadows, New York known as the 73rd Avenue Shopping Center (Site). The New York Express Cleaners have not been in operation at the Site since it was damaged in a fire about two years ago. The 73rd Avenue Shopping Center is a small shopping center located on 73rd Avenue and 188th Street in Fresh Meadows, New York. The shopping center is currently comprised of a Chinese food store, a nail salon, a branch of CitiBank, a Blockbuster Video store, a Rite Aid Pharmacy store, and the former New York Express Dry Cleaners (New York Express), which had operated retail dry cleaning on their premises. New York Express was located at the north end of the shopping center and is adjacent to the Rite Aid Pharmacy.

This QAPP provides guidance for environmental investigations at the Site and presents the project organization, data quality objectives, quality assurance and quality control (QA/QC) activities, sample collection procedures; analytical methods, analytical data management, and chemistry data review procedures associated with Remedial Investigation (RI) work activities at the Site.

1.1 QAPP OBJECTIVES

This QAPP provides a framework of procedures, functional activities, and organization to be used during the execution of environmental work at this Site. The procedures and criteria outlined in this document describe a level of performance required to achieve the project objectives.

The objectives of this document are to:

- Provide a consistent framework for collecting samples and generating analytical data throughout the project.
- Identify detection limit and QC goals for analytical methodologies used to generate chemistry data.
- Set forth review procedures used to demonstrate that the analytical systems are achieving project objectives.
- Set forth record-keeping procedures for field activities, sample collection and handling, and analytical data reporting.
- Provide for generation and documentation of data of known and acceptable quality.
- Set forth procedures that limit the effect of non-laboratory activities on analytical data.

When implemented, the activities described in this document will assure that documentation is generated so that field and analytical measurements can be verified. QA activities include the use of a management system to produce valid data that supports the program and includes a system of checks and reports to monitor the attainment of data quality objectives (DQOs). This management system includes plans that will allow the traceability, completeness, and security of field and analytical documents, and procedures for evaluating data quality relative to DQOs. QC includes specific technical activities performed by field or laboratory personnel to demonstrate that system performance is maintained within established criteria. To document precision, accuracy, and comparability of results, QC activities are included within this QA system.

1.2 SITE DESCRIPTION AND BACKGROUND

The 73rd Avenue Shopping Center is a small shopping center located on 73rd Avenue and 188th Street in Fresh Meadows, New York. The shopping center is currently comprised of a Chinese food store, a nail salon, a branch of CitiBank, a Blockbuster Video store, a Rite Aid Pharmacy store, and the former New York Express Dry Cleaners (New York Express), which had operated retail dry cleaning on their premises. New York Express was located at the north end of the shopping center and is adjacent to the Rite Aid Pharmacy.

In August of 1997, a Phase II Environmental Site Assessment (ESA) of the Site was conducted. The results of laboratory analysis indicated detectable concentrations of tetrachloroethene (PCE) and trichloroethene (TCE) in soil and groundwater samples. During the Phase II ESA activities, an apparent abandoned fuel oil underground storage tank (UST) was identified behind the Site.

Later in 1997, an assessment of the former UST area was conducted and the analytical results of soil samples indicated the presence of PCE, TCE, cis-1,2-dichloroethene (cis-DCE), petroleum-related VOCs, and semi-volatile organic compounds (SVOCs) in the soil samples. PCE, TCE, cis-DCE, and petroleum-related VOCs (naphthalene and sec-butyl benzene) were also detected in groundwater samples that were collected during the assessment. The concentrations of PCE and TCE in the soil samples exceeded the NYSDEC Technical and Administrative Guidance Memorandum (TAGM) - Determination of Soil Clean-up Objectives and Clean-up Standards, which were the soil standards in use at the time. The concentrations of PCE and TCE detected in several of the groundwater samples from the Phase II ESA and the subsequent investigations exceeded New York State Ambient Water Quality Standards and Guidance Values.

On April 10, 2001, soil sampling, soil gas sampling, and soil gas field screening were conducted. PCE and TCE were detected in soil and soil gas samples collected near the apparent source area and under the basement floor slab of New York Express, but at concentrations below TAGM Criteria. The results were summarized in a letter report entitled *Report of Soil and Soil Gas Sampling* dated July 5, 2001.

A Remedial Investigation/Remedial Action Workplan (RI/RAW) was prepared in 2003 and was implemented during the period from May to October 2004. The results of the RI were summarized in a report dated November 17, 2004.

During the period from May to October 2004, five groundwater monitoring wells, two soil vapor extraction wells, six vapor monitoring wells and three shallow soil gas wells were installed at the Site. A soil vapor extraction (SVE) pilot test was also completed to determine the site-specific data necessary for design of a SVE system.

Four soil samples were collected from selected well locations during their installation and analyzed for VOCs. Concentrations of PCE were reported in four soil samples from VMP 4 – 5-10 feet, VMP-4 – 15-20 feet, VMP 5 – 0-5 feet, and VMP 5 – 15-20 feet at 45 mg/kg, 16 mg/kg, 49 mg/kg and 22 mg/kg, respectively. Concentrations of TCE were detected in three soil samples from VMP 4 – 5-10 feet, VMP 5 – 0-5 feet, and VMP 5 – 15-20 feet, at 4.7 mg/kg, 0.24 mg/kg, and 0.26 mg/kg, respectively. TCE was not detected in soil sample VMP 4 – 15-20 above the method

detection limits. Only VMP 4 – 5-10 feet (4.7 mg/kg) exceeded the NYSDEC TAGM for TCE of 0.7 mg/kg.

Two rounds of groundwater samples were collected in September and October 2004 from the five groundwater monitoring wells installed adjacent to the Site. The September 2004 groundwater sample results indicated concentrations of PCE in all of the samples, and TCE and cis-DCE in some of the samples. PCE was detected at concentrations above the New York Ambient Water Quality Standards or New York Ambient Water Quality Guidance Values of 0.7 µg/L in wells MW-1 (50 µg/L), MW-2 (7.4 µg/L), MW-3 (7 µg/L), MW-4 (20 µg/L) and MW-6 (24 µg/L). Concentrations of cis-DCE reported in wells MW-1 (62 µg/L) and MW-4 (16 µg/L) also exceeded the New York Ambient Water Quality Standard of 5 µg/L. The TCE concentration in MW-1 (12 µg/L) exceeded the New York Ambient Water Quality Standard of 5 µg/L.

The October 2004 groundwater sample results indicated that PCE concentrations exceeded the New York Ambient Water Quality Guidance Value of 0.7 µg/L in wells MW-1 (14 µg/L), MW-2 (2.5 µg/L), MW-3 (2.2 µg/L), MW-4 (7.4 µg/L) and MW-6 (2.1 µg/L). The concentration of cis-DCE reported in wells MW-1 (68 µg/L), MW-2 (12 µg/L), MW-3 (9 µg/L) and MW-4 (40 µg/L) exceeded the New York Ambient Water Quality Standard of 5 µg/L. The TCE concentration reported in wells MW-1 (64 µg/L), MW-2 (13 µg/L), MW-3 (16 µg/L), MW-4 (32 µg/L) and MW-6 (19 µg/L) exceeded the New York Ambient Water Quality Standard of 5 µg/L.

Soil gas samples were collected from the vapor monitoring wells and shallow soil gas sampling points. Laboratory results for PCE near the source area were as high as 590,000 parts per billion by volume (ppbv). The most distant well from the assumed source, had a concentration of 3,600 ppbv, while two wells, which are both less than 50 feet from the source area, had concentrations of 1,600 ppbv and 79 ppbv, respectively. Cis-DCE was the next highest compound detected.

A portable SVE system was connected to one of the two vapor extraction wells and field data were collected for air flow rates, vacuum influence, and VOC concentrations. Significant vacuum influence was measured in all test wells, indicating a relatively large radius of influence (approximately 110 feet). These data are consistent with the sandy subsurface soils observed during the drilling activities.

A November 2004 Remedial Investigation report, which summarized the field activities, field data, and laboratory results, concluded the following: VOC contamination continued to exist in the area of the former UST at concentrations consistent with prior reports, and soil vapor extraction (SVE) would be an appropriate method of remediation.

An SVE system was designed and in January 12, 2006, was installed at the Site to remediate the chlorinated solvent impacted sand in the area of concern. The system was designed to extract soil vapor from two extraction wells, SVE-1 and SVE-2. The SVE wells are approximately 38 feet in depth and are screened at approximately 6 feet to 38 feet bgs. A Rotron six horsepower regenerative blower is used for the vacuum extraction of soil vapor. The SVE system operates at approximately 80 inches water column to 100 inches water column and produces 80 standard cubic feet per minute (scfm).

On April 19, 2005, the NYSDEC accepted the Site into the Brownfields Program.

Indoor air quality (IAQ) sampling and sub slab soil vapor sampling have been conducted in the basement spaces of the CitiBank, Blockbuster Video store, and the Rite Aid Pharmacy during the heating seasons of 2006, 2007, 2008, 2009, and 2010. The results of the last SVE influent sampling, which was conducted in September 2009, and the last IAQ and sub slab sampling, which was conducted in late March 2010, are presented in Tables 1 and 2 and are summarized below:

- Comparison of the historical SVE influent sample results in Table 1 indicate that there has been a significant reduction in the level of VOCs in the samples since system operation started. PCE decreased from 81,374 $\mu g/m^3$ on October 7, 2004 to 1,670 $\mu g/m^3$ on September 29, 2009; while, TCE decreased from 6,449 $\mu g/m^3$ to 93 $\mu g/m^3$ and cis-DCE from 5,700 $\mu g/m^3$ to 80.1 $\mu g/m^3$ during the same period. The October 7, 2004 SVE influent sample was collected during the pilot study after the vacuum was applied to SVE-1 for 115 minutes.

- The IAQ samples evidenced no exceedances of the NYSDOH indoor air guideline of 100 $\mu g/m^3$ for PCE and 5$\mu g/m^3$ for TCE. The basements are used for various retail products inventory management and have occasional visits from employees.

On the basis of the March 2010 sampling results, there is not an indoor air quality problem, and the analytical results of the SVE system influent samples demonstrate that the SVE system has been successful in significantly reducing PCE and TCE concentrations.

1.3 QAPP ORGANIZATION

This QAPP is organized as follows:

Section 2.0 provides information on the project team and responsibilities;
Section 3.0 discusses data quality objectives;
Section 4.0 describes field procedures;
Section 5.0 discusses data management;
Section 6.0 presents procedures for data review and validation, and
Section 7.0 discusses project health and safety

2.0 PROJECT RESPONSIBILITY

A description of the responsibilities for each member of the MACTEC project team is presented below. Any change in key roles will be submitted to MHB for approval so that continuation of services/assignment is not interrupted.

2.1 PROJECT TEAM

State Agency Lead: Ms. Mandy Yau has been designated as the NYSDEC Project Manager for this project.

Ms. Yau can be reached at:

NYSDEC Division of Environmental Remediation Region 2, Long Island City, NY 718 482-4897

Project Manager: David Side, P.G. will serve as the MACTEC Project Manager for this project. Mr. Side will be responsible for managing all technical and project management activities. This includes meeting all scope, schedule, and budget requirements, and communicating with the client on all cost, contractual, and administrative matters. Mr. Side will also serve as Technical Lead,

responsible for developing, and implementing the Remedial Investigation. He will coordinate the technical disciplines needed to perform this project. Specific responsibilities include working with other MACTEC technical staff to develop a technical approach that meets the project objectives; ensuring that the technical approach is properly implemented in the field; and providing technical direction during the execution of work tasks.

Principal Engineer/Senior Technical Reviewer: Andrew Mills, P.E. will provide senior-level guidance and input throughout the project and will oversee technical services provided. Mr. Mills will monitor and review deliverables to check for completeness, consistency, and overall quality of the data interpretations. Specific portions of each project deliverable may be reviewed by other senior-level technical personnel based on their experience in specific disciplines.

Field Operations Leader: Jesse Garvey will act as the Field Operations Leader for this project. In this capacity, he will be responsible for implementing and documenting field-related investigation activities. Specific responsibilities include day-to-day coordination and management of technical staff; coordination and oversight of subcontractors assisting the field team; and communication between the field team and necessary persons at the Site. Mr. Garvey will report directly to the Project Manager.

Project Data Manager: Victoria Bisbing will be responsible for the management of project data. This will include loading field data and analytical data into the project database and preparing data outputs to support data evaluation and interpretation activities.

Resumes for MACTEC personnel are attached.

Subcontractors: MACTEC will use the services of MACTEC-approved contractors during this project. These will be retained on an as-needed basis for each phase of field work. Supplemental remedial investigation activities will require a utility markout contractor, drilling contractors, and an offsite laboratory for soil, groundwater, and soil vapor analysis.

MACTEC expects to retain Accutest Laboratories, Inc. (Accutest) of Dayton, New Jersey for laboratory sample analyses. Accutest is a NELAP accredited, New York certified laboratory and will meet NYSDEC Analytical Services Protocols and has been the laboratory used during SVE,

indoor air quality, and sub slab sampling. Additional information on Accutest laboratory methods and detection and reporting limits are provided in Table A-3.

3.0 QUALITY ASSURANCE OBJECTIVES

The overall QA objective is to develop and implement procedures for field sampling, sample management, laboratory analysis, and reporting that will provide results which are defensible.

3.1 REGULATORY COMPLIANCE OBJECTIVES

Site investigation activities will be completed in accordance with NYSDEC regulations and guidelines. Regulations and guidelines provided by the United States Environmental Protection Agency (USEPA) may also be applied. When planning and implementing site-specific investigations, the MACTEC project team will incorporate requirements and procedures described in the following documents into their planning documents and technical evaluations of site conditions:

Draft DER-10 "Technical Guidance for Site Investigation and Remediation"; New York Department of Environmental Conservation; Division of Environmental Remediation; FINAL, May 2010.

6 NYCRR PART 375 "Environmental Remediation Program"; New York Department of Environmental Conservation; Division of Environmental Remediation; October 2006.

Title 6, Part 371 "Identification and Listing of Hazardous Wastes"; New York Codes, Rules, and Regulations; September 2006.

Title 6, Part 700-705 "Water Quality Regulations Surface Water and Groundwater Classifications and Standards"; New York Codes, Rules, and Regulations; August 1999.

"Division Technical and Administrative Guidance Memorandum: Determination of Soil Cleanup Objectives and Cleanup Levels"; New York Department of Environmental Conservation; Division of Hazardous Waste Remediation; January 1994.

Technical and Operational Guidance Series (TOGs) 1.1.1. "Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations"; New York Department of Environmental Conservation; Division of Water; June 1998.

USEPA 542-S-02-001 "Ground-Water Sampling Guidelines for Superfund and Resource Conservation and Recovery Act (RCRA) Project Managers"; United State Environmental Protection Agency (USEPA); Office of Solid Waste and Emergency Response; May 2002.

"Analytical Services Protocols (ASP)"; New York Department of Environmental Conservation; June 2000; revised July 2005.

3.2 PROJECT DATA QUALITY OBJECTIVES

DQOs are established during the development of each project Work Plan to specify the quality of data and project specific goals for each particular data collection activity. The DQOs will ensure that data collected can support project-specific decisions. The DQOs are the starting point in the design of the investigation and based on the concept that the intended use of the data determines the quality and type of the data required. DQOs are established based on site conditions, project objectives, and available measurement systems. The DQO process matches sampling and analytical capabilities to the data targeted for specific uses and ensures that the quality of the data does not underestimate project requirements.

During the development of project-specific Work Plans, the guidance documents identified in Section 3.1 will be used to establish sampling and analytical testing goals. The MACTEC project team will evaluate site historical information and data, and recommend plans as needed. Each Work Plan will include descriptions of the following information:

- Project description and site investigation objectives
- Planned explorations and sampling procedures
- Summaries of proposed samples for all media at the site
- Summary of analytical procedures
- Data quality goals for each sampling task
- Applicable standards for groundwater, surface water, and soils

3.3 ANALYTICAL DATA QUALITY LEVELS

The data quality levels identified for this project will be USEPA DQO Level 1 for monitoring for health and safety, field measurements taken during sample collection and VOC screening, and Level 3 Laboratory Analysis to provide data for comparison with risk-based cleanup criteria and evaluate response activities effectiveness. Analytical DQOs for the supplemental remedial investigation are presented in Table A-1.

3.4 QUALITY CONTROL SAMPLES

Several types of field QC samples will be collected to provide additional data that can be used to evaluate whether the sample collection and handling procedures have affected sample quality. QC sample frequency and type will be specified within the description of Scope of Work section within each Work plan that is specific to the Site.

QC samples that may be collected during the supplemental remedial investigation include:

- Field Duplicates (5 percent) consisting of replicate or co-located samples to evaluate precision;
- Matrix Spike/Matrix Spike Duplicates (5 percent) performed by the laboratory to evaluate the effect of sample matrix on the preparation and analytical procedures;
- Field Blanks to document cleanliness of water sources used for decontamination procedures during the field program;
- Equipment Blanks to evaluate the effectiveness of equipment decontamination;
- Trip Blanks to assess potential VOC contamination during sample transport.

Routing laboratory QC procedures defined by the methods (SW-846) will be established and defined in the contract arrangement with the subcontracted laboratory. QC limits for surrogates, spikes and duplicates are summarized in Table A-2.

3.5 ANALYTICAL METHODS

Samples will be submitted to the offsite laboratory for organic and inorganic analyses as specified in the Work Plan. Table A-3 lists the analytical methods that may be required during the supplemental remedial investigation and the associated method-specific field preservatives and maximum holding times prior to analysis. Laboratory detection and reporting limits are provided in Attachment 1.

4.0 FIELD PROCEDURES

This section describes field procedures such as sampling and decontamination procedures.

4.1 SAMPLE MEDIA

The following types of samples will be collected at the Site:

- Soil samples
- Groundwater samples
- Soil vapor samples
- Waste characterization samples (solid and/or water)

4.2 SAMPLE DESIGNATIONS

Field samples will be identified as follows:

73rdAABBxxyyzz

where:

73rd = 73rd Avenue Shopping Center

AA = Project Phase

RI – Remedial Investigation

BB = Sample Type

BS – boring soil sample

GW – groundwater

SV – soil vapor

WC - waste characterization

FB - field blank

EB - equipment blank

TB - trip blank

xx = Location Number (01, 02, etc.)

yy = Depth (top of interval)

Soil– feet below ground surface

Groundwater - feet below top of well casing

zz = Quality Control Designation

XX - regular sample

FD - field duplicate (replicated or collocated) sample

MS - matrix spike

MD - matrix spike duplicate

4.3 SAMPLE COLLECTION PROCEDURES

The following procedures are for the sampling that is anticipated for this project. Sample collection will be documented on field data records (FDRs), including a dedicated field logbook, daily field report form, and a daily instrument calibration log.

4.3.1 Soil Sampling.

Shallow soil sampling will provide samples of surface and near surface soils suitable for chemical analysis. Shallow soil samples may be obtained by using one of the following devices:

- Split spoon sampler;
- Hand auger or corer;
- Trowel or spoon, or;
- Spade.

Deeper subsurface soil samples will be obtained by using the split spoon sampler.

The split spoon sampler consists of a split steel tube or sample barrel threaded at both ends that may be driven using a slide hammer or hydraulically. Two distinct types of hand augers are available: a cup-type auger and a screw-type auger. Use of either device is generally limited to the upper portion of the soil profile (i.e., less than 5 ft). These augers are best suited for obtaining composite samples from relatively shallow depths and in relatively loose soils. Use of trowels or spades is straightforward but usually limited to sampling very shallow depths (i.e., less than 18 inches).

Soil samples will be grab samples. In grab sampling, the soil sample container is filled directly. A specific location is chosen and the sample is placed immediately in the appropriate containers with as little agitation or disturbance as possible. The soil samples will be placed in an iced cooler for preservation immediately upon collection and will remain chilled upon delivery to the laboratory.

Immediately after taking a sample, chain of custody (COC) procedures will be initiated. Sample type, depth, date, time and sample identification will be recorded on the appropriate FDRs. Any special observations (staining, odor, etc.) will also be recorded in the FDR.

4.3.2 Soil Sampling from Auger Drilling Rig Borings.

The soil sampling program will use an auger drilling rig to advance soil borings and collect soil samples. The auger drilling technique consists of driving a split spoon sampler to obtain soil samples near the surface and in the subsurface, advancing hollow stem auger flights to the final depth at which the split spoon was driven, and then proceeding to drive another split spoon sampler. This process is repeated until the desired depth of the soil boring is obtained or advancement of the auger or split spoon sampler is refused. The split spoon sampler can be driven using a slide hammer or hydraulically. The augers are advanced using a rotating top drive on an elevated mast. The auger drilling unit and split spoon sampling unit are usually mounted on a small truck. The auger drilling rig can advance small to medium diameter auger flights and drives small diameter drill rods to which the split spoon sampler is affixed in order to obtain soil samples. Advantages of using an auger drilling rig in environmental investigations include low cost, discrete depth soil sampling, and penetration of the subsurface.

MACTEC will use a qualified field geologist or engineer to collect soil samples for physical and analytical testing and geologic classification during completion of soil borings and direct push explorations.

The collection of the samples shall be in accordance with the following procedures:

1. Remove the rods and sampler from the borehole/exploration. Open the sampler by unscrewing the cutting shoe and retrieve the soil sample. Recovered soils contained in the sampler shall be characterized using the USCS, as described previously.
2. Scan the soil sample with a PID and record measurements.
3. Collect sample for chemical analysis as described for Soil Sampling.
4. Decontaminate the sampling device.
5. Record the boring lithology on a Soil Boring Log.
6. Record information regarding sample location, depth, and field observations, such as staining or odor, on the Soil Sample Log.

4.3.3 Groundwater Sampling.

A low flow purging and sampling method consistent with the USEPA Region I Low Stress Purging and Sampling Procedure for the collection of Groundwater Samples from Monitoring Wells, July 30, 1996, will be used to collect groundwater samples at the Site. The first step will be to gauge the depth to groundwater in each monitoring well with an electronic water level indicator. Next, a stainless steel submersible pump and dedicated tubing will be lowered into each well. The tubing will be connected to an electronic multi-parameter meter in order to measure the stabilization of the groundwater in each well as it is being purged. The purge flow rate will be approximately 200 to 500 milliliters per minute (ml/min) and will be adjusted depending on the drawdown of the groundwater in the well. The following field parameters will be measured:

- Dissolved oxygen (DO);
- Conductivity;
- pH;
- Oxidation/reduction potential (ORP);
- Temperature, and;
- Turbidity.

The field measurements and the groundwater levels in the wells will be measured at three-minute intervals. When the measurements indicate stabilization, a groundwater sample will be collected through the tubing or with a single-use, disposable Teflon bailer.

Groundwater samples will be collected for volatile organic compound (VOC) analysis in accordance with USEPA Method 8260. The groundwater sample will be collected in labeled 40-milliliter (ml) glass vials, with Teflon septum and preserved with hydrochloric acid. The groundwater sample will be collected with care to eliminate the formation of any air bubbles within the vials. The groundwater samples will be placed in an iced cooler for preservation immediately upon collection and will remain chilled upon delivery to the laboratory.

Immediately after taking a groundwater sample, COC procedures will be initiated and the sample type, depth, date, time and sample identification will be recorded on the appropriate FDRs. Any special observations (staining, odor, etc.) will also be recorded.

When field duplicates or other QC samples are collected, the samplers will fill all containers for a given set of parameters before moving on to the next parameter.

4.3.4 Soil Vapor Sampling

Soil vapor sampling will be conducted to evaluate the potential for soil vapor migration and offsite exposure to PCE and TCE following the soil vapor extraction (SVE) remediation of the soil in the apparent source area adjacent to the former New York Express.

Permanent soil vapor sampling points will be installed to collect soil vapor samples. Where possible, the soil vapor sampling points will be installed beneath the surface confinement of pavement to help ensure that the soil vapor samples are representative. The soil vapor sampling points will be installed approximately 12 to 15 feet from the exterior wall of any buildings so that they are away from any fill material that may be surrounding the building and where they should not be influenced by the heating, ventilation, and air conditioning (HVAC) systems of the building or mechanical equipment within the building, such as clothes dryers or exhaust fans or vents. The installation of permanent soil vapor sampling points will use a direct push Geoprobe® type of drilling rig operated by a New York certified drilling contractor, who will advance the small

diameter borings for the points and will construct the points. Each of the soil vapor points will be constructed in the same manner to minimize possible discrepancies. A mark out by a private utility location contractor will be made prior to any drilling activity.

Prior to the collection of soil vapor samples, a helium gas will be made to check the integrity of the sampling methodology, in accordance with the New York State Department of Health (NYSDOH) Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006). The area immediately surrounding the sample point will be covered with a polyethylene bag, or equivalent. The sample tubing will be connected to the purge pump through the plastic bag. The tracer gas tubing will also penetrate the plastic bag. The bag will be sealed with tape. A small inert plastic container (e.g., a 5-gallon bucket) can be used in lieu of the polyethylene bag in areas were the bag cannot be taped to a solid surface. To seal the container to the ground surface hydrated bentonite or modeling clay will be placed in a ring around the soil vapor monitoring point in a diameter slightly larger than the diameter of the opening of the bucket. A heavy weight will be placed on the container to ensure and maintain a tight seal. Prior to setting the seal, two holes will be drilled through the bottom of the bucket, one for the sample tubing and one for the tracer gas tubing. Each hole will be sealed with silicone sealant prior to sampling.

When the sample purge is started, the flow of the helium tracer gas will also be initiated. A portable helium analyzer will be used to monitor the purge pump exhaust for signs of the tracer gas. If helium is detected in the purge pump exhaust at concentrations greater than 10 percent, then the probe seal should be enhanced to reduce the infiltration of outdoor air. Tracer gas flow will be controlled to maintain nearly atmospheric pressure around the sampling connections. If helium is detected in the purge exhaust the procedure will be stopped and the sample probe will be resealed. The tracer test procedure will then be repeated to ensure the integrity of the clay seal.

Care will be exercised during the sample collection procedures to minimize the possibilities of sampling errors. Personnel will avoid actions such as fueling vehicles, using permanent marking pens, or wearing perfumes or colognes that could cause sample interference. Laboratory-supplied and certified pre-cleaned Summa® canisters and fittings will be used. New Teflon tubing and hose fittings will be used where sample tubing is required.

One field duplicate will be collected during the sampling event. To ensure proper sample duplication a "Y" fitting will be implemented with the sample probe connected to one end of the fitting and two Summa® canisters connected to the other ends of the fitting. The flow controller for the duplicate canister will be set to one-half the flow of the field sample canisters. Thus, the combined flow rates of the duplicate samples will equal the flow rate of one field sample. The canisters will be opened and closed simultaneously during sampling to ensure accurate splitting.

The soil vapor samples and duplicate will be collected in laboratory-supplied and certified clean Summa® canisters and submitted for VOC analysis in accordance with USEPA Method TO-15. COC protocol and documentation will be adhered to throughout the handling, packaging, and delivery of the samples to the analytical laboratory.

4.4 MANAGEMENT OF INVESTIGATION-DERIVED WASTES

The activities described in the Supplemental Remedial Investigation Work Plan (SRIWP) are expected to produce limited amounts of excess sampling material and waste. Care will be taken to excavate only the approximate volume of material needed to fill the sample containers. Any extra soil that is removed during the advancement of borings to a required sample depth will be temporarily staged on plastic and will be returned to the borehole at the end of sampling as long as it doesn't exhibit visual contamination (e.g. oil), chemical odor, or positive PID screening response.

Small amounts of waste water will be generated by washing hand tools between sample locations and by pressure washing drilling equipment between borings. Pressure washing will be accomplished at a designated spot on a paved surface of a parking area at the Site. Pressure washing will be limited so that the amount of water produced will be small. This water will be allowed to evaporate on the paved surface as long as it does not exhibit odor, VOCs above background when screened with a PID, or show evidence of residual oil. Waste water that contains evidence of such contamination will be containerized and staged at the Site in an appropriate location pending analysis and disposal.

Wastes such as personal protective equipment (e.g. gloves), paper and cardboard trash will be cleaned of any loose soil or sediment and will be bagged and disposed of as municipal waste.

4.5 SAMPLE LOCATION DETERMINATION

Sample locations will be surveyed by use of measuring tapes and stationary monumental references, such as the corners of the Site's buildings.

5.0 DATA MANAGEMENT

Management of chemical data includes the following tasks:

- Organization and storage of project field records including logbooks, instrument calibration records, exploration records, field sample collection records, and sample handling COC records.
- Tracking of laboratory samples and receipt of laboratory deliverables.
- Receipt, organization, and storage of laboratory data packages.
- Receipt of electronic data and entry of results into the project database.
- Data quality review at a validation level specified in the QAPP.
- Entry of data validation qualifiers and preparation of final data tables.
- Preparation of tables and figures for use in the Supplemental Remedial Investigation Report.

The data management process will include procedures necessary to ensure consistent and complete collection of field data, tracking of the laboratory analytical and validation processes, and consistent and timely production of electronic data deliverables (EDDs) from laboratories.

Prior to the field program, the Site data manager will set up the valid information in the project database. Valid information consists of the contractor names, laboratory names, method names, units of measure, parameter lists for each method, and QC codes for the field QC samples. Validation requirements, such as holding times and surrogate recoveries for each method and appropriate validation qualifiers are entered at this time as well.

Information specific to each sample will be entered in the field on appropriate FDRs, such as the site dedicated logbook, and on COCs. MACTEC will use the COCs and supporting field records to review laboratory EDDs to track the completeness of the laboratory data deliverables.

The Site Data Manager will upload the analytical result EDDs. Imperfect EDDs will not be uploaded to the holding table, but rather will be returned to the laboratory for correction. Returning the EDDs to the laboratory for correction prior to upload minimizes discrepancies between hard copy analytical reports and electronic data. Field data will be uploaded using an EXCEL template after it has been documented as being checked. Field data such as Site photographs or logbooks will be stored in the project files, along with supporting metadata such as author/creator of data, date, location, brief description. Ten percent of the analytical data and field data entered and uploaded to the database will be compared against hard copy. Additional data review will be completed if errors are noted.

Hardcopy data deliverables will be specified for each field program depending on the level of review planned for the sample set and the planned use of the data. If a full validation (Level 4) is scoped for the sample set, or a subset of samples in the sample set, the data deliverables will include a full hardcopy data package. Modified CLP type forms are acceptable provided they contain equivalent information. Deliverable packages will include a narrative that summarizes activities and any problems or issues, forms summarizing sample and QC blank results, forms summarizing QC measurement parameters specified in the method, and associated raw data generated in support of the reported results. Results of QC measurements will include calibration data summaries, laboratory control data summaries, MS/MSD summaries (for samples requested on the CoC), surrogate summaries, and laboratory duplicate summaries. A modified CLP Form 10, or equivalent, summarizing dual column results will be provided for each sample. Raw data will include copies of associated instrument printouts and laboratory notebook records that were generated during sample preparation and analysis.

6.0 DATA REVIEW

Analytical data, including that of the QC samples, will be carefully reviewed prior to use as final data in investigation reports.

7.0 HEALTH AND SAFETY

A Health and Safety Plan (HASP) has been prepared to govern the specific field tasks identified in this Work Plan. The site-specific HASP has been prepared in accordance with NYSDEC DER-10 (NYSDEC, 2010). The HASP will be reviewed and updated, as necessary, prior to every field mobilization to the Site. Site workers will be required to review and sign the plan and a copy of the plan will be available at the Site to govern field activities.

The field activities discussed in this Work Plan are not anticipated to cause increased potential exposure to Site contaminants to the community during sampling. Hand sampling methods for soil and groundwater are not likely to release any airborne particulate or chemical contamination.

Although VOCs are not expected to be encountered at levels that would be a potential concern to workers, periodic monitoring for VOCs will be performed during sampling activities to document actual conditions. Monitoring will be performed using a photoionization detector (PID). Results will be compared to the action levels specified in DER-10 and listed in the HASP. Work activities will be halted if total organic vapors exceed 5 ppm over background at the downwind perimeter of the work area. A copy of the NYSDOH Community Air Monitoring Plan is included in Appendix A.

The HASP will be amended to cover additional activities, as identified in any subsequent field sampling plans.

QAPP TABLES

Table A-1
Analytical DQO Levels

Parameter	Use	Data Quality level
pH, Temperature, Specific Conductance, Turbidity	Provides physical and chemical data on water samples at the time of collection	Level I
PID Screening	Provides qualitative instantaneous information on air quality for worker health and safety and identifies potential contamination in sampled media	Level I
TCL VOCs, SVOCs, Inorganics, PCBs using SW-846 methods	Provides analytical information to compare to standards and guidance values; determine the nature and extent of impact; evaluate potential risk to humans and the environment; support remedial action and risk-management decisions	Level III

Notes:
TCL - target compound list
VOCs = volatile organic compounds
SVOCs = semi-volatile organic compounds
Inorganics = TAL metals
PCBs = polychlorinated biphenyls

QUALITY ASSURANCE PROJECT PLAN
New York Express Dry Cleaners
Fresh Meadows, New York
MACTEC Project Number 3485050051
March 2011

Table A-2
Summary of QC Limits for Surrogates, Spikes and Duplicates

PARAMETER	QC TEST	ANALYTE	WATER (%R)	SOIL (%R)	GAS (%R)	Water RPD	Soil RPD	Gas RPD
Volatiles	Surrogate	All Surrogate Compounds	80 - 120	70 - 130	60-140			
	LCS	All Target Compounds	70 - 130	70 - 130	60-140			
	MS/MSD	All Target Compounds	70 - 130	70 - 130	60-140	20	50	30
	Field Duplicate	All Target Compounds				50	100	30
Semivolatiles	Surrogate	BN Fraction	50 - 140	40 - 140	60-140			
	Surrogate	Acid Fraction	30 - 140	30 - 140	60-140			
	LCS	All Target Compounds	50 - 140	40 - 140	60-140			
	MS/MSD	All Target Compounds	50 - 140	40 - 140	60-140	20	50	30
	Field Duplicate	All Target Compounds				50	100	30
PCBs	Surrogate	All Surrogate Compounds	30 - 150	30 -150	60-140			
	LCS	All Target Analytes	50 - 140	70 -130	60-140			
	MS/MSD	All Target Analytes	30 - 150	70 -130	60-140	20	50	30
	Field Duplicate	All Target Analytes				50	100	30
Inorganics	LCS	All Target Analytes	80 - 120	75 - 125	60-140			
	MS/MSD	All Target Analytes	75 -125	75 - 125	60-140	20	50	30
	Lab Duplicate	All Target Analytes				50	100	30
	Field Duplicate	All Target Analytes				50	100	30

Prepared/Date: CRR 05/05/09
Checked/Date: ECS 05/07/09

Notes:
LCS - Laboratory Control Sample
MS/MSD - Matrix Spike/ Matrix Spike Duplicate
RPD = Relative Percent Difference
%R = Percent Recovery
BN = base/neutral

Table A-3
Analytical Methods, Preservation, and Holding Time Requirements

Analyte	Medium	Reference Analytical Method	Preservative	Holding Time	Sample Container/Volume
PCBs	Aqueous	SW-846 8082 / 3520	4°C	indefinite	GTLC/1 Liter
VOCs	Aqueous	SW-846 8260B / 5030	HCL, 4°C	14 days	GTLS/ 3 40mL vials
SVOCs	Aqueous	SW-846 8270C / 3520	4°C	extract within 14 days	GTLC/1 Liter
TAL Metals	Aqueous	SW-846 6010B / 6020 / 7470A	HNO_3; 4°C	6 months; 28 days Hg	P/100 (200) mL
Total Cyanide	Aqueous	SW-846 9012B	NaOH; 4°C	6 months	G/50 mL
Hardness	Aqueous	SM2340	4°C	28 days	G/200 mL
PCBs	Solid	SW-846 8082 / 3540C	4°C	indefinite	GTLC/30 (50) grams
VOCs	Solid	SW-846 8260B / 5035	4°C	14 days	GTLC
SVOCs	Solid	SW-846 8270C / 3550B	4°C	extract within 14 days	GTLC/5grams
TAL Metals	Solid	SW-846 6010B / 6020 / 7471A	4°C	6 months; 28 days Hg	P/100 (200) mL
VOCs	Gas	TO15	None	30 days	Summa Canister 6 L

Notes
G = glass
GTLC = glass with teflon lined cap
PCBs = polychlorinated biphenyls
VOCs = volatile organic compounds
SVOCs = semi-volatile organic compounds
P = Plastic
HCL - hydrochloric acid
°C = degrees centigrade

APPENDIX C

HEALTH AND SAFETY PLAN (HASP)

SITE-SPECIFIC HEALTH & SAFETY PLAN

NEW YORK EXPRESS DRY CLEANERS
73rd STREET SHOPPING CENTER
QUEENS, NEW YORK

3485050051

Prepared by:

MACTEC, Inc.
5205 Militia Hill Rd
Plymouth Meeting, PA

December 1, 2008

SITE-SPECIFIC HEALTH & SAFETY PLAN (HASP)

for the

Project Name: New York Express Dry Cleaners
Project Location: Queens, New York
Project No.: 3485050051

This HASP, which must be kept on site, addresses the health and safety hazards of each task for this project, including the requirements and procedures for worker protection (per 29 CFR 1910.120 and the MACTEC ES&H Program 2.9.A - Hazardous Waste Operations and Emergency Response (HAZWOPER) Program). The Site Health and Safety Officer (SHSO) can change or amend this document only with agreement from the Division Environmental Health and Safety Manager (DEHSM). The SHSO must initial any change made to the HASP at the relevant section and document the amendment date below.

Prepared by: Jesse Garvey MACTEC Managing Office: Plymouth Meeting, PA

Approved by:

Dave Side	
SHSO	Date
Jesse Garvey	
Field Lead	Date
Dave Side	
Project Manager	Date

Date(s) of Amendment(s):

All site workers shall read this HASP. A pre-entry briefing conducted by the SHSO shall be held prior to initiating this project. Items to be covered during the briefing can be found on the Site Safety Orientation form (Appendix G). All applicable sections of this HASP shall be reviewed during this briefing. The SHSO shall review the information covered in the pre-entry briefing meeting with any worker not in attendance at the initial meeting prior to commencing work. Brief meetings will be held at the beginning of each work day to discuss important safety and health issues concerning tasks performed on that day and documented on the Daily Safety Meeting checklist (Appendix H). After reading the HASP and attending a pre-entry briefing, workers shall sign the following acknowledgment statement:

MACTEC Field Team Review: I acknowledge that I have read the requirements of this HASP, and agree to abide by the procedures and limitations specified herein. I also acknowledge that I have been given an opportunity to have my questions regarding the HASP and its requirements answered prior to performing field activities. Health and safety training and medical surveillance requirements applicable to my field activities at this site are current and will not expire during on-site activities.

NAME	DATE	NAME	DATE

TABLE OF CONTENTS

TABLE OF CONTENTS

LIST OF TABLES

Table Page

LIST OF FIGURES

Figure Page

LIST OF APPENDICES

Appendix

1.0 SITE DESCRIPTION

The Site is an active commercial dry cleaning facility located at 69-60 188th Street, Fresh Meadows, Queens Borough, New York. The dry cleaning facility is approximately 3,000 square feet in size and is located in the 73rd Street Shopping Center (formerly known as the Key Foods Shopping Center) on the northwest corner of 188th Street and 73rd Avenue. The Site has been used as a dry-cleaning facility since 1983.

A Phase I Environmental Site Assessment (ESA) was conducted in 1997. During the site visit performed for the Phase I ESA, an abandoned 1,250-gallon fuel oil underground storage tank (UST) was discovered near the rear of the New York Express Dry Cleaner. In November 1997 the UST was closed via excavation and off site disposal. Subsurface soil impacted with volatile organic compounds (VOCs), primarily tetrachloroethene and trichloroethene, were detected during the UST closure activities in soil overlying and surrounding the UST in excess of NYSDEC soil cleanup criteria. The presence of buildings and building foundations prohibited the removal of all impacted soil. In 2001, additional soil sampling and soil gas sampling were conducted.

A Voluntary Cleanup Agreement (VCA) dated March 8, 2002 was entered between NYSDEC and MHB (Site # V-00199-2). In accordance with the VCA, MHB proposed to delineate the extent of impacted soil and ground water, and remediate the impacted soil using in-situ soil vapor extraction (SVE). MHB applied to transition the site into the Brownfields Cleanup Program and the application has been accepted by the NYSDEC.

The following tasks are to be performed at the site (check the box if task is to be performed by MACTEC employees:

MAC-TEC?	Tasks	Initial Level of PPE
☐	▪ System Operation and Maintenance	
☐	▪ Indoor Air Quality Sampling	
☐	▪	
☐	▪	
☐	▪	

☐	▪	
☐	▪	
☐	▪	

Expected start date: December 1, 2008

Expected duration of project: 2 years

Expected average number of workers on site per day: 0

2.0 KEY PERSONNEL AND HEALTH AND SAFETY RESPONSIBILITIES

Table 2.1 describes health and safety responsibilities for key project personnel.

MACTEC

5205 Militia Hill Road

Figure 1-1

SITE LOCATION MAP

NEW YORK EXPRESS DRY CLEANERS

69-60 188th STREET. QUEENS. NEW YORK

TABLE 2.1

KEY PERSONNEL HEALTH AND SAFETY RESPONSIBILITIES

DIVISION ENVIRONMENTAL HEALTH AND SAFETY MANAGER	FIELD LEAD (FL)	SITE HEALTH & SAFETY OFFICER (SHSO)	PROJECT PERSONNEL
• Implement appropriate corporate health and safety policies, or environmental projects • Approve HASP and Amendments • Maintain exposure monitoring records • Notify Corporate ES&H Manager in the event of an emergency situation • Verify that corrective actions recommended on Incident Analysis Forms have been implemented	• See that personnel receive this plan, are aware of its provisions, and are aware of the potential hazards associated with site operations, are instructed in safe work practices, and are familiar with emergency procedures, and these actions are documented • Determine that appropriate monitoring and personnel protective equipment are available • Monitor the Field Logbooks to ensure the health and safety work practices are employed • Coordinate with SHSO so that emergency response procedures are implemented • Ensure corrective actions recommended on Incident Analysis Forms are implemented	• Implement project HASP; report to the Project Manager for action if any deviations from the anticipated conditions exist; and authorize the cessation of work at site investigations if necessary • Confirm that prior to a hazardous waste site visit, site personnel meet the proper medical requirements and have the health and safety training to qualify them to perform their assigned tasks. Identify all site personnel with special medical conditions. • Conduct pre-entry briefing and tailgate safety meetings. Document meetings on Daily Tailgate Safety Meeting Checklist (See Appendix H) • Verify that all monitoring equipment and personal protective equipment is operating correctly according to manufacturer's instructions and such equipment is utilized by on-site personnel. Calibrate or verify calibration of all monitoring equipment and record results. • Conduct daily inspections of jobsite using the Daily Site Safety And Health Checklist (See Appendix I) • Implement site emergency and follow-up procedures	• Be familiar with and abide by the HASP • Notify the SHSO of any special medical conditions (e.g., allergies) • Immediately report any accidents and/or unsafe conditions to the SHSO • No individual shall go on site where he/she does not have the required safety training

3.0 WORKER TRAINING

Upon designation of a specific project team, Table 3.1 will be completed to summarize the training experience of the project team with respect to 29 CFR 1910.120(e), 29 CFR 1910.38, and 29 CFR 1910.1200 and MACTEC ES&H Programs and Procedures: ESH 2.9.A – Hazardous Waste Operations and Emergency Response Program and ESH 2.9.E – Hazard Communication Program..

4.0 MEDICAL SURVEILLANCE

Upon designation of a specific project team, Table 3.1 will be completed to indicate the workers who participate in the company's Medical Surveillance Program (MACTEC ESH 2.13.1) [29 CFR 1910.120(f)]. All workers who could potentially be exposed to concentrations of contaminants above the OSHA Permissible Exposure Limits (PELs) for 30 days per year or more must be included in the Medical Surveillance Program. Any site specific medical surveillance conducted for site workers will also be listed on the table

5.0 SITE CONTROL

Site control procedures, as required by 29 CFR 1910.120(d) and MACTEC ESH 2.9.A - Hazardous Waste Operations and Emergency Response Program, will be implemented before the start of site tasks to control worker exposures to contaminants.

5.1 WORK ZONES

To be determined at the site by the SHSO. At this time it is anticipated that the work zones will be defined relative to the location of the work activity. The Exclusion Zone is considered the area within a 10-foot diameter of the sampling location. The Contamination Reduction Zone is considered to be the area with in a 20-foot diameter of the sampling location. The decontamination zone being located upwind of the work area. Work zones will be maintained through the use of:

☐ Warning Tape

☒ Visual Observations

5.2 BUDDY SYSTEM

When required by contract or when conditions exist that could be dangerous to life and health, a buddy system shall be implemented.

Yes	No	
☐	☒	Buddy System required?

TABLE 3.1

TRAINING/MEDICAL SURVEILLANCE/RESPIRATORY PROTECTION RECORDS

	Required?	Names of Field Team Members					
		Nic DiCarlo	**Mike Flanik**	**Charlie Charlesworth**	**Jesse Garvey**	**Sean King**	
Training/Medical	**Required?**	**Dates**	**Dates**	**Dates**	**Dates**	**Dates**	**Dates**
Medical Surveillance		**8/7/07**	**6/11/08**	**7/13/2007**		**6/6/08**	
Site Specific Medical Testing:_____		-	-	-	-	-	
40-Hour Initial		**10/1/04**	**3/2/07**			**2/16/07**	
8-Hour Supervisor [1]		**11/8/06**		**5/21/2007**			
8-Hour Refresher		**6/27/08**	**6/27/08**	**6/27/08**	**6/27/08**	**6/27/08**	
First Aid/CPR [1, 2]		**6/27/08**	**6/27/08**	**6/27/08**	**6/27/08**	**6/27/08**	
Respirator Fit Test [1]							
Respirator Brand [1]							
Hazard Communication							
Confined Space Entry [1]							
Fall Protection [1]		**NA**	**NA**	**NA**	**NA**	**NA**	
Client Required [1]		**NA**	**NA**	**NA**	**NA**	**NA**	

[1] If Applicable
[2] At least one worker must be trained in First Aid/CPR and have received Bloodborne Pathogen training.
[3] Required if acting as LF or SSHO

5.3 SITE ACCESS

Access to the site will be controlled using the following method(s):

☐ Sign in/sign out log ☐ Guard
☐ Identification badges ☐ Other: _____

5.4 GENERAL SAFE WORK PRACTICES

General safe work practices to be implemented during work activities at this site are included in Table 5.1.

TABLE 5.1

GENERAL SAFE WORK PRACTICES

- Minimize contact with excavated or contaminated materials. Plan work areas, decontamination areas, and procedures accordingly. Do not place equipment or drums on the ground. Do not sit on drums or other materials. Do not sit or kneel on the ground in the Exclusion Zone or CRZ. Avoid standing in or walking through puddles or stained soil.
- Smoking, eating, or drinking after entering the work zone and before decontamination will not be allowed. Use of illegal drugs and alcohol are prohibited.
- Practice good housekeeping. Keep everything orderly and out of potentially harmful situations.
- In an unknown situation, always assume the worst conditions.
- Be observant of your immediate surroundings and the surroundings of others. It is a team effort to notice and warn of impending dangerous situations. Withdrawal from a hazardous situation to reassess procedures is the preferred course of action.
- Conflicting situations may arise concerning safety requirements and working conditions and must be addressed and resolved rapidly by the SHSO and PC to relieve any motivations or pressures to circumvent established safety policies.
- Unauthorized breaches of specified safety protocol will not be allowed. Workers unwilling or unable to comply with the established procedures will be discharged.

6.0 HAZARD ANALYSIS

6.1 CONTAMINANTS OF CONCERN

Pertinent site information (e.g. records of chemicals used, records of disposal) and previous sampling data (e.g. groundwater, soil, sediment) have been reviewed to determine the contaminants of concern for this project. The known or suspected contaminants for the site are:

- Acetone
- Benzene
- Methyl Ethyl Ketone
- Tetrachloroehene
- Toluene
- Tetrachlorehene
-
-

Appendix A contains Contaminant Fact Sheets for each of these contaminants of concern.
Health hazards shall be evaluated using air monitoring equipment (Section 7.0) and controlled by implementing personal protective equipment (Section 8.0).

6.2 JOB HAZARD ANALYSIS

Job Hazard Analyses have been conducted for each task associated with this project in compliance with the MACTEC ESH 2.9.1 – Risk Assessment and Job Hazard Analysis Procedure. The following JHAs can be found in Appendix B.

JHAs:

Activity Specific JHAs:

☒	Mobilization/Demobilization and Site Preparation
☒	Field Work - General
☒	Decontamination
☐	Groundwater Sampling
☒	Soil Sampling
☐	Drilling Operation (MACTEC Driller)
☐	Geoprobe (MACTEC Geoprobe Operator)
☐	Excavations and Backfilling
☐	Stream/Wetlands Work
☐	
☐	
☐	

Hazard Specific JHAs:

☒	Insect Stings and Bites
☐	Gasoline
☐	Working with Preservatives (Acids)
☐	
☐	
☐	
☐	
☐	
☐	
☐	
☐	
☐	

7.0 AIR MONITORING

NOTE: Section 6.1 lists the known and suspected contaminant of concern at the site. Table 7-1 table lists the monitoring instruments and upgrade/action limits that will be used at the site:

Table 7-1
Action Levels per Monitoring Instrument

			Upgrade/Action Levels			
	Meter		**Level D**	**Level C**	**Level B**	**Action**
☒	Photoionization Detector [1]					
	☒	10.0-10.6 eV	< 4 ppm	≥ 4 ppm	≥ 75 ppm	
	☐	11.0-11.7 eV		≥	≥	
☐	Flame Ionization Detector [1]			≥	≥	
☒	Detector Tubes [1]					
	☒	Benzene	< 0.5 ppm	≥ 0.5 ppm	≥ 5 ppm	
	☐	Vinyl Chloride	< 0.5 ppm	< 0.5 ppm	> 0.5 ppm	
☒	Dust Meter [1]					
	☒	Respirable	< 1.5 mg/m^3	≥ 1.5 mg/m^3	≥ 15 mg/m^3	
	☐	Total	< 5 mg/m^3	≥ 5 mg/m^3	≥ 50 mg/m^3	
☒	LEL/O_2 Meter					
	☒	LEL [2]				> 10% back off
	☒	Oxygen [1]	19.5% - 23.5%	19.5% - 23.5%	< 19.5% or > 23.5%	
☐	Hydrogen Sulfide Meter [1]		< 5 ppm	< 5 ppm	≥ 5 ppm	
☐	Carbon Monoxide [1]		< 12 ppm	< 12 ppm	≥ 12 ppm	
☐						

[1] Monitor breathing zone
[2] Monitor source (e.g., well, cuttings, borehole, etc.)

Periodic monitoring shall be conducted when the possibility of an IDLH condition or flammable atmosphere has developed or when there is indication that exposures may have risen over permissible exposure limits or published exposure levels since prior monitoring. Situations where it shall be considered whether the possibility that exposures have risen are as follows:

- When work begins on a different portion of the site.
- When contaminants other than those previously identified are being handled.
- When a different type of operation is initiated (e.g., drum opening as opposed to exploratory well drilling.)
- When employees are handling leaking drums or containers or working in areas with obvious liquid contamination (e.g., a spill or lagoon.)

Each borehole, drill cuttings, well, etc., will be screened using the PID to give an indication of the potential for the presence of organic vapors. Detector tubes (DTs) for benzene and vinyl chloride and the PID will be used in the breathing zone upon the detection of PID readings above background levels in the immediate vicinity of the borehole, drill cuttings, well, etc. Action guides regarding the screening of the breathing zone and the required personal protective equipment (PPE) are presented in the Table 7-2

If sustained PID readings exceed 9 ppm or benzene readings (as measured by detector tubes) exceed 5 ppm or vinyl chloride readings (as measured by detector tubes) exceed 0.5 ppm, work will be stopped, the area evacuated, and the Site Health and Safety Officer notified. If work is stopped due to elevated levels of benzene or organic vapors, then consideration will be given to proceedings with the work using Level B PPE.

All monitoring equipment will be calibrated before each day of use. Results will be documented in the Field Logbook.

Areas of airborne dust and odor should be avoided. Skin contact with soil, sediment, surface water and ground water should be avoided.

8.0 PERSONAL PROTECTIVE EQUIPMENT

The initial level of protection required for each task is provided in Section 1.0 and Table 8-1. The individual PPE required for each task is listed in the JHAs. Table 8-1 summarizes the PPE required for all tasks to be conducted by MACTEC workers. The level of protection may be upgraded or downgraded according to the action guidelines provided in Section 7.0. Level of PPE used each day shall be indicated in the Field Logbook. When using PPE, workers must adhere to the company's Personal Protective Equipment Program (ESH Program 2.9.D) and OSHA regulations (29 CFR 1910.120[g] and 29 CFR 1910 Subpart I).

If respirators are worn, workers must adhere to the company's Respiratory Protection Program (ESH Program 2.9.C) and OSHA regulations (29 CFR 1910.134). Table 3.1 provides a record of the site workers' last annual fit test. Beards (e.g., facial hair interfering with the respirator seal) are not allowed when respirators are worn.

9.0 DECONTAMINATION

PPE shall be decontaminated as per 29 CFR 1910.120(k) and MACTEC ESH 2.9.A. The decontamination procedures, equipment, and decontamination solution required for each task are provided in Appendix C and the JHA – Decontamination.

Re-usable safety gear will be washed with soap and water prior to re-use or removing from the work zone. Sampling tools, etc. will be decontaminated as described in the W*ork Plan*, or as directed by the SHSO. All drilling fluids and cuttings will be handled in accordance with the *Work Plan*. The disposition of this material and disposable safety gear will be the responsibility of the site owner. Safety gear that cannot be decontaminated will be disposed of as an investigative derived waste (IDW) in accordance with the Work Plan.

Table 7-2
Air Monitoring Action Level Summary

PID/FID Reading[1,2]	**Detector Tube**[1] Benzene	**Detector Tube**[1] Vinyl Chloride	**Dust Meter**[1]	**LEL**[2]**/O_2**[1]	**Action**	**Level of PPE**
< 0.5 ppm[2]	--	--	< 1.5 mg/m^3		Continue to monitor with PID	Level D / Modified Level D
≥ 0.5 ppm[1]	< 0.5 ppm	< 0.5 ppm			Begin monitoring breathing zone with PID and benzene DT.	Level D / Modified Level D
0.5 – 9 ppm[1]	< 0.5 ppm	< 0.5 ppm	< 1.5 mg/m^3		Continue to monitor with PID and DT	Level D / Modified Level D
≥ 9 ppm[1] to 75 ppm	≥ 0.5 ppm to 5 ppm	< 0.5 ppm	≥ 1.5 mg/m^3		Continue to monitor with PID and DT	Level C
≥ 75 ppm[1]	≥ 5 ppm	≥ 0.5 ppm	≥ 15 mg/m^3		Stop work and evacuate area, Notify SSHO	Level B
				> 10% LEL[2]	Stop work. Evacuate area. If action levels continue to be exceeded, contact SHSO, consider return with ventilation system and spark proof/intrinsically safe equipment.	Back Off
				< 19.5% O2[1] > 25.5% O2[1]	Stop work and evacuate area, Notify SSHO	Level B

[1] Monitor breathing zone
[2] Monitor source (e.g., well, cuttings, borehole, etc.)

Table 8-1
PPE and Monitoring Requirements Summary

Initial Level of PPE *				
☐ Level D	☒ Modified Level D	☐ Level C	☐ Level B	☐ Level A
Standard PPE				
☐ Hard Hat	☒ Safety shoes	☒ Safety glasses	☐ Boot Covers	☐ Rubber Boots
☐ Aprons	☒ High Visibility Vest			
Eye and Face Protection				
☐ Welding glasses	☐ Welding helmet	☐ Face shield	☐ Chemical goggles	☐ Welding screens
Hearing Protection				
☒ Ear plugs	☐ Ear Muffs	☐ Ear plugs and muffs	☐ Other _____	
Respiratory Protection				
☒ None	☐ Upgrade Only	☐ Full Face APR	☐ Half Face APR	Cart. Type: MSA GMC or Equivalent
☐ PAPR				
☐ Airline respirator	☐ SCBA	☐ Dust mask	☐ _____	
Protective Clothing				
☐ Tyvek® coveralls	☐ Poly-coated Tyvek®	☐ Saranex® Coveralls	☐ Fully encapsulating suit	
☐ Cotton coveralls	☐ Modesty Clothing	☐ Fire resistant clothing	☐ Other _____	
Hand Protection				
☐ None	☐ Cotton gloves	☐ Leather gloves	☐ Cut-resistant gloves	☐ Glove liners
Outer Gloves				
☐ Nitrile	☐ Viton®	☐ Butyl	☐ Neoprene	☐ Other _____
Inner Gloves				
☐ Nitrile	☐ Vinyl	☐ Latex	☐ Other _____	
Monitoring Requirements				
☐ Oxygen	☐ Flammable gases/vapors	☐ Toxic Gas/vapors	☐ Hydrogen Sulfide	Carbon Monoxide
☐ Asbestos	☐ Full time IH coverage	☐ Part time IH coverage	☐ Be, Hg, Cr, Pb	
☐ Metals Specify: _____				
☐ Organic Vapors Specify: _____				
☒ None	☐ TLD required	☐ CAM	☐ Radon	
☐ Full time RCT coverage	☐ Part time RCT coverage	☐ Radioactive air particulates	☐ Other _____	
☐ Other _____		☐ Other _____		

10.0 EMERGENCY RESPONSE

The following emergency response information is provided as per 29 CFR 1910.120(j), MACTEC ESH 2.9.A – Hazardous Waste Operations an Emergency Response Program..

10.1 HOSPITAL ROUTE MAP

A Hospital Route Map is included as Figure 10.1.

10.2 EMERGENCY CONTACTS

A list of contacts and telephone numbers for the applicable local off-site emergency responders is provided in Table 10.1. The nature of the site work and contaminants of concern should be reviewed and the ability of off-site responders to respond to reasonably anticipated emergencies should be confirmed. If there are any concerns with off-site responsibilities they should be contacted directly.

10.3 EMERGENCY RESPONSE EQUIPMENT

The following emergency response equipment is required for this project and shall be readily available.

- ☒ Field First Aid Kit
- ☒ Fire Extinguisher
  - ☐ Type A (Combustible materials)
  - ☐ Type B (Flammable liquids and gases)
  - ☐ Type C (Doesn't conduct electricity – to be used on electrical equipment)
  - ☒ Type ABC
- ☐ Eyewash (Note: 15 minutes of free-flowing fresh water
- ☐ SCBA
- ☐ Shower
- ☐ Other: Respirator

FIGURE 10.1

Total Time: 9 minutesTotal Distance: 4.48 miles

A: 6960 188th St, Fresh Meadows, NY 11365-3771

1: Start out going SOUTH on 188TH ST/SAUL WEPRIN ST toward 73RD AVE. 0.8 mi

2: Merge onto GRAND CENTRAL PKWY W via the ramp on the LEFT toward TRIBORO BR. 2.6 mi

3: Take the UNION TPKE exit, EXIT 15, toward RT-25 W/QUEENS BLVD. 0.2 mi

4: Stay STRAIGHT to go onto UNION TURNPIKE. 0.2 mi

5: Take the QUEENS BLVD ramp toward RT-25 W. 0.1 mi

6: Turn RIGHT onto QUEENS BLVD. 0.3 mi

7: Turn RIGHT onto 76TH RD. 0.0 mi

8: Turn LEFT onto 113TH ST. 0.2 mi

9: End at 7335 113th St Flushing, NY 11375

B: 7335 113th St, Flushing, NY 11375

Total Time: 9 minutesTotal Distance: 4.48 miles

TABLE 10.1

EMERGENCY CONTACTS

NAME	TELEPHONE NUMBERS		DATE OF PRE-EMERGENCY NOTIFICATION (if applicable)
Fire Department:	911		
Hospital: Parkway Hospital	718-990-4100		
Police Department:	911		
Site Health And Safety Officer: Dave Side	Office: 610-941-9700	Cell: 610-496-0854	
Client Contact:	Office:	Pager:	
Project Manager: Dave Side	Office: 610-941-9700	Cell: 610-496-0854	
Division ES&H Manager: Cindy Sundquist	Office: 207-828-3309	Home: 207-892-4402 Cell: 207-650-7593	
EPA (if applicable):			
OTHER: Ambulance	911		

10.4 COMMUNICATIONS

On-site communications will be conducted through the use of:

- ☒ Verbal
- ☐ Two-way radio
- ☒ Cellular telephone
- ☒ Hand signals
  - Hand gripping throat ---------- Out of air, can't breathe
  - Grip partner's wrist or both hands around waist ---------- Leave area immediately
  - Hands on top of head ---------- Need assistance
  - Thumbs up ---------- OK, I am all right, I understand
  - Thumbs down ---------- No, negative
- ☐ Horn
- ☐ Siren
- ☐ Other: _____

Off-site communications will be conducted through the use of:

- ☒ Cellular phone
- ☐ Pay phone - location: _____
- ☐ Other: _____

10.5 EMERGENCY RESPONSE PROCEDURES

In the event that an on-site emergency develops, the procedures delineated in Table 11.2 are to be followed immediately.

Within 24 hours after any emergency response, the Incident Analysis Forms provided in Appendix D shall be completed and returned to the Division ES&H Manager, who will forward a copy to the Corporate ES&H Manager and General Counsel.

TABLE 10.2

EMERGENCY PROCEDURES

- The SHSO (or alternate) should be immediately notified via the on-site communication system. The SHSO assumes control of the emergency response.
- The SHSO notifies the Project Manager and client contact of the emergency. The SHSO shall then contact the Environmental, Health, and Safety Officer who will then contact the Corporate Safety Officer.
- If applicable, the SHSO shall notify off-site emergency responders (e.g. fire department, hospital, police department, etc.) and shall inform the response team as to the nature and location of the emergency on-site.
- If applicable, the SHSO evacuates the site. Site workers should move to the predetermined evacuation point (See Site Map).
- For small fires, flames should be extinguished using the fire extinguisher. Large fires should be handled by the local fire department.
- In an unknown situation or if responding to toxic gas emergencies, appropriate PPE, including SCBAs, should be donned.
- If chemicals are accidentally spilled or splashed into eyes or on skin, use eyewash and/or shower.
- If a worker is injured, first aid shall be administered by certified first aid provider.
- Before continuing site operations after an emergency involving toxic gases, the SHSO shall don a SCBA and utilize appropriate air monitoring equipment to verify that the site is safe.
- An injured worker shall be decontaminated appropriately.
- After the response, the SHSO shall follow-up with the required company reporting procedures, including the Incident Analysis Forms (Appendix D).

11.0 CONFINED SPACE ENTRY

Yes	No	
☐	☒	The task(s) for this project involve confined space entry.

If yes, see applicable JHA in Appendix B.

12.0 SPILL CONTAINMENT

Yes	No	
☐	☒	The task(s) for this project involve drum/tank/container sampling, excavation, transportation, etc.

If yes, see Appendix J for spill containment procedures. Refer to MACTEC ESH Procedure 2.14.3 – Spill Containment for further information

13.0 HAZARD COMMUNICATION

The following procedures shall be followed for all chemicals brought on site (e.g., decontamination solution, sample preservatives, etc.):

- Chemical containers (primary and secondary) shall be correctly and clearly labeled with the name of the chemical and the hazard(s) associated with that chemical (e.g. flammable, corrosive, etc.).
- Workers have received training on the hazards of these chemicals as indicated in Table 3.1.
- A Material Safety Data Sheet for each chemical listed below is included in Appendix E.

Acetone	Methanol
Alconox	Nitric Acid (HNO_3)
Ascorbic Acid	pH 4 Buffer
Bentonite	pH 7 Buffer
Contrad	pH 10 Buffer
Diesel fuel	Phenolphthalein
Gasoline	Potassium chloride (KCI)
Hexane	Sand
Hydrochloric Acid (HCI)	Silica Cement
Hydrogen gas	Sodium Hydroxide (N_aOH)
Isobutylene	Sodium Thiosulfate
Isopropyl Alcohol	Sulfuric Acid (H_2SO_4)
Liqui-nox	Turbidity Standards
Methane gas	Zinc Acetate

When chemicals are used on site, workers must adhere to the company's Hazard Communications Program (ESH Program 2.9.E) and the OSHA regulation (29 CFR 1910.1200).

14.0 **RECORD KEEPING**

At the end of the project, the following items shall be maintained in the project file:

- ☒ HASP
- ☒ Incident Analysis Forms (if applicable)
- ☒ SHSO Summary (Appendix I)

APPENDIX A

CONTAMINANT FACT SHEETS

APPENDIX A

EXAMPLE CONTAMINANT FACT SHEET REPLACE WITH COMPLETED VERSIONS

CONTAMINANT FACT SHEET

Chemical Name:

_____

CAS Number: _____

Synonyms:

_____

_____

_____

HEALTH HAZARD DATA

Color: _____

Physical State: Solid _____

Liquid _____

Gas _____

Odor: _____

Odor Threshold _____

Vapor Density: _____

Ionization Potential (IP): _____

IDLH: _____

Carcinogen: OSHA _____

IARC _____

NTP _____

ACGIH _____

NIOSH _____

Skin absorbable: _____

Skin corrosive: _____

Signs/Symptoms of Acute Exposure:

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs			
ACGIH TLVs			
NIOSH RELs			

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Resonse or Conversion Factor	Meter Specific Action Level

Checked by: Date:

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:

Suits _____

_____

_____

Gloves _____

_____

Boots _____

_____

_____

Service Limit Concentration (ppm): _____

MUC 1/2 Mask APR = TWA x 10 = _____

MUC Full-Face APR = TWA x 50 =

FIRE/REACTIVITY DATA

Flash Point: _____

LEL/UEL: _____/_____

Fire Extinguishing Media:

Dry Chemical _____ Foam _____

Water Spray _____ CO_2 _____

Incompatibilities:

_____

_____

_____

_____

APPENDIX B

JOB HAZARD ANALYSIS PER TASK(S)

JOB HAZARD ANALYSIS FORM

JHA No.: JHA - _____ - _____ - _____ - _____

Job Title: Mobilization/Demobilization, Site Preparation **Date of Analysis:** 5/1/07

Job Location: _____ **Team Leader:** _____

Applicable ES&H Procedures:

2.9.A - Hazardous Waste Operations and Emergency Response Program
2.9.B - Hearing Conservation Program
2.9.C - Respiratory Protection Program
2.9.D - Personal Protective Equipment Program
2.9.E - Hazard Communication Program
2.5.1 - Operation of Company Vehicles and Use of Personal Vehicles on Company Business
2.5.1 - Heavy Equipment
2.13.1 - Medical Surveillance

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Prepare for Site Visit	1A) N/A	1A) Prior to leaving for site ▪ Obtain and review HASP prior to site visit, if possible ▪ Determine PPE needs – bring required PPE to the site, if not otherwise being provided at the site (e.g., steel toed boots) ▪ Determine training and medical monitoring needs and ensure all required Health and Safety training and medical monitoring has been received and is current ▪ Ensure all workers are fit for duty (alert, well rested, and mentally and physically fit to perform work assignment) ▪ If respiratory protection is required/potentially required, ensure that training and fit-testing has occurred within the past year. ▪ Familiarize yourself with route to the site
	1B) Vehicle defects	1B) Inspect company owned/leased vehicle for defects such as: ▪ Flat tires ▪ Windshield wipers worn or torn ▪ Oil puddles under vehicle ▪ Headlights, brake lights, turn signals not working
	1C) Insufficient emergency equipment, unsecured loads	1C) Insufficient emergency equipment, unsecured loads ▪ Ensure vehicle has first aid kit and that all medications are current (if first aid kits are not provided at the site) ▪ Ensure vehicle is equpped with warning flashers and/or flares and that the warning flashers work ▪ Cell phones are recommended to call for help in the event of an emergency ▪ Vehicles carrying tools must have a safety cage in place. All tools must be properly secured ▪ Vehicles must be equipped with chocks if the vehicle is to be left running, unattended. ▪ Ensure sufficient gasoline is in the tank

Key Work Steps	Hazards/Potential Hazards	Safe Practices
2. Operating vehicles – general	2A) Collisions, unsafe driving conditions	2A) Drive Defensively! ▪ Seat belts must be used at all times when operating any vehicle on company business. ▪ Drive at safe speed for road conditions ▪ Maintain adequate following distance ▪ Pull over and stop if you have to look at a map ▪ Try to park so that you don't have to back up to leave. ▪ If backing in required, walk around vehicle to identify any hazards (especially low level hazards that may be difficult to see when in the vehicle) that might be present. Use a spotter if necessary
3. Driving to the jobsite	3A) Dusty, winding, narrow roads	3A) Dusty, winding, narrow roads ▪ Drive confidently and defensively at all times. ▪ Go slow around corners, occasionally clearing the windshield.
	3B) Rocky or one-lane roads	3B) Rocky or one-lane roads ▪ Stay clear of gullies and trenches, drive slowly over rocks. ▪ Yield right-of-way to oncoming vehicles---find a safe place to pull over.
	3C) Stormy weather, near confused tourists	3C) Stormy weather, near confused tourists ▪ Inquire about conditions before leaving the office. ▪ Be aware of oncoming storms. ▪ Drive to avoid accident situations created by the mistakes of others.
	3D) When angry or irritated	3D) When angry or irritated ▪ Attitude adjustment; change the subject or work out the problem before driving the vehicle. Let someone else drive.
	3E) Turning around on narrow roads	3E) Turning around on narrow roads ▪ Safely turn out with as much room as possible. ▪ Know what is ahead and behind the vehicle. ▪ Use a backer if available.
	3F) Sick or medicated	3F) Sick or medicated ▪ Let others on the crew know you do not feel well. ▪ Let someone else drive.
	3G) On wet or slimy roads	3G) On wet or slimy roads ▪ Drive slow and safe, wear seatbelts.
	3H) Animals on road	3H) Animals on road ▪ Drive slowly, watch for other animals nearby. ▪ Be alert for animals darting out of wooded areas
4. Gain permission to enter site	4A) Hostile landowner, livestock, pets	4A) Hostile landowner, livestock, pets ▪ Talk to land owner, be courteous and diplomatic ▪ Ensure all animals have been secured away from work area
5. Mobilization/ Demobilization of Equipment and Supplies	5A) Struck by Heavy Equipment/Vehicles	5A) Struck by heavy equipment ▪ Be aware of heavy equipment operations. ▪ Keep out of the swing radius of heavy equipment. ▪ Ground personnel in the vicinity of heavy equipment operations will be within the view of the operator at all times ▪ Employees shall wear a high visibility vest or T-shirt (reflective vest required if working at night). ▪ Ground personnel will be aware of the counterweight swing and maintain an adequate buffer zone. ▪ Ground personnel will not stand directly behind heavy equipment when it is in operation.

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	5B) Struck by Equipment/Supplies	5B) Struck by Equipment/Supplies ▪ Workers will maintain proper space around their work area, if someone enters it, stop work. ▪ When entering another worker's work space, give a verbal warning so they know you are there.
	5C) Overexertion Unloading/Loading Supplies	5C) Overexertion Unloading/Loading Supplies ▪ Train workers on proper body mechanics, do not bend or twist at the waist while exerting force or lifting. ▪ Tightly secure all loads to the truck bed to avoid load shifting while in transit.
	5D) Caught in/on/between	5D) Caught in/on/between ▪ Do not place yourself between two vehicles or between a vehicle and a fixed object.
	5E) Slip/Trip/Fall	5E) 1E). Slip/Trip/Fall ▪ Mark all holes and low spots in area with banner tape. Instruct personnel to avoid these areas. ▪ Drivers will maintain 3 point contact when mounting/dismounting vehicles/equipment. ▪ Drivers will check surface before stepping, not jumping down.
	5F) Vehicle Incident	5F) Vehicle accident ▪ Employees should follow MACTEC vehicle operation policy and be aware of all stationary and mobile vehicles.
6. Site Preparation	6A) Slip/Trip/Fall	6A) Slip/Trip/Fall ▪ Mark all holes and low spots in area with banner tape. Instruct personnel to avoid these areas
	6B) Overexertion	6B) Overexertion ▪ Workers will be trained in the proper method of lifting items. ▪ Do not bend and twist at the waist while lifting or exerting force.
	6C) Struck by Equipment/Supplies	6C) Struck by Equipment/Supplies ▪ Workers will maintain proper space around their work area, if someone enters it, stop work. ▪ When entering another worker's work space, give a verbal warning so they know you are there.
7. Driving back from the jobsite	8A) See hazards listed under item #3	8A) See safe work practices under item #3

Identify Hazards and PPE

Complete the checklists for hazard identification and PPE requirements. Information from the RA and applicable permits are included in this section.

Standard Hazards			
☐ Falling Objects	☒ Slips and trips	☐ Pinch points	☐ Rotating equipment
☐ Falls	☐ Power equipment/tools	☐ Elevated work surfaces	☐ _____

Eye Hazards			
☒ Particulates	☐ Liquid splashes	☐ Welding Arc	☐ _____

Hearing Hazards			
☐ None	☐ Impact noise	☐ High frequency noise	☒ High ambient noise

Respiratory Hazards						
☒ None	☐ Dust/particulates	☐ Organic Vapors	☐ Acid Gases	☐ Radon	☐ Asbestos	☐ Be, Hg, Cr, Pb
☐ Oxygen deficient	☐ Welding fumes	☐ Aerosols/Particulates	☐ _____			

Chemical Hazards			
☒ None	☐ Organic solvents	☐ Reactive metals	☐ PCBs
☐ Acids / bases	☐ Oxidizers	☐ Volatiles / Semi-volatiles	☐ _____

Environmental Hazards					
☐ None	☒ Temperature extremes: ☐ Cold ☐ Heat	☐ Wet location	☐ Explosive vapors	☐ Confined space	☐ Engulfment Hazard
☒ Bio hazards (poisonous plants, insects, snakes, bird/mouse droppings, fungus, etc.)				☐ _____	

Electrical Hazards					
☐ None	☐ Overhead utilities	☐ Underground utilities	☐ Hidden utilities	☐ Energized equip/circuits	☐ Wet location

Fire Hazards			
☒ None	☐ Cutting, welding, or grinding generated sparks or heat sources	☐ Flammable materials present	☐ Oxygen enriched location

Ergonomic Hazards					
☐ None	☒ Lifting	☒ Bending	☐ Twisting	☒ Pulling/tugging	☐ Repetitive motion
Computer Use in the:	☐ Office	☐ Field	☐ _____		

Radiological Hazards							
☒ None	☐ Loose contamination	☐ Fixed Contamination	☐ Airborne contamination	☐ Radiation	☐ Radon		
☐ Alpha	☐ Beta	☐ Gamma/X-rays	☐ Neutron	☐ EMF	☐ Criticality	☐ Tritium	☐ TRU
☐ Depleted Uranium	☐ Enriched Uranium	☐ _____	☐ _____				

Other Hazards
☐

Completed by: _____ Date: _____

PPE and Monitoring Requirements

Standard PPE					
☒ Hard Hat	☒ Safety shoes	☒ Safety glasses	☐ Boot Covers	☐ Rubber Boots	☒ High Visibility Vest
Eye and Face Protection					
☐ Welding glasses	☐ Welding helmet	☐ Face shield	☐ Chemical goggles	☐ Welding screens	
Hearing Protection					
☒ Ear plugs	☐ Ear Muffs	☐ Ear plugs and muffs	☐ Other _____		
Respiratory Protection					
☒ None	☐ Upgrade Only	☐ Full Face APR	☐ Half Face APR	Cart. Type _____	☐ PAPR
☐ Airline respirator	☐ SCBA	☐ Dust mask	☐ _____		
Protective Clothing					
☐ Tyvek® coveralls	☐ Poly-coated Tyvek® Coveralls	☐ Saranex® Coveralls	☐ Fully encapsulating suit		
☐ Cotton coveralls	☐ Modesty Clothing	☐ Fire resistant clothing	☐ Other _____		
Hand Protection					
☐ None	☐ Cotton gloves	☐ Leather gloves	☐ Cut-resistant gloves	☐ Glove liners	
<u>Outer Gloves</u>					
☐ Nitrile	☐ Viton®	☐ Butyl	☐ Neoprene	☐ Other _____	
<u>Inner Gloves</u>					
☐ Nitrile	☐ Vinyl	☐ Latex	☐ Other _____		
Monitoring Requirements					
☐ Oxygen	☐ Flammable gases/vapors	☐ Toxic Gas/vapors	☐ Hydrogen Sulfide	Carbon Monoxide	
☐ Asbestos	☐ Full time IH coverage	☐ Part time IH coverage	☐ Be, Hg, Cr, Pb		
☐ Metals Specify: _____					
☐ Organic Vapors Specify: _____					
☐ None	☐ TLD required	☐ CAM	☐ Radon		
☐ Full time RCT coverage	☐ Part time RCT coverage	☐ Radioactive air particulates	☐ Other _____		
☐ Other _____	☐ Other _____				

PPE and monitoring requirements completed by: _____ Date: _____

JOB HAZARD ANALYSIS FORM

JHA No.: JHA -_____ -_____ -____ -____

Job Title: Field Work – General **Date of Analysis:** 5/1/07

Job Location: _____ **Team Leader:** _____

Applicable ES&H Procedures:
- 2.9.A - Hazardous Waste Operations and Emergency Response Program
- 2.9.B - Hearing Conservation Program
- 2.9.C - Respiratory Protection Program
- 2.9.D - Personal Protective Equipment Program
- 2.9.E - Hazard Communication Program
- 2.5.1 - Operation of Company Vehicles and Use of Personal Vehicles on Company Business
- 2.5.1 - Heavy Equipment
- 2.9.7 - Overhead and Underground Utilities
- 2.9.8 - Permit-Required Confined Space
- 2.9.16 - Thermal Stress
- 2.9.19 - Electrical Safety
- 2.9.20 - Lockout / Tagout
- 2.9.21 - Power and Hand Tools
- 2.13.1 - Medical Surveillance

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Mobilization/ Demobilization and Site Preparation	1A) See Mobilization / Demobilization and Site Preparation JHA	1A) See Mobilization/Demobilization and Site Preparation JHA
2. Communication	2A) Safety, crew unity	2A) Talk to each other. ▪ Log all workers and visitor on and off the site. ▪ Let other crewmembers know when you see a hazard. ▪ Avoid working near known hazards. ▪ Always know the wherabouts of fellow crewmembers. ▪ Carry a radio and spare batteries or cell phone ▪ Review Emergency Evacuation Procedures (see below).
3. Walking and working in the field	3A) Falling down, twisted ankles and knees, poor footing	3A) Always watch your footing. ▪ Horseplay is strictly prohibited ▪ Slow down and use extra caution around logs, rocks, and animal holes. ▪ Extremely steep slopes (>50%) can be hazardous under wet or dry conditions; consider an alternate route. ▪ Wear laced boots with a minimum 8" high upper and non-skid Vibram-type soles for ankle support and traction.
	3B) Falling objects	3B) Protect head agains falling objects. ▪ Wear your hardhat for protection from falling limbs and pinecones, and from tools and equipment carried by other crewmembers. ▪ Stay out of the woods during extremely high winds.

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	3C) Chemical/Toxicological Hazards	3C) Chemical/Toxicological Hazards ▪ See HASP for appropriate level of PPE ▪ Use monitoring equipment, as outlined in HASP, to monitor breathing zone ▪ Read MSDSs for all chemicals brought to the site ▪ Be familiar with hazards associated with site contaminants. ▪ Ensure that all containers are properly labelled ▪ Decon thoroughly prior to consumption of food, beverage or tobacco.
	3D) Damage to eyes	3D) Protect eyes: ▪ Watch where you walk, ecpecially around trees and brush with limbs sticking out. ▪ Exercise caution when clearing limbs from tree trunks. Advise wearing eye protection. ▪ Ultraviolet light from the sun can be damaging to the eyes; look for sunglasses that specify significant protection from UV-A and UV-B radiation. If safety glasses require, use one's with tinted lenses
	3E) Bee and wasp stings	3E) See JHA for Insect Stings and Bites
	3F) Ticks and infected mosquitos	3F) See JHA for Insect Stings and Bites
	3G) Wild Animals	3G) Wild Animals ▪ Avoid phyisical contact with wild animals ▪ Do not threaten and/or conrner animals ▪ Make noise to get the animal to retreat. ▪ Stay in or return to vehicle/equipment if in danger
	3H) Contact with poisonous plants or the oil from those plants:	3H) Contact with poisonous plants or the oil from those plants: ▪ Look for signs of poisonous plants and avoid. ▪ Ensure all field workers can identify the plants. Mark identified poisonous plants with spray paint if working at a fixed location. ▪ Do not allow plant to touch any part of your body/clothing. ▪ Wear PPE as described in the HASP and wear Tyveks, gloves and boot covers if contact with plant is likely ▪ Always wash gloves before removing them. ▪ Discard PPE in accordance with the HASP. ▪ Use commercially available products such as Ivy Block or Ivy Wash as appropriate. ▪ See the JHA for Poisonous Plants
		 POISON IVY (Rhus toxicondendron L.) POISON OAK (Rhus diversiloba) POISON SUMAC (Rhus toxicondendron vernix

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	3I) Back Injuries	3I) Back Injuries ▪ Site personnel will be instructed on proper lifting techniques. ▪ Mechanical devices should be used to reduce manual handling of materials. ▪ Split heavy loads in to smaller loads ▪ Team lifting should be utilized if mechanical devices are not available. ▪ Make sure that path is clear prior to lift.
	3J) Shoveling	3J) Shoveling ▪ Select the proper shovel for the task. A long handled, flat bladed shovel is recommend for loose material ▪ Inspect the handle for splinters and/or cracks ▪ Ensure that the blade is securely attached to the handle ▪ Never be more than 15 inches from the material you are shoveling ▪ Stand with your feet about hip width for balance and keep the shovel close to your body. ▪ Bend from the knees (not the back) and tighten your stomach muscles as you lift. ▪ Avoid twisting movements. If you need to move the snow to one side reposition your feet to face the direction the snow will be going. ▪ Avoid lifting large shoveling too much at once. When lifting heavy material, pick up less to reduce the weight lifted. ▪ Pace yourself to avoid getting out of breath and becoming fatigued too soon. ▪ Be alert for signs of stress such as pain, numbness, burning and tingling. Stop immediately if you feel any of these symptoms.
	3K) Slips/Trips/Falls	3K) Slips/Trips/Falls ▪ Maintain work areas safe and orderly; unloading areas should be on even terrain; mark or repair possible tripping hazards. ▪ Site SHSO inspect the entire work area to identify and mark hazards. ▪ Maintain three points of contact when climbing ladders or onto/off of equipment
	3L) Overhead Hazards	3L) Overhead Hazards ▪ Personnel will be required to wear hard hats that meet ANSI Standard Z89.1. ▪ All ground personnel will stay clear of suspended loads. ▪ All equipment will be provided with guards, canopies or grills to protect the operator from falling or flying objects. ▪ All overhead hazards will be identified prior to commencing work operations.
	3M) Dropped Objects	3M) Dropped Objects ▪ Steel toe boots meeting ANSI Standard Z41 will be worn.
	3N) Noise	3N) Noise ▪ Hearing protection will be worn with a noise reduction rating capable of maintaining personal exposure below 85 dBA (ear muffs or plugs); all equipment will be equipped with manufacturer's required mufflers. Hearing protection shall be worn by all personnel working in or near heavy equipment.
	3O) Eye Injuries	3O) Eye Injuries ▪ Safety glasses meeting ANSI Standard Z87 will be worn.

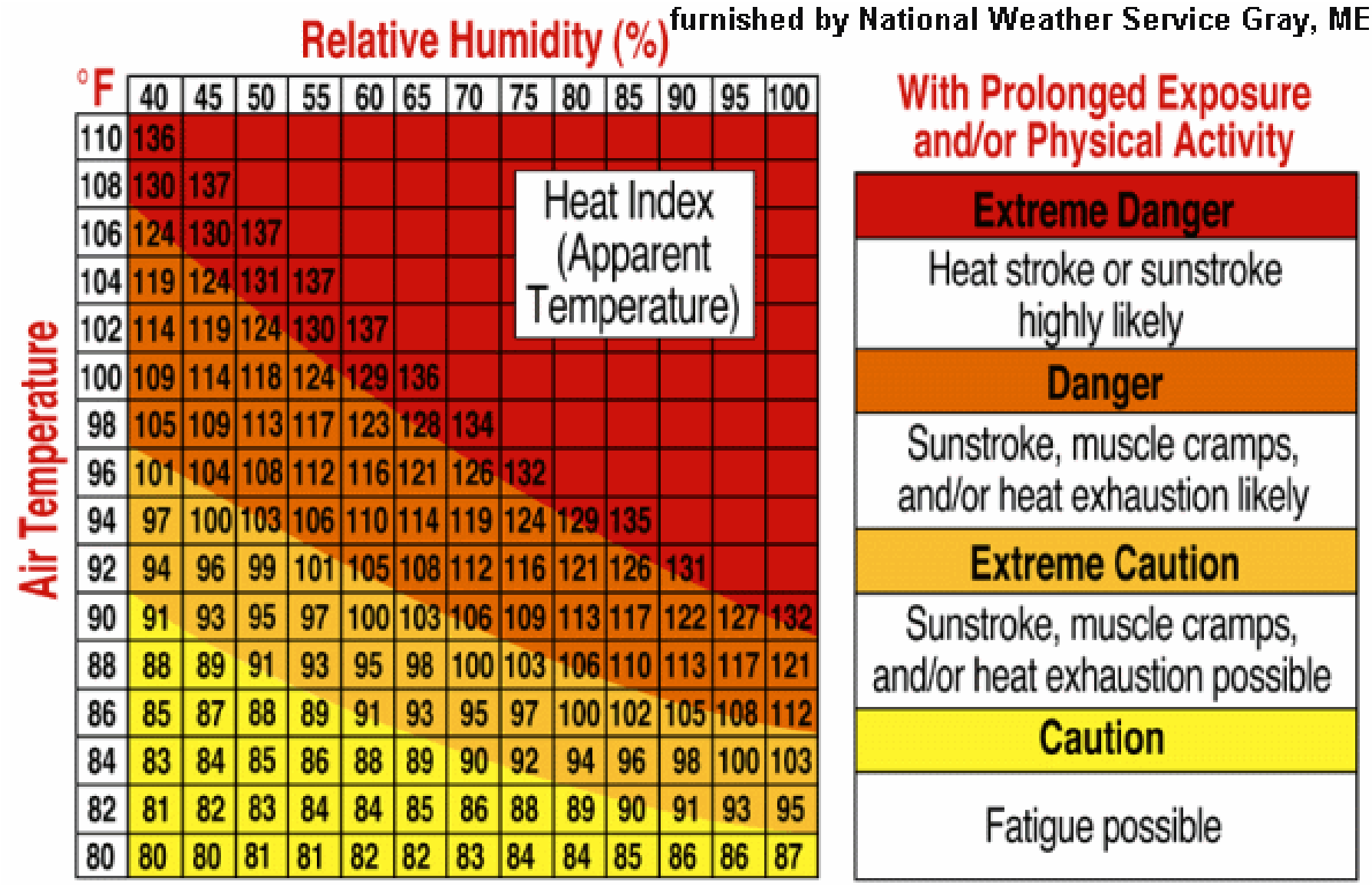
Key Work Steps	Hazards/Potential Hazards	Safe Practices
	3P) Heavy Equipment (overhead hazards, spills, struck by or against)	3P) Heavy Equipment ▪ All operators will be trained and qualified to operate equipment ▪ Equipment will have seat belts. ▪ Operators will wear seat belts when operating equipment. ▪ Do not operate equipment on grades that exceed manufacturer's recommendations. ▪ Equipment will have guards, canopies or grills to protect from flying objects. ▪ Ground personnel will stay clear of all suspended loads. ▪ Personel are prohibited from riding on the buckets, or elsewhere on the equipment except for designated seats with proper seat belts or lifts specifically designed to carry workers. ▪ Ground personnel will wear high visibility vests ▪ Spill and absorbent materials will be readily available. ▪ Drip pans, polyethylene sheeting or other means will be used for secondary containment. ▪ Ground personnel will stay out of the swing radius of excavators. ▪ Eye contact with operators will be made before approaching equipment. ▪ Operator will acknowledge eye contact by removing his hands from the controls. ▪ Equipment will not be approached on blind sides. ▪ All equipment will be equipped with backup alarms and use spotters when significant physical movement of equipment occurs on-site, (i.e., other than in place excavation or truck loading). ▪ Inspect rigging prior to each use.
	3Q) Struck by vehicle/equipment	3Q) Struck by vehicle/equipment ▪ Be aware of heavy equipment operations. ▪ Keep out of the swing radius of heavy equipment. ▪ Ground personnel in the vicinity of vehicles or heavy equipment operations will be within the view of the operator at all times. ▪ Ground personnel will be aware of the counterweight swing and maintain an adequate buffer zone. ▪ Ground personnel will not stand directly behind heavy equipment when it is in operation. ▪ Drivers will keep workers on foot in their vision at all times, if you lose sight of someone, Stop! ▪ Spotters will be used when backing up trucks and heavy equipment and when moving equipment. ▪ High visibility vests will be worn when workers are exposed to vehicular traffic at the site or on public roads.
	3R) Struck/cut by tools	3R) Struck/cut by tools ▪ Cut resistant work gloves will be worn when dealing with sharp objects. ▪ All hand and power tools will be maintained in safe condition. ▪ Do not drop or throw tools. Tools shall be placed on the ground or worksurface or handed to another employee in a safe manner. ▪ Guards will be kept in place while using hand and power tools.
	3S) Caught in/on/between	3S) Caught in/on/between ▪ Workers will not position themselves between equipment and a stationary object. ▪ Workers will not wear long hair down (place in pony-tail and tuck into shirt) or jewelry if working with tools/machinery.

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	3T) Contact with Electricity/Lightning	3T) Contact with Electricity/Lighting ▪ All electrical tools and equipment will be equipped with GFCI. ▪ Electrical extension cords will be of the "Hard" or "Extra Hard" service type. ▪ All extension cords shall have a three-blade grounding plug. ▪ Personnel shall not use extension cords with damaged outer covers, exposed inner wires, or splices. ▪ Electrical cords shall not be laid across roads where vehicular traffic may damage the cord without appropriate guarding. ▪ All electrical work will be conducted by a licensed electrician. ▪ All equipment will be locked out and tagged out and rendered in a zero energy state prior to commencing any operation that may exposed workers to electrical, mechanical, hydraulic, etc. hazards. ▪ All utilities will be marked prior to excavation activities. ▪ All equipment will stay a minimum of 10 feet from overhead energized electrical lines (50 kV). This distance will increase by 4 inches for each 10 kV above 50 kV. Rule of Thumb: Stay 10 feet away from all overhead powerlines known to be 50 kV or less and 35 feet from all others.) ▪ The SHSO shall halt outdoor site operations whenever lightning is visible, outdoor work will not resume until 30 minutes after the last sighting of lightning.
	3U) Equipment failure	3U) Equipment failure ▪ All equipment will be inspected before use. If any safety problems are noted, the equipment should be tagged and removed from service until repaired or replaced.
	3V) Hand & power tool usage.	3V) Hand & power tool usage ▪ Daily inspections will be performed. ▪ Ensure guards are in place and are in good condition. ▪ Remove broken or damaged tools from service. ▪ Use the tool for its intended purpose. ▪ Use in accordance with manufacturers instructions. ▪ No tampering with electrical equipment is allowed (e.g., splicing cords, cutting the grounding prong off plug, etc.) ▪ See JHA for Power Tool Use - Electrical and Power Tool Use - Gasoline
	3W) Fire Protection	3W) Fire Protection ▪ Ensure that adequate number and type of fire extinguishers are present at the site ▪ Inspect fire extinguishers on a monthly basis – document ▪ All employees who are expected to use fire exinguishers will have received training on an annual basis. ▪ Obey no-smoking policy ▪ Open fires are prohibited ▪ Maintain good housekeeping. Keep rubbish and combustibles to a minimum. ▪ Keep flammable liquids in small containers with lids closed or a safety can. ▪ When dispensing flammable liquids, do in well vented area and bond and ground containers.
	3X) Confined Space Entry	3X) Confined Space Entry ▪ See JHA for Confined Space Entry

Key Work Steps	Hazards/Potential Hazards	Safe Practices
4. Environmental health considerations	4A) Heat Stress	4A) Take precautions to prevent heat stress ▪ Remain constantly aware of the four basic factors that determine the degree of heat stress (air temperature, humidity, air movement, and heat radiation) relative to the surrounding work environmental heat load. ▪ Know the signs and symptoms of heat exhaustion, heat cramps, and heat stroke. Heat stroke is a true medical emergency requiring immediate emergency response action. **NOTE: The severity of the effects of a given environmental heat stress is decreased by reducing the work load, increasing the frequency and/or duration of rest periods, and by introducing measures which will protect employees from hot environments.** ▪ Maintain adequate water intake by drinking water periodically in small amounts throughout the day (flavoring water with citrus flavors or extracts enhances palatability). ▪ Allow approximately 2 weeks with progressive degrees of heat exposure and physical exertion for substantial acclimatization. ▪ Acclimatization is necessary regardless of an employee's physical condition (the better one's physical condition, the quicker the acclimatization). Tailor the work schedule to fit the climate, the physical condition of employees, and mission requirements. ▪ A reduction of work load markedly decreases total heat stress. ▪ Lessen work load and/or duration of physical exertion the first days of heat exposure to allow gradual acclimatization. ▪ Alternate work and rest periods. More severe conditions may require longer rest periods and electrolyte fluid replacement.
	4B) Wet Bulb Globe Temperature (WBGT) Index	4B) WBGT ▪ Curtail or suspend physical work when conditions are extremely severe (see attached Heat Stress Index). ▪ Compute a Wet Bulb Globe Temperature Index to determine the level of physical activity (take WBGT index measurements in a location that is similar or closely approximates the environment to which employees will be exposed).
		WBGT THRESHOLD VALUES FOR INSTITUTING PREVENTIVE MEASURES
		80-90 degrees F — Fatigue possible with prolonged exposure and physical activity. 90-105 degrees F — Heat exhaustion and heat stroke possible with prolonged exposure and physical activity. 105-130 degrees F — Heat exhaustion and heat stroke are likely with prolonged heat exposure and physical activity.
	4C) Cold Extremes	4C) Take precautions to prevent cold stress injuries ▪ Cover all exposed skin and be aware of frostbite. While cold air will not freeze the tissues of the lungs, slow down and use a mask or scarf to minimize the effect of cold air on air passages. ▪ Dress in layers with wicking garments (those that carry moisture away from the body – e.g., cotton) and a weatherproof slicker. A wool outer garment is recommended. ▪ Take layers off as you heat up; put them on as you cool down. ▪ Wear head protection that provides adequate insulation and protects the ears. ▪ Maintain your energy level. Avoid exhaustion and over-exertion which causes sweating, dampens clothing, and accelerates loss of body heat and increases the potential for hypothermia. ▪ Acclimate to the cold climate to minimize discomfort. ▪ Maintain adequate water/fluid intake to avoid dehydration.

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	4D) Wind	4D) Effects of the wind ▪ Wind chill greatly affects heat loss (see attached Wind Chill Index). ▪ Avoid marking in old, defective timber, especially hardwoods, during periods of high winds due to snag hazards.
	4E) Thunderstorms	4E) Thunderstorms ▪ Monitor weather channels to determine if electrical storms are forcased. ▪ Plan ahead and identify safe locations to be in the event of a storm. (e.g., sturdy building, vehicle, etc.) ▪ Suspend all field work at the first sound of thurnder. You should be in a safe place when the time between the lightning and thunder is less than 30 seconds. ▪ Only return to work 30 minutes after the after the last strike or sound of thunder

furnished by National Weather Service Gray, ME



Wind Chill Chart

Wind (mph) \ Temperature (°F)	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45	26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55	25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60	25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Frostbite Times — 30 minutes — 10 minutes — 5 minutes

$$\text{Wind Chill (°F)} = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$$

Where, T= Air Temperature (°F) V= Wind Speed (mph)

Effective 11/01/01

Identify Hazards and PPE

Complete the checklists for hazard identification and PPE requirements. Information from the RA and applicable permits are included in this section.

Standard Hazards			
☒ Falling Objects	☒ Slips and trips	☐ Pinch points	☐ Rotating equipment
☐ Falls	☒ Power equipment/tools	☐ Elevated work surfaces	☐ _____

Eye Hazards			
☒ Particulates	☐ Liquid splashes	☐ Welding Arc	☐ _____

Hearing Hazards			
☐ None	☐ Impact noise	☐ High frequency noise	☒ High ambient noise

Respiratory Hazards						
☐ None	☒ Dust/particulates	☒ Organic Vapors	☐ Acid Gases	☐ Radon	☐ Asbestos	☐ Be, Hg, Cr, Pb
☐ Oxygen deficient	☐ Welding fumes	☐ Aerosols/Particulates	☐ _____			

Chemical Hazards			
☐ None	☒ Organic solvents	☐ Reactive metals	☐ PCBs
☐ Acids / bases	☐ Oxidizers	☒ Volatiles / Semi-volatiles	☐ _____

Environmental Hazards					
☐ None	☒ Temperature extremes: ☐ Cold ☐ Heat	☒ Wet location	☐ Explosive vapors	☐ Confined space	☐ Engulfment Hazard
☒ Bio hazards (poisonous plants, insects, animals, fungus, etc.)		☐ _____			

Electrical Hazards					
☐ None	☒ Overhead utilities	☒ Underground utilities	☐ Hidden utilities	☐ Energized equip/circuits	☐ Wet location

Fire Hazards			
☐ None	☐ Cutting, welding, or grinding generated sparks or heat sources	☒ Flammable materials present	☐ Oxygen enriched location

Ergonomic Hazards					
☐ None	☒ Lifting	☒ Bending	☒ Twisting	☒ Pulling/tugging	☐ Repetitive motion
Computer Use in the:	☐ Office	☐ Field	☐ _____		

Radiological Hazards							
☒ None	☐ Loose contamination	☐ Fixed Contamination	☐ Airborne contamination	☐ Radiation	☐ Radon		
☐ Alpha	☐ Beta	☐ Gamma/X-rays	☐ Neutron	☐ EMF	☐ Criticality	☐ Tritium	☐ TRU
☐ Depleted Uranium	☐ Enriched Uranium	☐ _____	☐ _____				

Other Hazards
☐

Completed by: _____ Date: _____

PPE and Monitoring Requirements

Standard PPE					
☒ Hard Hat	☒ Safety shoes	☒ Safety glasses	☐ Boot Covers	☐ Rubber Boots	☒ High Visibility Vest
Eye and Face Protection					
☐ Welding glasses	☐ Welding helmet	☐ Face shield	☐ Chemical goggles	☐ Welding screens	
Hearing Protection					
☒ Ear plugs	☐ Ear Muffs	☐ Ear plugs and muffs	☐ Other _____		
Respiratory Protection					
☐ None	☒ Upgrade Only	☒ Full Face APR	☐ Half Face APR	Cart. Type: MSA GMC or Equivalent	☐ PAPR
☐ Airline respirator	☐ SCBA	☐ Dust mask	☐ _____		
Protective Clothing					
☐ Tyvek® coveralls	☐ Poly-coated Tyvek® Coveralls	☐ Saranex® Coveralls	☐ Fully encapsulating suit		
☐ Cotton coveralls	☐ Modesty Clothing	☐ Fire resistant clothing	☐ Other _____		
Hand Protection					
☐ None	☐ Cotton gloves	☐ Leather gloves	☐ Cut-resistant gloves	☐ Glove liners	
Outer Gloves					
☒ Nitrile	☐ Viton®	☐ Butyl	☐ Neoprene	☐ Other _____	
Inner Gloves					
☐ Nitrile	☒ Vinyl	☐ Latex	☐ Other _____		
Monitoring Requirements					
☐ Oxygen	☒ Flammable gases/vapors	☒ Toxic Gas/vapors	☐ Hydrogen Sulfide	Carbon Monoxide	
☐ Asbestos	☐ Full time IH coverage	☐ Part time IH coverage	☐ Be, Hg, Cr, Pb		
☐ Metals Specify: _____					
☐ Organic Vapors Specify: Vinyl Chloride, Benzene, Toluene, Xylene, Ethylbenzene, TCE, PCE					
☒ None	☐ TLD required	☐ CAM	☐ Radon		
☐ Full time RCT coverage	☐ Part time RCT coverage	☐ Radioactive air particulates	☐ Other _____		
☐ Other _____		☐ Other _____			

PPE and monitoring requirements completed by: _____ Date: _____

JOB HAZARD ANALYSIS FORM

JHA No.: JHA -_____-_____-____-____

Job Title: Decontamination **Date of Analysis:** 5/1/07

Job Location: _____ **Team Leader:** _____

Applicable ES&H Procedures:
2.9.A - Hazardous Waste Operations and Emergency Response Program
2.9.C - Respiratory Protection Program
2.9.D - Personal Protective Equipment Program
2.9.E - Hazard Communication Program
2.5.1 - Heavy Equipment
2.9.16 - Thermal Stress
2.9.21 - Power and Hand Tools

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Establish Decontamination Station	1A) Materials Handling	1A) Materials Handling ▪ Use proper lifting techniques ▪ Use mechanical aids, if available, to move heavy items.
2. Decontamination / Steam cleaning.	2A) Struck by steam/hot water/pressure washing	2A) Struck by steam/hot water ▪ Workers not directly engaged in steam cleaning operations must stay clear. ▪ Workers using steam cleaning equipment must be trained on operation and safety devices/procedures using the owners/operators manual. ▪ Use face shield **and** safety glasses or goggles, if steam cleaning. ▪ Stay out of the splash/steam radius. ▪ Pressure washer must have dead man switch. ▪ Do not direct steam at anyone. ▪ Do not hold objects with your feet or hands. ▪ Ensure that direction of spray minimizes spread of contaminants of concern. ▪ Use shielding as necessary.
	2B) Exposure to contaminants	2B) Exposure to contaminants ▪ Conduct air monitoring (see HASP). ▪ Wear proper PPE. ▪ See MSDSs for hazards associated with the decon solutions used (if other than water alone us used).
	2C) Slips/Trips/Falls	2C) Slips/Trips/Falls ▪ Be cautious as ground/plastic can become slippery ▪ Use boots or boot covers with good traction
3. Vehicle Decontamination	3A) Vehicle traffic in and out of the CRZ	3A) Large Vehicle Traffic ▪ Always wear a hard hat, steel toe boots, and a high visibility vest (unless Tyveks are used and are high visibility). ▪ Vehicle drivers are not to exit the vehicle in the CRZ. ▪ Identify an individual to communicate with vehicle drivers and maintain order ▪ Trucks will be lined with plastic and kept out of direct contact with any contaminated materials during loading. Wear PPE when removing plastic lining from truck beds.

Key Work Steps	Hazards/Potential Hazards	Safe Practices
		▪ If not in the vehicle, obtain eye contact with the driver, so he is aware of your presence and location in the CRZ. ▪ If you are driving the vehicle, be aware of personnel in the CRZ and maintain communication with the identified personnel.
	3B) Exposure to contaminants	3B) Exposure to contaminants ▪ Use safety glasses or goggles, Polycoated Tyvek (if level of contamination poses dermal hazard or to keep work clothes dry), high visibility vest (if high visibility Tyveks are not used) hard hats, steel toe boots, and gloves while cleaning contaminated materials. ▪ Do not doff PPE until decontamination of the vehicle is complete and a decontamination certificate has been issued by the HSO. ▪ Conduct air monitoring (see HASP). ▪ See MSDSs for hazards associated with the decon solutions (if other than water alone is used).
	3C) Slips/Trips/Falls	3C) Slips/Trips/Falls ▪ Be cautious as ground/plastic can become slippery ▪ Use boots or boot covers with good traction
4. Equipment and Sample Decontamination	4A) Chemical exposure when handling contaminated sample jars and equipment	4A) Chemical exposure ▪ Wear PPE. ▪ Refer to MSDS for specific hazards associated with decon solutions ▪ Monitor breathing zone for contaminants ▪ Monitor breathing zone for decon solutions (e.g., methanol, hexane, etc.) if appropriate (see HASP)
	4B) Materials Handling related injuries	4B) Materials Handling related injuries ▪ Use proper lifting techniques when lifting heavy equipment ▪ Use two person lift for heavy coolers

5. Personal Decontamination	5A) Exposure to contaminants	5A) Exposure to contaminants
		▪ Avoid bringing contaminated materials via shoes and clothing into the CRZ by examining such prior to exiting the EZ.
		▪ Removal of PPE will be performed by the following tasks in the listed order:
		  ▪ Gross boot wash and rinse and removal
		  ▪ Outer glove removal
		  ▪ Suit removal
		  ▪ Respirator removal (if worn).
		  ▪ Inner glove removal
		▪ Contaminated PPE is to be placed in the appropriate, provided receptacles.
		▪ Respirators will be removed and decontaminated at a specified location within the CRZ by a designated technician, then placed in storage bag.
		▪ Employees will wash hands, face, and any other exposed areas with soap and water.
		▪ Portable eyewash stations and showers will be available should employees come into direct contact with contaminated materials.
		▪ See MSDSs for hazards associated with the decontamination solutions used.
		▪ Decon solutions will be disposed of according to the work plan.

Identify Hazards and PPE

Complete the checklists for hazard identification and PPE requirements. Information from the RA and applicable permits are included in this section.

Standard Hazards			
☐ Falling Objects	☒ Slips and trips	☐ Pinch points	☐ Rotating equipment
☐ Falls	☐ Power equipment/tools	☐ Elevated work surfaces	☐ _____

Eye Hazards			
☐ Particulates	☒ Liquid splashes	☐ Welding Arc	☐ _____

Hearing Hazards			
☐ None	☐ Impact noise	☐ High frequency noise	☐ High ambient noise

Respiratory Hazards						
☐ None	☐ Dust/particulates	☐ Organic Vapors	☐ Acid Gases	☐ Radon	☐ Asbestos	☐ Be, Hg, Cr, Pb
☐ Oxygen deficient	☐ Welding fumes	☐ Aerosols/Particulates	☐ _____			

Chemical Hazards			
☐ None	☒ Organic solvents	☐ Reactive metals	☐ PCBs
☐ Acids / bases	☐ Oxidizers	☐ Volatiles / Semi-volatiles	☐ _____

Environmental Hazards					
☐ None	☒ Temperature extremes: ☐ Cold ☐ Heat	☒ Wet location	☐ Explosive vapors	☐ Confined space	☐ Engulfment Hazard
☐ Bio hazards (poisonous plants, insects, animals, fungus, etc.)	☐ _____				

Electrical Hazards					
☒ None	☐ Overhead utilities	☐ Underground utilities	☐ Hidden utilities	☐ Energized equip/circuits	☐ Wet location

Fire Hazards			
☒ None	☐ Cutting, welding, or grinding generated sparks or heat sources	☐ Flammable materials present	☐ Oxygen enriched location

Ergonomic Hazards					
☐ None	☒ Lifting	☒ Bending	☐ Twisting	☒ Pulling/tugging	☐ Repetitive motion
Computer Use in the:	☐ Office	☐ Field	☐ _____		

Radiological Hazards							
☒ None	☐ Loose contamination	☐ Fixed Contamination	☐ Airborne contamination	☐ Radiation	☐ Radon		
☐ Alpha	☐ Beta	☐ Gamma/X-rays	☐ Neutron	☐ EMF	☐ Criticality	☐ Tritium	☐ TRU
☐ Depleted Uranium	☐ Enriched Uranium	☐ _____	☐ _____				

Other Hazards
☐

Completed by: _____ Date: _____

PPE and Monitoring Requirements

Standard PPE					
☒ Hard Hat	☒ Safety shoes	☒ Safety glasses	☐ Boot Covers	☐ Rubber Boots	☒ High Visibility Vest
Eye and Face Protection					
☐ Welding glasses	☐ Welding helmet	☐ Face shield	☐ Chemical goggles	☐ Welding screens	
Hearing Protection					
☐ Ear plugs	☐ Ear Muffs	☐ Ear plugs and muffs	☐ Other _____		
Respiratory Protection					
☐ None	☒ Upgrade Only	☒ Full Face APR	☐ Half Face APR	Cart. Type: MSA GMC or Equivalent	☐ PAPR
☐ Airline respirator	☐ SCBA	☐ Dust mask	☐ _____		
Protective Clothing					
☐ Tyvek® coveralls	☒ Poly-coated Tyvek® Coveralls	☐ Saranex® Coveralls	☐ Fully encapsulating suit		
☐ Cotton coveralls	☐ Modesty Clothing	☐ Fire resistant clothing	☐ Other _____		
Hand Protection					
☐ None	☐ Cotton gloves	☐ Leather gloves	☐ Cut-resistant gloves	☐ Glove liners	
Outer Gloves					
☒ Nitrile	☐ Viton®	☐ Butyl	☐ Neoprene	☐ Other _____	
Inner Gloves					
☐ Nitrile	☒ Vinyl	☐ Latex	☐ Other _____		
Monitoring Requirements					
☐ Oxygen	☐ Flammable gases/vapors	☒ Toxic Gas/vapors	☐ Hydrogen Sulfide	Carbon Monoxide	
☐ Asbestos	☐ Full time IH coverage	☐ Part time IH coverage	☐ Be, Hg, Cr, Pb		
☐ Metals Specify: _____					
☒ Organic Vapors Specify: Vinyl chloride, benzene, toluene, xylene, Ethylbenzene, TCE PCE					
☒ None	☐ TLD required	☐ CAM	☐ Radon		
☐ Full time RCT coverage	☐ Part time RCT coverage	☐Radioactive air particulates	☐ Other _____		
☐ Other _____		☐ Other _____			

PPE and monitoring requirements completed by: _____ Date: _____

APPENDIX C

DECONTAMINATION PROCEDURES & EQUIPMENT PER TASK(S)

APPENDIX C1

DECONTAMINATION PROCEDURES & EQUIPMENT

Task(s) _____
Decontamination Solution: Detergent and Water

LEVEL D		
Station 1:	Equipment Drop	Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, etc. on plastic drop cloths. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, a cool-down station may be set up within this area.
Station 2:	Outer Boots, and Gloves Wash and Rinse (if worn)	Scrub outer boots, and outer gloves decon solution or detergent water. Rinse off using copious amounts of water.
Station 3:	Outer Boot and Glove Removal (if worn)	Remove outer boots and gloves. Deposit in plastic bag.
Station 4:	Inner glove removal	Remove inner gloves and place in plastic bag.
Station 5:	Field Wash	Hands and face are thoroughly washed. Shower as soon as possible.

APPENDIX C2

DECONTAMINATION PROCEDURES & EQUIPMENT

Task(s) _____
Decontamination Solution: Detergent and Water

MODIFIED LEVEL D & LEVEL C		
Station 1:	Equipment Drop	Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, etc. on plastic drop cloths. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, a cool-down station may be set up within this area.
Station 2:	Outer Garment, Boots, and Gloves Wash and Rinse	Scrub outer boots, outer gloves, and splash suit with decon solution or detergent water. Rinse off using copious amounts of water.
Station 3:	Outer Boot and Glove Removal	Remove outer boots and gloves. Deposit in container with plastic liner.
Station 4: (Level C only)	Canister or Mask Change	If worker leaves exclusion zone to change canister (or mask), this is the last step in the decontamination procedure. Worker's canister is exchanged, new outer gloves and boot covers are donned, joints are taped, and worker returns to duty.
Station 5:	Boot, Gloves and Outer Garment Removal	Boots, chemical resistant splash suit, and inner gloves are removed and deposited in separate containers lined with plastic.
Station 6: (Level C only)	Face Piece Removal	Facepiece is removed. Avoid touching face with fingers. Facepiece is deposited on plastic sheet.
Station 7:	Field Wash	Hands and face are thoroughly washed. Shower as soon as possible.

APPENDIX C3

DECONTAMINATION PROCEDURES AND EQUIPMENT

Task(s) _____
Decontamination Solution: Detergent and Water

LEVEL B		
Station 1:	Equipment Drop	Deposit equipment used on site (tools, sampling devices and containers, monitoring instruments, radios, etc.) on plastic drop cloths. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, a cool-down station may be set up within this area.
Station 2:	Outer Garment, Boots, and Gloves Wash and Rinse	Scrub outer boots, outer gloves, and splash suit with decon solution or detergent water. Rinse off using copious amounts of water.
Station 3:	Outer Boot and Glove Removal	Remove outer boots and gloves. Deposit in container with plastic liner.
Station 4:	Tank Change	If worker leaves exclusion zone to change air tank, this is the last step in the decontamination procedure. Worker's air tank is exchanged, new outer gloves and boot covers are donned, joints are taped, and worker returns to duty.
Station 5:	SCBA Backpack, Boot, Gloves and Outer Garment Removal	SCBA backpack is removed and placed on plastic sheets. Boots, chemical resistant splash suit, and inner gloves are removed and deposited in separate containers lined with plastic.
Station 6:	Face Piece Removal	SCBA facepiece is removed. Avoid touching face with fingers. Facepiece is deposited on plastic sheet.
Station 7:	Field Wash	Hands and face are thoroughly washed. Shower as soon as possible.

APPENDIX D

INCIDENT ANALYSIS FORMS

Check one
Initial Report: ☐
Update: ☐
Final Report: ☐

Category C: ☐
Category B: ☐
Category A: ☐

INCIDENT ANALYSIS REPORT

Attorney-Client Work Product Prepared in Anticipation of Litigation

Local Office ID Number: _ Division ES&H Manager Tracking Number: _____

Report Date: _____

Section 1 – General Information

Incident Date: _____

Employee Name: _____ Sex: ☐ M ☐ F Time of incident: _____

Job Title: _____ Hire Date: _____ Time employee began work: _____

Department: _____ Project Manager: _____ Client: _____

Office where employee works from: _____ Immediate Supervisor: _____ Hours employee worked during last 7 days: ____ hr

Location where incident occurred: _____ Is this a Company controlled work site: ☐ Yes ☐ No

Section 2 – Incident Type (mark all that apply)

A. Type of incident being reported:

☐ Near Miss ☐ First-aid Case ☐ Medical Treatment ☐ Hospitalization Required ☐ Fatality

☐ Day Away Case ☐ Restricted/Transfer Case ☐ Environmental Release ☐ Regulatory Inspection ☐ Notice of Violation

☐ Vehicle Incident ☐ Other (please describe): _____

B. If an **injury or illness** - describe the part of the body that was affected and how it was affected:

C. If an **environmental release** - describe the quantity and name and CAS# of material released into the environment:

D. If an **inspection by a regulatory agency** - what agency, who were the inspectors, and supply inspector contact information:

Section 3 – Incident Description (Attach and number additional pages, as needed, to ensure all details related to the incident are captured.)

A. List the names of all persons involved in the incident, and employer information:

B. List the names of any witnesses, their employer, and a local/company telephone number or address:

C. What was the employee(s) doing just prior to the incident?

D. What happened?

E. What object or substance directly harmed the employee?

F. List any damaged equipment or property (other than motor vehicles) model and serial number **and** estimated costs to repair/replace damaged equipment or property, if applicable:

Section 4 - Incident Analysis

A. Was a Job Hazard Analysis (JHA) completed for the work being performed? YES ☐ NO ☐ Who prepared the JHA?

B. When and who was the last safety officer (i.e. LHSR, supervisor, Division ES&H Manager, etc.) at your work site?

C. When and what safety training **directly related** to the incident has the person(s) involved had?

Section 5 - Incident Investigation Results

#	**Causal Factors** (Attach and number any additional pages as needed to completely address this section)
1	
2	
3	
4	
5	

(The below items represent major root cause categories which have been determined to be Less Than Adequate (LTA). A more detailed determination of the root cause will be facilitated, if needed, by your Division's ES&H Manager.)

1. Equipment Reliability Program Implementation
2. Administrative / Management Systems
3. Immediate Supervision
4. Training
5. Human Factors Engineering
6. Communications
7. Personal Performance

Root Cause#	**Corrective Actions to be taken** (Attach additional pages as needed to completely address this section)	**Responsible Person**	**Proposed Completion Date**	**Closed on Date**	**Verified by and Date Verified**

Section 6 – Approvals

Incident investigated by (signatures):			
Employee(s):	Date:	Employee's Supervisor:	Date:
LHSR/Project/Office Manager:	Date:	Division ES&H Manager:	Date:

VEHICLE INCIDENT REPORT

Revision 1

Attorney-Client Work Product Prepared in Anticipation of Litigation

(Review instructions on page 12 prior to completing this form)

Section 1 - General Information

Time incident occurred: _____ ☐ AM ☐ PM | ☐ Dark ☐ Light | Road Condition: ☐ Dry ☐ Wet | Date of incident: _____

Were police summoned to scene? ☐ Yes ☐ No Police Department and Location: _____

Report #: _____ Officer's Name and Badge Number: _____

Section 2 - Company Driver and Vehicle

Driver's name: _____ D/L # _____ State: _____

Driver's home office address: _____ Driver's Phone # _____

Company Vehicle # _____ Year _____ Model _____ License # _____ State _____

Company car? ☐ Yes ☐ No Owned by employee? ☐ Yes ☐ No

Leased/rented from _____

Passenger/Witness Name(s) _____ Address: _____ Phone: _____

Passenger/Witness Name(s) _____ Address: _____ Phone: _____

Passenger/Witness Name(s) _____ Address: _____ Phone: _____

Damage to vehicle: _____

Injuries to employee(s): _____

Injuries to others: _____

Vehicle was being used for: Company business ☐ Yes ☐ No Personal business ☐ Yes ☐ No

Towed: ☐ Yes ☐ No By Whom: _____ To Where: _____

Section 3 - Other Driver and Vehicle Information

Driver's Name: _____ D/L # _____ State _____

Current Address _____ City _____ State _____

Telephone Home: _____ Work: _____ Cell: _____

Reg. Owner's Name: _____ Address: _____ City: _____ State: _____

(verify registration document)

The Other Vehicle: Make _____ Model _____ Year _____ License # _____ State _____

Insurance company name: _____ Address: _____ Phone # _____

Policy No. _____ Contact Person _____ Phone # _____

Passenger/Witness Name(s) _____ Address: _____ Phone: _____

Passenger/Witness Name(s) _____ Address: _____ Phone: _____

Damage: (*Make note of pre-existing damage and take pictures if possible.* ***Attach additional pages as needed****)*

Injuries to other driver/passengers:

Section 4 – Approvals (signatures required)

Form completed by: _____ Signature: _____ Date: _____

Please Print/Type

Things to Do First In The Event Of a Motor Vehicle Incident

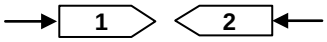
1. Most important: **STOP**.
2. **Call 911 if there are injuries.**
3. Call for an officer if the incident occurred on public property (streets, highways or roads). Disputes often arise between the parties involved as to who was at fault; therefore, a police report is important. If an officer is unable to attend the scene of the accident, a counter police report may be filed at most stations. Insurance companies rely on police reports to determine liability.
4. Complete the Incident Investigation Report and the Vehicle Incident Report forms. It is important that both these forms are completed in detail. Include a diagram of the incident on the back of the report. Incomplete information may lead to delays in processing associated claims and in helping to prevent this type of incident from occurring again.
5. Express no opinion as to who was at fault. This is for the insurance companies to determine.
6. Give only information that is required by the authorities or as directed by MACTEC contractual requirements.
7. Sign only those statements required by the authorities or as directed by MACTEC contractual requirements. Do not sign away your rights or the company's rights.
8. If you are injured or think you were injured, tell your supervisor and see a physician. Your supervisor will notify MACTEC's Worker's Compensation insurance carrier, your Division's ES&H Manager and the Corporate Director of ES&H by phone, email or fax. For additional instructions on what to do, go to MACTEC's ES&H website on the intranet at:

   http://intranet.mactec.com/EnvSafetyHealth/HealthSafety_Claims_Reporting.htm
9. Your supervisor will forward both completed incident reports immediately to your Division's ES&H Manager.

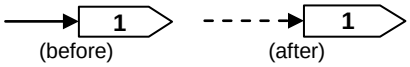
MACTEC, Inc.

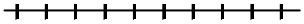
Vehicle Crash Diagram

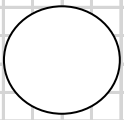
Instructions:

1. Number each vehicle and show directions 

2. Use a solid line to show path before incident and use a dotted line to show path after incient



3. Show pedestrian/non-motorist by: 
4. Show railroad by: 
5. Indicate north by arrow as: 
6. Show street or highway names or numbers
7. Show signs, signals, warning and traffic controls.



Prepared by: _____ Date: _____

APPENDIX E

MATERIAL SAFETY DATA SHEETS

NOTE:

Include the applicable MSDSs for the chemicals brought to the site here. If you want to keep the MSDSs in a separate folder in support vehicle/trailer, include the statement below

The Material Safety Data Sheets which apply to this field activity are provided as a separate document and are to be kept with this HASP in the field support vehicle/office.

APPENDIX F

SHSO SUMMARY

APPENDIX F

SHSO SUMMARY

To be completed by SHSO following completion of each phase of field work.

During the work covered by this Site Specific Health and Safety Plan, there were:

(check one)

____ No violations of the Safety Plan provisions and no incidents involving injury, illness or personnel contamination.

____ The following violations of the Safety plan provisions or incidents involving injury, illness or personnel contamination occurred. (Provide details of type of violation or incident, who was involved, circumstances, and first aid or medical treatment required.)

_____

_____

_____

_____

If violation or incident occurred, describe corrective actions taken to prevent reoccurrence.

_____

_____

_____

_____

Project/Task Name: _____

Project/Task Number: _____

Dates in Field: _____

Signature: _____

(SHSO)

Date: _____

APPENDIX G

SITE SAFETY ORIENTATION FORM

SITE SAFETY ORIENTATION

Project:_____ Site:_____

Project Number:_____ Date:_____

All applicable items listed below are to be reviewed on the first day of site activities and when new workers arrive on site. Training provider, please initial each item covered in the training, or note "NA" as applicable.

General Supervisor: ..... _____

Site Health and Safety Supervisor (SHSS): ..... _____

Employees' direct supervisor:..... _____

Location of HASP and MSDS on site:..... _____

HazCom labeling system if different from Local Operation: ..... _____

Site-specific medical surveillance requirements:..... _____

Site control measures (location of exclusion zone, etc.):..... _____

Safety and health hazards on site:..... _____

The Level of Protection and specific PPE to be used: ..... _____

Work practices to be used on site to minimize exposure:..... _____

Decontamination procedures: ..... _____

How to effectively use site/task engineering controls: ..... _____

Applicable elements of the site emergency response plan:..... _____

Any other site-specific health and safety related requirements: ..... _____

Participating employees must print and sign their name in the spaces provided below:

_____ _____

_____ _____

_____ _____

_____ _____

APPENDIX H

DAILY TAILGATE SAFETY MEETING CHECKLIST

MACTEC ENGINEERING AND CONSULTING, INC.

DAILY TAILGATE SAFETY MEETING CHECKLIST

Project:		Site:	
Date:		Location:	

To be reviewed on the first day of site activities and when new workers arrive on site:

Alternate for Health & Safety:	
Location of on-site HASP:	
Site training requirements:	See HASP
Specific medical surveillance requirements:	See HASP

Agenda:

During the project, one or more of the agenda items could be selected for the required daily site training.

		Check-off: Date				
		___	___	___	___	___
1.	Planned work for this day (discuss)	☐	☐	☐	☐	☐
2.	Physical hazards and controls (discuss/review)	☐	☐	☐	☐	☐
3.	Chemical hazards and controls (discuss/review)	☐	☐	☐	☐	☐
4.	Biological hazards and controls (discuss/review)	☐	☐	☐	☐	☐
5.	Personal protective equipment Modified D	☐	☐	☐	☐	☐
6.	Personal protective equipment required per the hazard assessment:	☐	☐	☐	☐	☐

SPECIFY TYPE	
Protective coveralls	
Safety glasses/goggles	ANSI approved
Hard hat	ANSI approved
Foot protection	Safety toe boots & overboots
Work gloves	
Chemical gloves	Neoproene outer, nitrile inner
Hearing protection	
Other	

7.	Review inspection, decontamination, and maintenance procedures and the limitations of the above stated PPE.	☐	☐	☐	☐	☐
8.	Decontamination procedure (discuss/review)	☐	☐	☐	☐	☐
9.	Exclusion zone maintained	☐	☐	☐	☐	☐
10.	Site emergency response plan (discuss/review)	☐	☐	☐	☐	☐
11.	Signs and symptoms of overexposure to chemicals anticipated on site	☐	☐	☐	☐	☐
12.	General health and safety rules	☐	☐	☐	☐	☐
13.	Specific health and safety requirements relating to site activities including: (discuss/review)	☐	☐	☐	☐	☐
14.	Drilling/boring	☐	☐	☐	☐	☐
15.	UST	☐	☐	☐	☐	☐
16.	Excavations	☐	☐	☐	☐	☐
17.	Heavy equipment	☐	☐	☐	☐	☐
18.	Slips, trips, and falls	☐	☐	☐	☐	☐
19.	Lockout/tagout	☐	☐	☐	☐	☐
20.	Working in temperature extremes	☐	☐	☐	☐	☐
21.	Rain or other weather advisories	☐	☐	☐	☐	☐
22.	Other health & safety issues (discuss/note)	☐	☐	☐	☐	☐

MACTEC ENGINEERING AND CONSULTING, INC.

DAILY TAILGATE SAFETY MEETING CHECKLIST

I have participated in the daily safety meeting discussing the topics indicated on the reverse and fully understand my responsibility for complying with all health and safety requirements. I have had the opportunity to have my questions on site health and safety issues and procedures answered.

Employee Name	Employee Signature	Date

Name and Signature of person conducting training

Date

APPENDIX I

DAILY HEALTH AND SAFETY CHECKLIST

MACTEC, Inc.

DAILY SITE SAFETY AND HEALTH CHECKLIST

Site: _____

Project Number: _____ **Project Manager:** _____

Prepared by: _____

Names of MACTEC employee's onsite: _____

Y	N	N/A		Comments
Inspect Initial Start up of the project, when tasks change or new workers come to the site.				
☐	☐	☐	1. Are emergency phone numbers posted?	
☐	☐	☐	2. Are directions to the nearest emergency medical care posted?	
☐	☐	☐	3. Is there a SSHP at the site?	
☐	☐	☐	a. Is it current?	
☐	☐	☐	b. Does it address all know/suspected hazards?	
☐	☐	☐	c. Is it approved?	
☐	☐	☐	4. Have applicable workers received 40-hour initial training? (24-hours training for contractors is acceptable)	
☐	☐	☐	5. Have all applicable workers received refresher training within the past year?	
☐	☐	☐	6. Are all applicable workers in the medical monitoring program?	
☐	☐	☐	a. Are they current in their physicals?	
☐	☐	☐	7. Is there a charged fire extinguisher on-site?	
☐	☐	☐	8. Is there an eyewash on-site?	
☐	☐	☐	a. Solution not expired?	
☐	☐	☐	9. Is there a first aid kit on-site?	
☐	☐	☐	a. Adequately stocked?	
☐	☐	☐	b. Include bloodborne Pathogen equipment?	
The following questions should be evaluated each day:				
☐	☐	☐	10. Do visitors sign the visitor's log acknowledging that they understand:	
☐	☐	☐	a. General site information?	
☐	☐	☐	b. Operations?	
☐	☐	☐	c. Specific hazards?	
☐	☐	☐	d. Required safety procedures and requirements?	
☐	☐	☐	11. Is there at least one person on site at all times current in their first aid/CPR training?	

Y	N	N/A		Comments
☐	☐	☐	12. Are Tailgate Safety Meetings taking place?	
☐	☐	☐	a. Are names of attendees and subject matter documented?	
☐	☐	☐	13. Are all PPE identified in the HASP being worn by site workers?	
☐	☐	☐	14. Are ear plugs/muffs worn when noise makes conversation difficult at a distance of 2 feet?	
☐	☐	☐	15. Are gloves and protective clothing worn when there is a danger of chemical exposure?	
☐	☐	☐	16. Are appropriate air monitoring instruments being used?	
☐	☐	☐	a. Are air monitoring instruments properly calibrated?	
☐	☐	☐	17. Are approved respirators worn when needed?	
☐	☐	☐	a. Are the cartridges appropriate for the hazards at the site?	
☐	☐	☐	b. Are cartridges changed daily, unless specified otherwise in the SHSO?	
☐	☐	☐	18. Are compressed gas cylinders at the site?	
☐	☐	☐	a. If yes, are the caps kept on the cylinder when not in use?	
☐	☐	☐	b. Are compressed gas cylinders stored and transported in such a manner as to prevent it from being damaged?	
☐	☐	☐	19. Do employees who drive on company business have current operators licenses?	
☐	☐	☐	20. Do all employees wear their seat belts?	
☐	☐	☐	21. Are trucks and trailers secured from movement during loading and unloading operations?	
☐	☐	☐	22. Are MACTEC vehicles (including rentals and personal vehicles) parked in a safe manner?	
☐	☐	☐	23. Are traffic cones set up if needed?	
☐	☐	☐	24. Is the drill rig parked in a safe manner?	
☐	☐	☐	a. Is there a minimum of 10 feet between power lines and the mast?	
☐	☐	☐	25. Is the location of electrical power lines and other utilities determined before digging or drilling?	
☐	☐	☐	26. Is there a wind indicator showing wind direction on-site?	
☐	☐	☐	27. Are exits in building/trailers kept free of obstruction?	

Y	N	N/A		Comments
☐	☐	☐	28. Are all work areas properly illuminated?	
☐	☐	☐	29. Are tools and equipment used by employees in good condition?	
☐	☐	☐	30. Are all ladders in good condition and secured when in use?	
☐	☐	☐	31. Are all electrically operated tools grounded?	
☐	☐	☐	32. Are exposed wiring and cords not frayed or deteriorated?	
☐	☐	☐	33. Do extension cords have a grounding conductor?	
☐	☐	☐	34. Is there a means to minimize heat or cold stress on-site?	
☐	☐	☐	35. Are breaks taken as required?	
☐	☐	☐	36. Are meals eaten only in areas free from toxic materials?	
☐	☐	☐	37. Are there confined spaces at the site?	
☐	☐	☐	a. If yes, will MACTEC employees be entering the space?	
☐	☐	☐	b. Is a permit being used?	
☐	☐	☐	c. Is the permit completely filled out and approved prior to entry?	
☐	☐	☐	d. Are confined spaces thoroughly emptied of the hazardous substances prior to entry?	
☐	☐	☐	e. Is ventilation provided prior to entry?	
☐	☐	☐	f. Is air within the confined space tested for oxygen deficiency, explosive concentrations, and toxic substances in that order?	
☐	☐	☐	g. Is the air in the space tested frequently?	
☐	☐	☐	h. Is approved respiratory equipment required in the confined space if the air cannot be made acceptable?	
☐	☐	☐	i. Is there an assigned safety standby outside the confined space?	
☐	☐	☐	j. Is the safety standby trained and equipped to handle emergencies?	
☐	☐	☐	k. Is the entry being done in compliance with the MACTEC Permit Required Confined Space Program?	

APPENDIX J

SPILL CONTAINMENT PLAN

APPENDIX D

MONITORING WELL LOGS

MACTEC

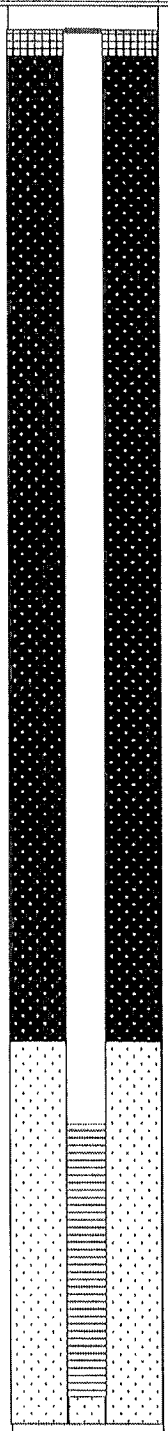
5205 Militia Hill Road
Plymouth Meeting, Pennsylvania 19462

Project No.	3485040034.03	Well ID:.	MW-1
Contractor:	Summit Drilling	Drilling Method:	Air Rotary and Hollow-Stem Auger
Drill Crew:	Dan David Russell	Logged by:	Charlie Charlesworth
Date Started:	8/6/2004	Date Finished:	8/9/2004

Project Name and Location:
NY Express Dry Cleaners
6960 188th Street, Fresh Meadows
Queens, New York

PVC Elevation: N/A

First water during drilling (feet bgs): 39'

DEPTH (feet)	LITHOLOGY	ORGANIC VAPORS	CONSTRUCTION DIAGRAM	WELL CONSTRUCTION DESCRIPTION
0	Concrete	0ppm		0-1' Cement flushmount with steel casing 0-40' 2-inch PVC casing 1-37' Bentonite seal
5	Unconsolidated fill material	0 ppm		
10	Unconsolidated fill material	0 ppm		
15	Silty sand - brown, solvent odor present	72.2 ppm		
20	Silty sand - brown, moist	27.9 ppm		
25	Silty sand - brown	10.9 ppm		
30	Silty sand - brown	5.0 ppm		
35	Silty sand - medium grained, brown	1.1 ppm		37-50' Sandpack, #1 sand
40	Silty sand - brown, moist	0 ppm		39' First water 40-50' 2-inch PVC screen, 10 slot
45	Silty sand - brown, moist	0 ppm		
50	No cuttings			50' Total depth of monitoring well

MACTEC

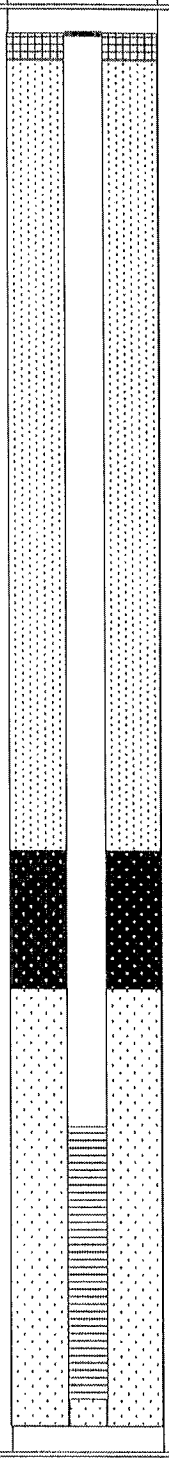
5205 Militia Hill Road
Plymouth Meeting, Pennsylvania 19462

Project No.	3485040034.03	Well ID:.	MW-2
Contractor:	Summit Drilling	Drilling Method:	Air Rotary
Drill Crew:	Dan David	Logged by:	Charlie Charlesworth
Date Started:	8/5/2004	Date Finished:	8/10/2004

Project Name and Location:
NY Express Dry Cleaners
6960 188th Street, Fresh Meadows
Queens, New York

PVC Elevation: N/A

First water during drilling (feet bgs): 39'

DEPTH (feet)	LITHOLOGY	ORGANIC VAPORS	CONSTRUCTION DIAGRAM	WELL CONSTRUCTION DESCRIPTION
0	Backtop (0-4")	0 ppm		0-1' Cement flushmount with steel casing 0-40' 2-inch PVC casing 1-30' Sand
5	Sand - coarse grained, brown moist	0 ppm		
10	Silty sand - fine to coarse grained, pebbles, moist, brown	0 ppm		
15	Silty sand - medium grained, some cobbles, some clay, moist, brown	0 ppm		
20	Silty sand - medium grained, cobbles, moist, brown	0 ppm		
25	Silty sand - medium grained, slightly moist	0 ppm		
30	Silty sand - fine to medium grained, moist, brown, with cobbles	0 ppm		30-35' Bentonite seal
35	Silty sand - fine to medium grained, moist, brown, with cobbles through 45'bgs	0 ppm		35-50' Sandpack, #1 sand
40		0 ppm		39' First water 40-50' 2-inch PVC screen, 10 slot
45	No Cuttings from 45-60'bgs	0 ppm		
50				50' Total depth of monitoring well

MACTEC

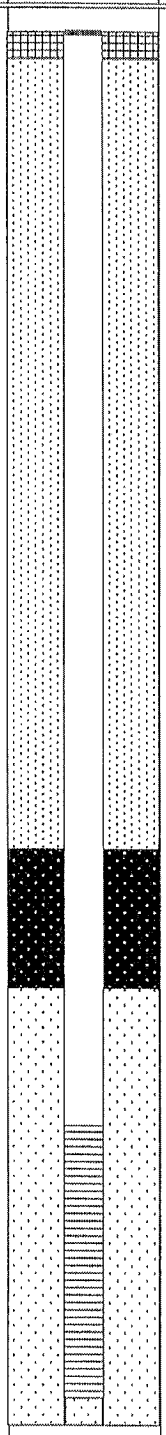
5205 Militia Hill Road
Plymouth Meeting, Pennsylvania 19462

Project No.	3485040034.03	Well ID:.	MW-3
Contractor:	Summit Drilling	Drilling Method:	Air Rotary
Drill Crew:	Dan David	Logged by:	Charlie Charlesworth
Date Started:	8/5/2004	Date Finished:	8/10/2004

Project Name and Location:
NY Express Dry Cleaners
6960 188th Street, Fresh Meadows
Queens, New York

PVC Elevation: N/A

First water during drilling (feet bgs): 39'

DEPTH (feet)	LITHOLOGY	ORGANIC VAPORS	CONSTRUCTION DIAGRAM	WELL CONSTRUCTION DESCRIPTION
0	Backtop (0-4")	0ppm		0-1' Cement flushmount with steel casing 0-40' 2-inch PVC casing 1-30' Sand
5	Silty sand - fine grained, damp dark brown	0 ppm		
10	Silty sand - Fine grained, brown	0 ppm		
15	Silty sand - fine to medium grained, some cobbles	0 ppm		
20	Silty sand - fine to medium grained, damp, brown, some cobbles	0 ppm		
25	Silty sand - fine to medium grained, brown, cobbles and pebbles intermixed	0 ppm		
30	Silty sand - fine to medium grained	0 ppm		30-35' Bentonite seal
35	Silty sand - fine grained, brown, moist, with some cobbles	0 ppm		35-50' Sandpack, #1 sand
40	Silty sand - medium grained	0 ppm		39' First water 40-50' 2-inch PVC screen, 10 slot
45	Silty sand - medium grained some pebbles	0 ppm		
50	Sand - coarse grained, wet, brown, with some pebbles	0 ppm		50' Total depth of monitoring well

MACTEC

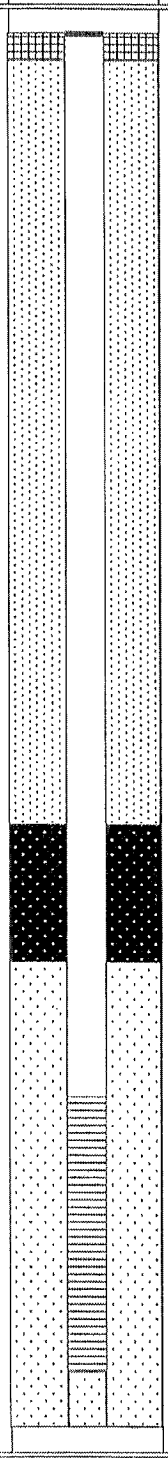
5205 Militia Hill Road
Plymouth Meeting, Pennsylvania 19462

Project No.	3485040034.03	Well ID:.	MW-4
Contractor:	Summit Drilling	Drilling Method:	Air Rotary and Hollow-Stem Auger
Drill Crew:	Dan David	Logged by:	Charlie Charlesworth
Date Started:	8/6/2004	Date Finished:	8/10/2004

Project Name and Location:
NY Express Dry Cleaners
6960 188th Street, Fresh Meadows
Queens, New York

PVC Elevation: N/A

First water during drilling (feet bgs): 39'

DEPTH (feet)	LITHOLOGY	ORGANIC VAPORS	CONSTRUCTION DIAGRAM	WELL CONSTRUCTION DESCRIPTION
0	Backtop	0ppm		0-1' Cement flushmount with steel casing 0-39' 2-inch PVC casing 1-29' Sand
5	Silty Sand - coarse grained, brown, trace clay	0 ppm		
10	Sand - fine to medium grained, brown, moist	0 ppm		
15	Silty sand - fine to medium grained, brown, moist	0 ppm		
20	Silty sand - fine to medium grained, moist, brown, some cobbles	0 ppm		
25	Silty sand - fine to medium grained, moist, brown	0 ppm		
30	Silty sand - fine to medium grained, moist, brown	0 ppm		29-34' Bentonite seal
35	Silty sand - medium grained, brown, moist, with some cobbles and pebbles	0 ppm		34-49' Sandpack, #1 sand
38	Cobbles			39' First water
40	Silty sand - medium grained	0 ppm		39-49' 2-inch PVC screen, 10 slot
45	Silty sand - medium grained, moist	0 ppm		
50	Silty sand - medium grained, wet	0 ppm		49' Total depth of monitoring well

MACTEC

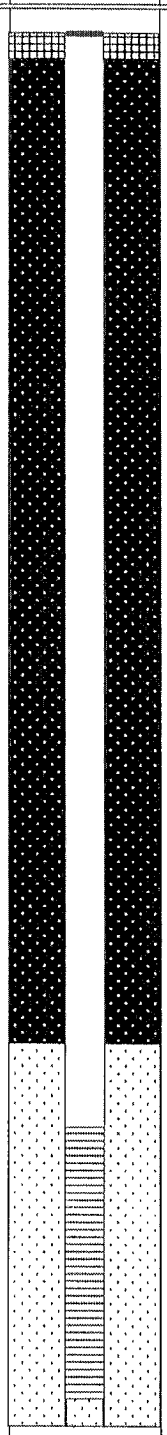
5205 Militia Hill Road
Plymouth Meeting, Pennsylvania 19462

Project No.	3485040034.03	Well ID:.	MW-6
Contractor:	Summit Drilling	Drilling Method:	Truck-mounted Geoprobe® 6600
Drill Crew:	Dennis Crayon	Logged by:	Charlie Charlesworth
Date Started:	8/6/2004	Date Finished:	8/9/2004

Project Name and Location:
NY Express Dry Cleaners
6960 188th Street, Fresh Meadows
Queens, New York

PVC Elevation: N/A

First water during drilling (feet bgs): 39'

DEPTH (feet)	LITHOLOGY	ORGANIC VAPORS	CONSTRUCTION DIAGRAM	WELL CONSTRUCTION DESCRIPTION
0	Blacktop	0ppm		0-1' Cement flushmount with steel casing 0-40' 2-inch PVC casing 1-37' Bentonite seal
5	Sand - grayish-brown, some silt, dry Blow counts: 9, 9, 8, 5	0 ppm		
10	Silty sand - brown, with quartz and limestone pieces, dry Blow counts: 15, 19, 14, 15	0 ppm		
15	Silty sand - brown, sandstone and micacious pieces, dry Blow counts: 45, 19, 22, 18	0 ppm		
20	Cobbles/Gravel - brown, dry Blow counts: 45, 50, 100/2	0 ppm		
25	Silty sand - brown, moist, some quartz gravel pieces Blow counts: 80, 27, 25, 30	0 ppm		
30	No cuttings	0 ppm		
35	No cuttings			37-50' Sandpack, #1 sand
40	No cuttings			39' First water 40-50' 2-inch PVC screen, 10 slot
45	No cuttings			
50	No cuttings			50' Total depth of monitoring well

APPENDIX E

HISTORICAL SAMPLING AND MONITORING RESULTS

Table 4-1 - Summary of Well Construction Details
NY Express Dry Cleaners, Fresh Meadows, New York
MACTEC E&C Project No. 3485040034

Well Designation	Well Diameter (inches)	Total Well Depth (ft below land surface)	Screen Setting (ft below land surface)	Sand Pack Interval (ft below land surface)	Bentonite Interval (ft below land surface)	Cement-Bentonite Grout Interval (ft below land surface)	Cement Flushmount Interval (ft. below land surface)	Elevation of Measuring Point (ft relative from onsite datum)
MW-1	2	50	40.0-50.0	37.0-50.0	30.0-37.0	1.0-30.0	0-1.0	100.82
MW-2	2	50	40.0-50.0	35.0-50.0	30.0-35.0	1.0-30.0	0-1.0	100.06
MW-3	2	50	40.0-50.0	35.0-50.0	30.0-35.0	1.0-30.0	0-1.0	100.02
MW-4	2	50	40.0-50.0	38.0-50.0	36.0-38.0	1.0-36.0	0-1.0	99.54
MW-6	2	50	40.0-50.0	38.0-50.0	33.0-38.0	1.0-33.0	0-1.0	102.25
VMP-1	1	30	10.0-30.0	8.0-30.0	0.5-8.0	NA	0-0.5	100.14
VMP-2	1	30	10.0-30.0	8.0-30.0	0.5-8.0	NA	0-0.5	101.2
VMP-3	1	30	10.0-30.0	8.0-30.0	0.5-8.0	NA	0-0.5	100.98
VMP-4	1	30	10.0-30.0	8.0-30.0	0.5-8.0	NA	0-0.5	100.6
VMP-5	1	30	10.0-30.0	8.0-30.0	0.5-8.0	NA	0-0.5	NS
VMP-6	1	30	10.0-30.0	8.0-30.0	0.5-8.0	NA	0-0.5	99.68
SG-7	1	3	1.0-3.0	0.5-3.0	NA	NA	0-0.5	100.6
SG-8	1	3	1.0-3.0	0.5-3.0	NA	NA	0-0.5	99.78
SG-9	1	3	1.0-3.0	0.5-3.0	NA	NA	0-0.5	99.58
SVE-1	4	38	6.0-38.0	4.0-38.0	0.5-4.0	NA	0-0.5	100.6
SVE-2	4	38	6.0-38.0	5.0-38.0	0.5-5.0	NA	0-0.5	100.3

Prepared By: _____
Checked By: _____

NOTES:
The onsite datum is defined as the top of the base of the light post west of SG-8 (Light Post A); assumed elevation is 100 feet.
The measuring point of each well is the north side top of the PVC casing.
NS - Not Surveyed.
NA - Not applicable.

Table 4-2 - Summary of Detected Volatile Organic Compounds Reported in Soil Gas Samples
NY Express Dry Cleaners, Fresh Meadows, New York
MACTEC E&C Project No. 3485040034

Sample Location:	VMP-1	VMP-2	VMP-3	VMP-4	VMP-5	VMP-6	SG-8	SG-9
Sample Date:	10/7/2004	10/7/2004	10/7/2004	10/7/2004	10/7/2004	9/1/2004	9/1/2004	9/1/2004
Compound (ppbv)								
Trichlorethene	4100	1100	170	13000	54000	170	ND	1700
Tetrachloroethene	39000	13000	3600	170000	590000	1600	79	20000
trans-1,2-Dichloroethene	140	30	ND	1500	3300	ND	ND	ND
cis-1,2-Dichlorothene	7400	2300	230	20000	160000	350	ND	550
Total Detected VOCs	50,640	16,430	4,000	204,500	807,300	2,120	79	22,250

NOTES:
ppbv - parts per billion by volume.
ND = Not Detected.

Prepared By: _____
Checked By: _____

Table 4-3 - Soil Vapor Extraction Pilot Test Data
NY Express Dry Cleaners, Fresh Meadows, New York
MACTEC E&C Project No. 3485040034

Date: October 7, 2004
Extraction Well: SVE-1

Ambient Temp (°F): 79
Ambient Humidity: 35.42%
Weather: 70's Clear

System Data						Well Data						
Elapsed Time (Minutes)	Vacuum (in. w.c.)	PID (ppm) Effluent	PID (ppm) SVE-1	Airspeed (ft/min) Ambient Conditions	Airspeed (cfm)	VMP-1 (in. w.c.)	VMP-2 (in. w.c.)	VMP-3 (in. w.c.)	VMP-4 (in. w.c.)	VMP-5 (in. w.c.)	VMP-6 (in. w.c.)	SVE-2 (in. w.c.)
0	NA	NA	NA	NA	0	0.005	0.005	0.001	0.002	0.001	0.003	0.006
1	50	1.4	275	4564	399	0.799	0.502	0.088	7.033	3.871	0.962	1.688
15	50	0.7	337	5200	454	1.702	1.232	0.314	7.597	5.288	1.596	3.005
30	50	0.2	315	5010	438	1.765	1.309	0.336	8.015	5.408	0.886	3.111
45	50	0	334	4929	431	1.583	1.145	0.288	7.858	5.114	1.552	2.858
60	50	0	330	4846	423	1.762	1.308	0.334	8.018	5.380	1.680	3.100
75	50	0	362	4700	411	1.759	1.304	0.332	8.037	5.390	1.679	3.098
90	50	0	355	4696	410	1.770	1.310	0.333	8.042	5.400	1.682	3.101
105	50	0	338	4864	425	1.769	1.312	0.335	8.051	5.405	1.700	3.120
120	50	0	340	4750	415	1.759	1.309	0.336	8.049	5.398	1.698	3.099
					Mean cfm= 423							
						14.673	10.736	2.697	70.702	46.655	13.438	26.186
					Average Vacuum (in. w.c.)	1.6	1.2	0.3	7.9	5.2	1.5	2.9
					Distance From SVE-1 (feet)	39	65	110	6	18	47	38

NOTES:
ft/min - Feet per minute.
ppm - Parts per million.
in. w.c. - Inches of water column.
cfm - Cubic feet per minute.

Prepared by: _____
Checked by: _____

Table 4-4 - Summary of SVE Pilot System Gas Stream Analyses
NY Express Dry Cleaners, Fresh Meadows, New York
MACTEC E&C Project No. 3485040034

Sample Identification:	Influent 1 10/7/2004	Influent 2 10/7/2004	Influent 3 10/7/2004	Effluent 10/7/2004
Elapsed Test Time (minutes)	25	70	115	117
Permanent Gases (%)				
Carbon Dioxide	5.8	2.4	0.3	NS
Carbon Monoxide	<0.10	<0.10	<0.10	NS
Methane	<0.050	<0.050	<0.050	NS
Nitrogen	78	78	78	NS
Oxygen	16	20	22	NS
Volatiles Organic Compounds (ppmv)				
1,1,1-Trichloroethane	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND	ND
1,1-Dichloroethene	0.025	0.015	ND	ND
1,2-Dichlorobenzene	ND	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND	ND
Benzene	ND	ND	ND	ND
Bromodichloromethane	ND	ND	ND	NR
Bromoform	ND	ND	ND	NR
Bromomethane/Chloroethane	ND	ND	ND	ND
Carbon Tetrachloride	ND	ND	ND	ND
Chlorobenzene	ND	ND	ND	ND
Chlorodibromomethane	ND	ND	ND	NR
Chloroform	0.079	0.042	0.012	ND
Chloromethane	ND	ND	ND	ND
cis-1,2-Dichloroethene	26	15	5.7	0.061
cis-1,3-Dichloropropene	ND	ND	ND	NR
Ethylbenzene	ND	ND	ND	ND
Methylene Chloride	ND	ND	ND	ND
Tetrachloroethene	75	37	12	0.55
Toluene	ND	ND	ND	0.014
trans-1,2-Dichloroethene	0.49	0.22	0.08	ND
trans-1,3-Dichloropropene	ND	ND	ND	NR
Trichloroethene	8.4	4.2	1.2	0.03
Trichlorofluoromethane	ND	ND	ND	ND
Vinyl Chloride	ND	ND	ND	ND

NOTES:
ND - Not Detected.
NR - Not Reported.
NS - Not Sampled.
ppmv - parts per million by volume

Prepared By: _____
Checked By: _____

Table 4-5 - Summary of Water Level Data Collected on September 1, 2004 and October 6, 2004
NY Express Dry Cleaners, Fresh Meadows, New York
MACTEC E&C Project No. 3485040034

Well ID	Measuring Point Elevation* (ft relative to onsite datum**)	Measured Depth to Water (ft below top of measuring point)	Groundwater Elevation (ft relative to onsite datum)	Measured Depth to Water (ft below top of measuring point)	Groundwater Elevation (ft relative to onsite datum)
Date		September 1, 2004	September 1, 2004	October 6, 2004	October 6, 2004
MW-1	100.82	41.13	59.69	39.71	61.11
MW-2	100.06	38.57	61.49	38.97	61.09
MW-3	100.02	38.97	61.05	38.94	61.08
MW-4	99.54	39.00	60.54	38.50	61.04
MW-6	102.25	39.76	62.49	41.13	61.12

NOTES:
The measuring point of each monitoring well is defined as the "north side" of the top of the PVC casing.
The onsite datum is defined as the top of the base of Light Post A; Assumed elevation is 100 feet.

Prepared By: _____
Checked By: _____

Table 5-1 - Summary of Detected Volatile Organic Compounds Reported in Soil Samples
NY Express Dry Cleaners, Fresh Meadows, New York
MACTEC E&C Project No. 3485040034

Sample Location:	NY TAGM	VMP 4 - 5-10	VMP 4 - 15-20	VMP 5 - 0-5	VMP 5 - 15-20
Sample Date:	Recommended	8/9/2004	8/9/2004	8/10/2004	8/10/2004
Sample Interval (feet below ground surace):	Soil Clean-up Objective	6.5-7.5	15.0-20.0	1.0-2.0	15.5-16.5
Compound (mg/kg)					
Carbon Disulfide	2.7	ND	ND	ND	0.0025
cis-1,2-Dichloroethene	NS	0.29	0.01	ND	ND
trans-1,2-Dichloroethene	0.3	0.014	ND	0.0076	0.0085
Tetrachloroethene	1.4	**45**	**16**	**49**	**22**
Trichloroethene	0.7	**4.7**	ND	0.24	0.26

NOTES:
All concentrations are reported on a dry weight basis in milligrams per kilogram (mg/kg).
Bold-typeface indicates exceedance of TAGM value.
NS - No Standard.
ND - Not Detected above analytical method detection limit.

Prepared By: _____
Checked By: _____

Table 5-2 - Summary of Detected Volatile Organic Compounds Reported in Groundwater Samples - September 2004
NY Express Dry Cleaners, Fresh Meadows, New York
MACTEC E&C Project No. 3485040034

Well ID: / **Sampling Date:**	NY Ambient Water Quality Standards	NY Ambient Water Quality Guidance Values	MW-1 9/1/2004	MW-2 9/1/2004	MW-3 9/1/2004	MW-4 9/1/2004	MW-6 9/1/2004
Compound (ug/L)							
Chloroform	7	NS	ND	ND	ND	ND	0.8J
cis-1,2-Dichloroethene	5	NS	**62**	5	1.4J	**16**	ND
Tetrachloroethene	NS	0.7	**50**	**7.4**	**7**	**20**	**24**
Trichloroethene	5	NS	**12**	1.2	0.8J	3.3	2.7

Prepared By: _____
Checked By: _____

NOTES:
Concentrations reported in micrograms per liter (ug/L).
Bold-typeface items indicate the analyte exceeds the NY TOGS for Ambient Water Quality Standards and Guidance Values.
J - Analyte was found at estimated values below the method detection limit.
NS - No Standard.

Table 5-3 - Summary of Detected Volatile Organic Compounds Reported in Groundwater Samples - October 2004
NY Express Dry Cleaners, Fresh Meadows, New York
MACTEC E&C Project No. 3485040034

Well ID: **Sample Date:**	NY Ambient Water Quality Standards	NY Ambient Water Quality Guidance Values	MW-1 10/6/2004	MW-2 10/6/2004	MW-3 10/6/2004	MW-4 10/6/2004	MW-6 10/6/2004	Field Blank 10/6/2004
Compound (ug/L)								
trans-1,2-Dichloroethene	5	NS	0.9 J	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	5	NS	**68**	**12**	**9**	**40**	4.1 J	ND
Chloroform	7	NS	0.6 J	ND	ND	0.5 J	0.6 J	ND
Trichloroethene	5	NS	**14**	2.5	2.2	**7.4**	2.1	ND
Tetrachloroethene	NS	0.7	**64**	**13**	**16**	**32**	**19**	ND

Prepared By: _____
Checked By: _____

NOTES:
Concentrations reported in micrograms per liter(ug/L).
Bold-typeface items indicate the analyte exceeds the NY TOGS for Ambient Water Quality Standards or Guidance Values.
ND = Not Detected above analytical method detection limit.
J = Analyte was found at estimated values below the method detection limit.
NS - No Standard.

Table 5-4 - Summary of Biogeochemical Parameters for Groundwater Samples - September 2004
NY Express Dry Cleaners, Fresh Meadows, New York
MACTEC E&C Project No. 3485040034

Well ID: / **Sampling Date:**	NY Ambient Water Quality Standards	MW-1 9/1/2004	MW-2 9/1/2004	MW-3 9/1/2004	MW-4 9/1/2004	MW-6 9/1/2004
Analyte (mg/L)						
Metals						
Iron	0.3	**4.36**	**0.802**	**2.37**	NA	**2.72**
Manganese	0.3	**0.54**	**1.57**	0.261	NA	**0.539**
Other						
Chloride	500	224	251	264	NA	338
Ferrous Iron	NS	ND	ND	ND	NA	0.11
Nitrate	20	6.4	NA	NA	NA	8.4
Nitrite	2	0.14	NA	NA	NA	ND
Sulfate	500	91.2	58.4	56.8	NA	72.1
Sulfide	1	ND	ND	ND	NA	ND
Total Organic Carbon	NS	1.6	1.4	ND	NA	1.2
Methene	NS	ND	ND	ND	NA	ND
Ethene	NS	ND	ND	ND	NA	ND
Ethane	NS	ND	ND	ND	NA	ND
Field Parameters						
pH (standard units)	NS	7.59	7.45	7.36	NA	6.84
Conductivity (Microsiemens)	NS	1.32	1.27	1.38	NA	1.58
Dissolved Oxygen (mg/L)	NS	2.18	2.59	7.18	NA	6.85
Turbidity (NTU)	NS	-5	120	82	NA	690
Temperature (Degrees Celcius)	NS	22.43	22.28	22.26	NA	21.92
ORP (Millivolts)	NS	111	54	164	NA	150

NOTES:
ND - Not Detected.
NA - Well was not sampled.
NS - No Standard.
Concentrations reported in milligrams per liter (mg/L) unless noted otherwise.
Field Parameters were logged immediately before the sample was taken.

Prepared By: _____
Checked By: _____

Table 5-5 - Summary of Biogeochemical Parameters for Groundwater Samples - October 2004
NY Express Dry Cleaners, Fresh Meadows, New York
MACTEC E&C Project No. 3485040034

Sampling Location:	NY Ambient Water Quality Standards	MW-1 10/6/2004	MW-2 10/6/2004	MW-3 10/6/2004	MW-4 10/6/2004	MW-6 10/6/2004	Field Blank 10/6/2004
Analyte (mg/L)							
Metals							
Iron	0.3	0.751	0.818	0.521	0.43	2.46	ND
Manganese	0.3	0.108	1.12	0.344	0.424	0.167	ND
Dissolved Metals							
Iron	0.3	ND	ND	ND	ND	ND	ND
Manganese	0.3	0.0706	1.1	0.264	0.422	0.127	ND
Other							
Chloride	500	204	221	285	241	261	ND
Ferrous Iron	NS	ND	0.39	ND	ND	0.28	ND
Nitrate	20	6.6	3.5	4.6	4.6	6.8	ND
Nitrite	2	ND	ND	ND	ND	ND	ND
Sulfate	500	77.5	53.6	54.4	50.4	57.6	ND
Sulfide	1	ND	ND	ND	ND	ND	ND
Total Organic Carbon	NS	ND	ND	ND	ND	ND	ND
Methene	NS	ND	ND	ND	ND	ND	ND
Ethene	NS	ND	ND	ND	ND	ND	ND
Ethane	NS	ND	ND	ND	ND	ND	ND
Field Parameters							
Carbon Dioxide (mg/L)	NS	45	45	40	45	40	NA
pH (standard units)	NS	6.15	6.22	6.01	5.96	6.08	NA
Conductivity (Microsiemens)	NS	958	952	1112	919	1035	NA
Dissolved Oxygen (mg/L)	NS	4.35	6.22	7.69	7.6	7.08	NA
Turbidity (NTU)	NS	23	210	5	25	52.5	NA
Temperature (Degrees Celcius)	NS	21.87	21.91	21.1	21.11	20.83	NA
ORP (Millivolts)	NS	500.4	486.3	483.9	496	465	NA

NOTES:
ND - Not Detected.
NA -
NS - No Standard.
Concentrations reported in milligrams per liter (mg/L) unless noted otherwise.

Prepared By: _____
Checked By: _____

Table 5-6 - Summary of Results of Slug Tests Performed on Monitoring Wells
NY Express Dry Cleaners, Fresh Meadows, New York
MACTEC E&C Project No. 3485040034

Well	Test	Falling-Head (F) or Rising-Head (R)	Horizontal Hydraulic Conductivity (ft/day)		
			B	L	Mean value
MW-1	1	R	205	130	222
	2	F	178	317	
		R	364	231	
	3	F	65	116	
		R	377	239	
MW-2	2	F	68	120	91
		R	64	113	
MW-4	1	F	158	281	183
		R	106	188	
				Overall Mean:	166
				Median:	183

Prepared by: _____
Checked by: _____

NOTES:
B = Bouwer and Rice Method (1976)
L = Lambe & Whitman (1969)
Only those analytical methods were utilized which are applicable to water-table conditions, the conditions existing in the surficial aquifer at the site.
Tests were conducted on October 6, 2004.