445 WASHINGTON STREET

MANHATTAN, NEW YORK

Remedial Investigation Report

NYC VCP Site Number: 14CVCP222M

E Designation Number: 14EHAZ083M

Prepared for:

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REMEDIAL INVESTIGATION REPORT

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LIST OF ACRONYMS

Acronym	Definition
AOC	Area of Concern
CAMP	Community Air Monitoring Plan
COC	Contaminant of Concern
CPP	Citizen Participation Plan
CSM	Conceptual Site Model
DER-10	New York State Department of Environmental Conservation Technical Guide 10
FID	Flame Ionization Detector
GPS	Global Positioning System
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
IRM	Interim Remedial Measure
NAPL	Non-aqueous Phase Liquid
NYC VCP	New York City Voluntary Cleanup Program
NYC DOHMH	New York City Department of Health and Mental Hygiene
NYC OER	New York City Office of Environmental Remediation
NYS DOH ELAP	New York State Department of Health Environmental Laboratory Accreditation Program
OSHA	Occupational Safety and Health Administration
PID	Photoionization Detector
QEP	Qualified Environmental Professional
RI	Remedial Investigation
RIR	Remedial Investigation Report
SCO	Soil Cleanup Objective
SPEED	Searchable Property Environmental Electronic Database

CERTIFICATION

I, Mark E. Robbins, am a Qualified Environmental Professional, as defined in RCNY § 43-1402(ar). I have primary direct responsibility for implementation of the Remedial Investigation for the 445 Washington Street Site, (NYC VCP Site No. 14CVCP223M). I am responsible for the content of this Remedial Investigation Report (RIR), have reviewed its contents and certify that this RIR is accurate to the best of my knowledge and contains all available environmental information and data regarding the property.

Mark E. Robbins _____

Qualified Environmental Professional Date Signature

EXECUTIVE SUMMARY

The Remedial Investigation Report (RIR) provides sufficient information for establishment of remedial action objectives, evaluation of remedial action alternatives, and selection of a remedy pursuant to RCNY§ 43-1407(f). The remedial investigation (RI) described in this document is consistent with applicable guidance.

Site Location and Current Usage

The Site is located at 45 Washington Street, 24-30 Desbrosses Street and 454-456 Greenwich Street in the Tribeca section of Manhattan, New York and is identified as Block 224 and Lot 21, 32, 33 and 36 on the New York City Tax Map. Figure 1 shows the Site location. The Site is 11,962-square feet and is bounded by mixed-use commercial-residential buildings to the north, Desbrosses Street to the south, Greenwich Street to the east, and Washington Street to the west. A map of the site boundary is shown in Figure 2. Currently, the Site is used for a commercial parking garage.

Summary of Proposed Redevelopment Plan

The proposed future use of the Site will consist of a seven story hotel with a parking garage in the cellar. As of the date of this report, the development plans are still being finalized. The current zoning designation is C6-2A, Tribeca Mixed Use. The proposed use is consistent with existing zoning for the property. Lot 42 is included in a New York City Landmark district. The maximum depth of excavation at Lot 42 is twelve (12) feet below grade. The maximum depth of excavation at the remaining portions of the Site is eighteen (18) feet below grade.

Summary of Past Uses of Site and Areas of Concern

Based on a review of the May 2013 Phase I ESA prepared by Hydro Tech it appears that the Site was developed prior to 1894 with 4-story and 5-story mixed use commercial and residential buildings. These buildings were demolished and replaced with a motor freight station between 1928 and 1950. The historical records further indicate that the Site has been occupied by the Tribeca Parking Corp from 2006 through 2012. This is consistent with the current use of the Site.

According to ACRIS records, the Site was owned by Oneida Motor Freight Inc. from 1968 through 1978 and Ponte Steak House Inc. from 1978 through 2013. The Site is currently owned by 445 Washington LLC.

The AOCs identified for this site include:

1. The historical use of the Site as a freight trucking facility
2. The historical presence of underground storage tanks
3. The presence of urban fill material

Summary of the Work Performed under the Remedial Investigation

Hydro Tech performed the following scope of work on behalf of CBCS Washington Street LLC:

1. Conducted a Site inspection to identify AOCs and physical obstructions (i.e. structures, buildings, etc.);
2. Conducted a geophysical survey consisting of a Ground Penetrating Radar (GPR) survey.
3. Installed twelve (12) soil borings across the entire project Site, and collected twenty-two (22) soil samples for chemical analysis from the soil borings to evaluate soil quality;
4. Installed four (4) groundwater monitoring wells throughout the Site to establish groundwater flow and collected four (4) groundwater samples for chemical analysis to evaluate groundwater quality;
5. Installed five (5) soil vapor probes around Site perimeter and collected five (5) soil vapor samples for chemical analysis.
6. Collected one (1) ambient outdoor air sample.

Summary of Environmental Findings

1. Elevation of the property ranges from 8 to 9 feet above sea level.
2. Depth to groundwater ranges from 12.20 to 16.40 feet below grade at the Site.
3. Groundwater flow is generally from east to west beneath the Site.

4. Bedrock was not encountered over the course of this investigation.

5. The stratigraphy of the site, from the surface down, consists of 14 to 16 feet of urban fill (sand, brick, pebbles, concrete, glass, charcoal) underlain by moist brown and gray sand and silty sand.

6. Six vent pipes and two manhole access covers are located in the northeast portion of the Site along Greenwich Street. Two vent pipes are located in the southwest portion of the Site along Washington Street. The GPR survey did not identify any anomalies indicative of underground storage tanks.

7. The soil samples collected during the RI show that two VOCs including Naphthalene (maximum of 120 ppm) and acetone (maximum of 3.1 ppm) exceeding Unrestricted Use SCOs. No VOCs were detected at concentrations exceeding Track 2 Restricted Commercial SCOs in any of the soil samples. Acetone was also detected in two of the laboratory batch blanks. PCE and TCE were not detected in any of the soil samples. SVOCs were detected in five of the ten shallow samples and two of the ten deep samples at concentrations exceeding the Track 2 Commercial SCOs. These SVOCs included benzo(a)anthracene (maximum of 157 ppm), benzo(a)pyrene (maximum of 105 ppm), benzo(b)fluoranthene (maximum of 92.4 ppm), benzo(k)fluoranthene (maximum of 80.4 ppm), chrysene (maximum of 139 ppm), dibenzo(a,h)anthracene (maximum of 7.17 ppm), phenanthrene (maximum of 354 ppm), pyrene (maximum of 287 ppm) and indeno(1,2,3-cd)pyrene (maximum of 28.4 ppm). Four pesticides including 4,4'-DDD (maximum of 0.00931 ppm), 4,4'-DDT (maximum of 0.047 ppm), 4,4'-DDE (maximum of 0.374 ppm) and dieldrin (maximum of 0.00682 ppm) were detected in the shallow soil at a concentration exceeding the Track 1 Unrestricted Use SCOs but well below the Restricted Commercial SCO. No PCBs were detected in any of the soil samples collected. Four (4) metals were identified in the shallow and deep soil samples at concentrations exceeding the Track 1 Unrestricted SCOs. The metals include arsenic (maximum of 20.1 ppm), barium (maximum of 1,100 ppm), copper (maximum of 54.7 ppm), chromium trivalent (maximum of 128 ppm), lead (maximum of 1,180 ppm), mercury (maximum of 0.964 ppm), nickel (maximum of 38 ppm) and zinc (maximum of 372 ppm). Of these metals, arsenic, barium, lead and mercury also exceeded Restricted Commercial SCOs. Overall, concentrations and distribution of SVOCs and metals in soils is indicative of historic fill material.

8. Groundwater samples collected during the RI showed no PCBs, pesticides or chlorinated VOCs at concentrations exceeding the Part 703.5 GQS. Total VOCs range from 4 ppb to 78 ppb detected in MW-3. Three VOCs, Isopropylbenzene (maximum of 15 ppb), n-Propylbenzene (maximum of 37 ppb) and sec-Butylbenzene (maximum of 12 ppb) were detected in the groundwater sample collected from MW-3 located in the southwest portion of the Site at concentrations exceeding the GQS. Other VOCs including 1,2,4-trimethylbenzene, acetone, MTBE and sec-isopropyltoluene were detected in this groundwater sample at trace concentrations, well below the GQS. PCE and TCE were not detected in any of the groundwater samples. Three SVOCs including benzo(a)pyrene (maximum of 2.32 ppb), benzo(b)fluoranthene (maximum of 2.23 ppb) and chrysene (maximum 2.55 ppb) were detected in MW-3 at concentrations exceeding the GQS. No other SVOCs were detected in any of the groundwater samples at concentrations exceeding the GQS. Several metals including magnesium, manganese, selenium and sodium exceeded their respective GQS.

9. The soil vapor results collected during the RI showed sixteen (16)petroleum and chlorinated VOCs were detected in soil vapor samples collected during the RI. Highest concentrations were detected for acetone (maximum of 1,200 ug/m^3), methylene chrloride (max. 44), n-Hexane (62), and toluene (max. 39). Maximum total concentrations ranged from 214 ug/m^3 to 1353 ug/m^3. Chlorinated VOC, tetrachloroethylene (PCE) was detected in all of the soil vapor samples at a maximum concentration of 90 ug/m^3. Trichloroethylene (TCE), TCA and carbon tetrachloride were not detected in soil vapors samples. The PCE concentrations are below the monitoring level ranges established within the State DOH soil vapor guidance matrix.

REMEDIAL INVESTIGATION REPORT

1.0 SITE BACKGROUND

CBCS Washington Street LLC has enrolled in the New York City Voluntary Cleanup Program (NYC VCP) to investigate and remediate a 0.27-acre site located at 445 Washington Street, 24-30 Desbrosses Street and 454-456 Greenwich Street in the Tribeca section of Manhattan, New York. Commercial use is proposed for the property. The RI work was performed between September 26, 2013 and October 4, 2013. This RIR summarizes the nature and extent of contamination and provides sufficient information for establishment of remedial action objectives, evaluation of remedial action alternatives, and selection of a remedy that is protective of human health and the environment consistent with the use of the property pursuant to RCNY§ 43-1407(f).

1.1 Site Location and Current Usage

The Site is located at 45 Washington Street, 24-30 Desbrosses Street and 454-456 Greenwich Street in the Tribeca section of Manhattan, New York and is identified as Block 224 and Lot 21, 32, 33 and 36 on the New York City Tax Map. Figure 1 shows the Site location. The Site is 11,962-square feet and is bounded by mixed-use commercial-residential buildings to the north, Desbrosses Street to the south, Greenwich Street to the east, and Washington Street to the west. A map of the site boundary is shown in **Figure 2**. Currently, the Site is used for a commercial parking garage.

1.2 Proposed Redevelopment Plan

The proposed future use of the Site will consist of hotel with a parking garage in the cellar. As of the date of this report, the development plans are still being finalized. The current zoning designation is C6-2A, Tribeca Mixed Use. The proposed use is consistent with existing zoning for the property. Lot 42 is included in a New York City Landmark district. The maximum depth of excavation at Lot 42 is twelve feet below grade. The maximum depth of excavation at the remaining portions of the Site is 18 feet below grade. **Figure 3** shows the layout of the proposed development.

1.3 Description of Surrounding Property

The Site is located in a commercial and residential neighborhood.

Within a 500-foot radius of the Site, there is a variety of land used including commercial, residential, mixed residential-commercial and industrial. Figure 2 shows the surrounding land usage.

Sensitive Receptors

There are no sensitive receptors within a 500-foot radius of the Site.

2.0 SITE HISTORY

2.1 Past Uses and Ownership

Based on a review of the May 2013 Phase I ESA prepared by Hydro Tech it appears that the Site was developed prior to 1894 with 4-story and 5-story mixed use commercial and residential buildings. These buildings were demolished and replaced with a motor freight station between 1928 and 1950. The historical records further indicate that the Site has been occupied by the Tribeca Parking Corp from 2006 through 2012. This is consistent with the current use of the Site.

According to ACRIS records, the Site was owned by Oneida Motor Freight Inc. from 1968 through 1978 and Ponte Steak House Inc. from 1978 through 2013. The Site is currently owned by 445 Washington LLC.

2.2 Previous Investigations

A May 2013 Phase I ESA by Hydro Tech identified the following recognized environmental conditions:

- A Little "E" Restriction assigned to the property by the New York City Department of City Planning for hazardous material
- The presence of underground storage tanks
- The historical presence of storage tanks
- The historical use of the property as a freight trucking and distributing terminal including an onsite gasoline pump

2.3 Site Inspection

The Site inspection was performed under the direction of the Qualified Environmental Professional (QEP) certifying this report to evaluate areas of concern. Six vent pipes and two manhole access covers were identified in the northeast portion of the Site along Greenwich Street. Two vent pipes are located in the southwest portion of the Site along Washington Street.

2.4 Areas of Concern

The AOCs identified for this site include:

1. The historical use of the Site as a freight trucking facility
2. The historical presence of underground storage tanks
3. The presence of urban fill material

Phase 1 Report is presented in **Appendix A**. **Figure 4** shows the AOCs.

3.0 PROJECT MANAGEMENT

3.1 Project Organization

The Qualified Environmental Profession (QEP) responsible for preparation of this RIR is Mark E. Robbins.

3.2 Health and Safety

All work described in this RIR was performed in full compliance with applicable laws and regulations, including Site and OSHA worker safety requirements and HAZWOPER requirements.

3.3 Materials Management

All material encountered during the RI was managed in accordance with applicable laws and regulations.

4.0 REMEDIAL INVESTIGATION ACTIVITIES

Hydro Tech performed the following scope of work on behalf of CBCS Washington Street LLC:

1. Conducted a Site inspection to identify AOCs and physical obstructions (i.e. structures, buildings, etc.);
2. Conducted a geophysical survey consisting of a Ground Penetrating Radar (GPR) survey.
3. Installed twelve (12) soil borings across the entire project Site, and collected twenty-two (22) soil samples for chemical analysis from the soil borings to evaluate soil quality;
4. Installed four (4) groundwater monitoring wells throughout the Site to establish groundwater flow and collected four (4) groundwater samples for chemical analysis to evaluate groundwater quality;
5. Installed five (5) soil vapor probes around Site perimeter and collected five (5) soil vapor samples for chemical analysis.
6. Collected one (1) ambient outdoor air sample.

All fieldwork was photo documented. **Appendix B** provides investigation photographs.

4.1 Geophysical Investigation

A geophysical survey consisting of GPR survey was performed during the September 2013 Remedial Investigation. The purpose of the GPR was to determine if any anomalies indicative of underground storage tanks are present at the Site and to clear all sampling locations of any potential subsurface obstructions.

The survey was performed in all accessible portions of the Site over a grid pattern that was determined prior to the survey. The GPR operator wheeled the antenna over the predetermined grid. The GPR survey included the areas in the vicinity of the went pipes located in the northeast portion of the Site along Greenwich Street and the vent pipes located in the southwest portion of the Site along Washington Street. The GPR takes one “scan” per set unit. The number of scans per unit is based upon the estimated size of targets.

As each scan is performed, the antenna emits specific radar amplitude into the subsurface. The amplitude of the radar reflected back to the antenna is based upon the differences in the dielectric constants of the subsurface materials. The differences in amplitude obtained during each scan are graphically displayed on the Control Unit, which are then interpreted by the GPR operator. Additional interpretations are then conducted in the office using computer software.

The results of the GPR survey did not identify any anomalies indicative of underground storage tanks at the Site. However, six vent pipes and two manhole access covers were identified in the northeast portion of the Site along Greenwich Street and two vent pipes were identified in the southwest portion of the Site along Washington Street. The full GPR report is included as **Appendix C**.

4.2 Borings and Monitoring Wells

Drilling and Soil Logging

A total of eight twelve (12) on-Site soil borings designated SP-1 through SP-12 were installed to depths ranging from 14 to 20 feet below grade surface (bgs) during the remedial investigation. Based on maximum excavation depths in different parts of the Site, SP-1, SP-2, SP-3, SP-4, SP-5 and SP-7 were installed to a depth of 20 feet below grade and SP-8, SP-9, SP-10 and SP-11 were installed to a depth of 14 feet. Soil probes SP-6 and SP-7 were installed to a depth of 20 feet bgs in the vicinity of two vent pipes along Washington Street. The soil borings were installed utilizing Hydro Tech's track-mounted Geoprobe® 6620DT, a remotely operated probe hydraulic unit. This unit installs soil probes utilizing direct-push technology.

A map showing the location of soil borings is shown in **Figure 5**.

Soil samples were collected in all soil borings at 2-foot intervals utilizing a 4-foot long Macro Core sampler fitted with dedicated acetate liners. The Macro sampler allows for the collection of both continuous and discrete soil samples. Each sampler was installed with 1½-inch diameter drill rods. Groundwater was not encountered during the installation of the soil borings.

The sample collection initially involved the installation of a Macro Core sampler to the desired sampling depth. A piston stop-pin was then removed from the top of the Macro Core sampler and then installed the length of the sampling interval. The sampler was then removed from the ground with the sample intact in the acetate liner. Continuous soil samples were collected during soil probe installation. A total of twenty-two (22) soil samples were collected

for laboratory analysis. A total of ten (10) shallow samples from zero to 2 feet bgs, six (6) middle samples from 12-16 and six (6) deep samples from 8 to 12.

Separate aliquots of each soil sample were placed into airtight ziploc bags. The Hydro Tech geologist then characterized each soil sample in the field. The soil characterization consisted of determining the soil classification utilizing the Unified Soil Classification System and screening each sample for organic vapors utilizing a Photoionization Detector (PID).

A PID makes use of the principle of photoionization for the detection and qualitative measurement of organic vapors. A PID does not respond to all compounds similarly, rather, each compound has its own response factor relative to its calibration. For this investigation, the PID was calibrated to the compound isobutylene, as published by the manufacturer. The PID has a minimum detection limit of 0.1 parts per million (ppm). This meter measures the hydrocarbon concentrations in isolated portions of the secured samples.

Headspace analyses were conducted on each soil sample by partially filling a ziploc bag and sealing it, thereby creating a void. This void is referred to as the sample headspace. To facilitate the detection of any hydrocarbons contained within the headspace, the container was agitated for a period of 30 seconds. The probe of the PID was placed within the headspace to measure the organic vapors present.

Boring logs were prepared by a geologist are attached in **Appendix D**. A map showing the location of soil borings and monitor wells is shown in **Figure 5**.

Groundwater Monitoring Well Construction

Four (4) groundwater monitoring wells were installed to determine water quality and the site specific flow direction at the Site. The monitoring well was installed utilizing Hydro Tech's track-mounted Geoprobe® 6620DT. All of the monitoring wells are constructed of 1-inch diameter PVC. The total depth of the monitoring wells range from 25 feet to 30 feet below grade. The screened interval of the well consists of 0.020-inch slots and is situated approximately 5 feet above the water table and 10 feet below the water table. The monitoring well construction details are provided in **Appendix E**.

Monitoring well locations are shown in **Figure 5**.

Survey

A land survey was used to identify the location of all soil borings and monitor wells.

Water Level Measurement

Groundwater head measurements were collected utilizing a Solinst® 122 Oil/Water Interface Probe (Interface Probe). The Interface Probe can measure depths to water to 0.01 inch.

The depth to water was measured in the well from the northern portion of the casing top. The groundwater was encountered between 16.40 and 12.20 feet bgs at the Site.

Water level data is included in **Table 1**.

Soil Vapor Boring Construction

Five (5) soil vapor probes designated SV-1 through SV-5 were installed at the Site during this RI. A map showing the locations of the soil vapor borings is shown in **Figure 5**. The soil vapor probes were installed to 10 feet bgs. The probes were constructed with inert tubing. Vapor implants were sealed to the surface with non-VOC containing product.

After installation of the probes, one to three volumes were purged prior to collecting the samples. Samples could not be collected from SV-2 and SV-4 due to interference; therefore, three (3) soil vapor samples were collected for chemical analysis during this RI.

The soil vapor probes were installed utilizing similar technology as the soil probes in accordance with the NYSDOH Guidance of Evaluating Soil Vapor Intrusion, dated October 2006. Each soil vapor sampling point consisted of a stainless steel screen, or implant, fitted with dedicated polyethylene tubing. Each of the implants is of 1½-inch diameter. The soil vapor implant was installed in the subsurface soil. Glass beads were poured into the hole to fully encompass the screen implant and the hole was sealed with bentonite and quick dry-lock non-VOC quick set cement.

4.3 Sample Collection and Chemical Analysis

Sampling performed as part of the field investigation was conducted for all Areas of Concern and also considered other means for bias of sampling based on professional judgment, area history, discolored soil, stressed vegetation, drainage patterns, field instrument measurements, odor, or other field indicators. All media including soil, groundwater and soil vapor have been sampled and evaluated in the RIR. Discrete (grab) samples have been used for final delineation of the nature and extent of contamination and to determine the impact of contaminants on public health and the environment. The sampling performed and presented in this RIR provides

sufficient basis for evaluation of remedial action alternatives, establishment of a qualitative human health exposure assessment, and selection of a final remedy.

Soil Sampling

Twenty-two (22) soil samples were collected for chemical analysis during this RI. All soil samples were collected utilizing a 4-foot long Macro Core sampler fitted with dedicated acetate liners.

The soil was screened and characterized at 2-foot intervals. At least two soil samples from the probes, except SP-6 and SP-12, were containerized and analyzed at a New York State Department of Health ELAP-certified laboratory. One sample was collected from each soil probes SP-6 and SP-12 based upon in-field screening results. These samples collected from SP-6 and SP-12 were analyzed for volatile organic compounds (VOCs) via EPA Method 8260, semi-volatile compounds (SVOCs) via EPA Method 8270. Two samples (one shallow and one deep) were collected from all remaining probes. These shallow and deep soil samples from were analyzed for VOCs via 8260, SVOCs via 8270, pesticides/PCBs via EPA Method 8081/8082, TAL metals and chromium trivalent, chromium hexavalent.

Data on soil sample collection for chemical analyses, including dates of collection and sample depths, is reported in **Tables 2**, **3**, **4** and **5**. **Figure 5** shows the location of samples collected in this investigation. Laboratories and analytical methods are shown below.

A QA/QC for soil sampling was performed and included one field blank and one trip blank for one trip.

All samples were properly handled and placed into the appropriately labeled containers. The samples were placed in a cooler filled with ice and maintained at a maximum 4 degrees Celsius. All samples were transmitted under proper chain of custody procedures to a State-certified (ELAP) laboratory for confirmatory laboratory analyses.

All holding times were met. The laboratory did not report any irregularities with respect to their internal Quality Assurance/Quality Control.

Groundwater Sampling

Four (4) monitoring wells were installed and four (4) groundwater samples were collected for chemical analysis during this RI. Groundwater sample collection data is reported in **Tables 6**, **7**, **8** and **9**. **Figure 5** shows the location of groundwater sampling.

Initially, each groundwater well was purged 3 to 5 well volumes. Groundwater samples were obtained utilizing a peristaltic pump and dedicated tubing. Each groundwater sample was placed into 3 pre-cleaned 40-milliliter (mL) vials, 2 pre-cleaned 250 mL plastic containers, 1 pre-cleaned 500 mL plastic container and 2 pre-cleaned 1,000 mL jars and appropriately labeled. The groundwater samples from the monitoring wells MW-1 through MW-4 were analyzed for volatile organic compounds (VOCs) via EPA Method 8260, semi-volatile organic compounds (SVOCs) via EPA Method 8270, Pesticides/PCBs via EPA Method 8081/8082, TAL Metals (filtered and non-filtered), Chromium Trivalent and Chromium Hexavalent.

Two field blanks and one trip blank were collected. Laboratories and analytical methods are shown below.

Soil Vapor Sampling

Five (5) soil vapor probes were installed and due to interference, three (3) soil vapor samples were collected for chemical analysis during this RI. Soil vapor sampling locations are shown in **Figure 5**. Soil vapor sample collection data is reported in **Table 11**. Methodologies used for soil vapor assessment conform to the *NYS DOH Final Guidance on Soil Vapor Intrusion, October 2006.*

A soil vapor sample from each soil vapor probe was collected utilizing 6-liter pre-cleaned, passivated, evacuated whole air Summa® Canister. A 12-inch by 12-inch piece of plastic sheeting was sealed with beeswax around the edges over the sampling probe in order to keep the tracer gas in contact with the probe and the ambient air from entering the probe during testing.

In order to insure the integrity of the borehole seal and to verify that ambient air is not inadvertently drawn into the sample, a tracer gas, Helium, was used to enrich the atmosphere in the immediate vicinity of the sampling location.

Plastic sheeting was used to keep the tracer gas in contact with the soil vapor probe during the sampling. Prior to soil vapor sampling, approximately 0.3 liters of air was purged out of all vapor points utilizing a syringe.

The Summa Canisters were calibrated for 6 hours and the soil vapor sampling was run on each canister for a time period of 6 hours. The initial vacuum (inches of mercury) and start time was recorded immediately after opening each Summa Canister. After the sampling was complete, the final vacuum and top time was recorded.

After the soil vapor sampling, each Summa was labeled and sent to a laboratory certified to perform air analysis in New York State and analyzed for VOCs via EPA TO-15.

Additionally, one (1) outdoor ambient air sample was collected during this RI.

Chemical Analysis

Chemical analytical work presented in this RIR has been performed in the following manner:

Factor	Description
Quality Assurance Officer	The chemical analytical quality assurance is directed by Phil Murphy
Chemical Analytical Laboratory	Chemical analytical laboratory(s) used in the RI is NYS ELAP certified York Analytical Laboratories.
Chemical Analytical Methods	Soil analytical methods: • TAL Metals by EPA Method 6010C (rev. 2007); • VOCs by EPA Method 8260C (rev. 2006); • SVOCs by EPA Method 8270D (rev. 2007); • Pesticides by EPA Method 8081B (rev. 2000); • PCBs by EPA Method 8082A (rev. 2000); Groundwater analytical methods: • TAL Metals by EPA Method 6010C (rev. 2007); • VOCs by EPA Method 8260C (rev. 2006); • SVOCs by EPA Method 8270D (rev. 2007); • Pesticides by EPA Method 8081B (rev. 2000); • PCBs by EPA Method 8082A (rev. 2000); Soil vapor analytical methods:

	• VOCs by TO-15 VOC parameters.

Results of Chemical Analyses

Laboratory data for soil are summarized in **Table 2**, **3**, **4**, and **5**. Laboratory data for groundwater are summarized in **Table 6**, **7**, **8** and **9**. Laboratory data for soil vapor and air are summarized in **Table 11**. Laboratory data deliverables for all samples evaluated in this RIR are provided in digital form in **Appendix F, G** and **H**.

5.0 ENVIRONMENTAL EVALUATION

5.1 Geological and Hydrogeological Conditions

Stratigraphy

The stratigraphy of the site, from the surface down, consists of 14 to 16 feet of urban fill (sand, brick, pebbles, concrete, glass, charcoal) underlain by moist brown and gray sand and silty sand.

Hydrogeology

A table of water level data for all monitor wells is included in **Table 1**. The average depth to groundwater is 14.83 and the range in depth is 12.20 to 16.40. A map of groundwater level elevations with groundwater contours and inferred flow lines is shown in Figure 6. Groundwater flow is from east to west.

5.2 Soil Chemistry

Data collected during the RI is sufficient to delineate the vertical and horizontal distribution of contaminants in soil/fill at the Site. A summary table of data for chemical analyses performed on soil samples is included in **Tables 2** through **5**. **Figures 7, 8, 9** and **10** shows the location and posts the values for soil/fill that exceed the 6NYCRR Part 375-6.8 Unrestricted Use (Track 1) Soil Cleanup Objectives (SCOs) and the Restricted Use (Track 2) Commercial SCOs. A copy of the laboratory report is provided in **Appendix G**.

The soil samples collected during the RI showed that two VOCs, Naphthalene (maximum of 120 ppm) and Acetone (maximum of 3.1 ppm), are present in the soil the Site at concentrations above the Track 1 but below the Track 2 Restricted Commercial SCOs. Acetone was also detected in two of the laboratory batch blanks. Total VOCs range from non-detected in SP-1 (0’-2’), SP-3 (18’-20’), SP-6 (12’-14’), SP-10 (12’-14’) and SP-11 (0’-2’) to 123.1 ppm detected in SP-2 (0’-2’). PCE and TCE were not detected in any of the soil samples.

SVOCs were detected in five of the ten shallow samples and two of the ten deep samples at concentrations exceeding the Track 2 Commercial SCOs. These SVOCs included benzo(a)anthracene (maximum of 157 ppm), benzo(a)pyrene (maximum of 105 ppm), benzo(b)fluoranthene (maximum of 92.4 ppm), benzo(k)fluoranthene (maximum of 80.4 ppm), chrysene (maximum of 139 ppm), dibenzo(a,h)anthracene (maximum of 7.17 ppm), phenanthrene (maximum of 354 ppm), pyrene (maximum of 287 ppm) and indeno(1,2,3-cd)pyrene (maximum of 28.4 ppm).

Four (4) pesticides including 4,4'-DDD (maximum of 0.00931 ppm), 4,4'-DDT (maximum of 0.047 ppm), 4,4'-DDE (maximum of 0.374 ppm) and dieldrin (maximum of 0.00682 ppm) were detected in the shallow soil at a concentration exceeding the Track 1 Unrestricted Use SCOs but well below the Restricted Commercial SCO. No PCBs were detected in any of the soil samples collected.

Eight (8) metals were identified in the shallow and deep soil samples at concentrations exceeding the Track 1 Unrestricted SCOs. The metals include arsenic (maximum of 20.1 ppm), barium (maximum of 1,100 ppm), copper (maximum of 54.7 ppm), chromium trivalent (maximum of 128 ppm), lead (maximum of 1,180 ppm), mercury (maximum of 0.964 ppm), nickel (maximum of 38 ppm) and zinc (maximum of 372 ppm). Of these metals, arsenic, barium, lead and mercury also exceeded Restricted Commercial SCOs.

Overall, the findings indicate the presence of one petroleum related VOCs in the deep shallow soil beneath the western-central portion of the site (SP-2). A slight petroleum odor, organic vapors and charcoal were noted in this soil sample. No potential source for a release was identified in the vicinity of this soil boring, therefore this results in not indicative of a release and is most likely related to urban fill. The findings further indicate the presence of historic fill material from zero to 14 feet bgs as evidenced by the presence of SVOCs, pesticides and metals in the soil.

5.3 Groundwater Chemistry

Data collected during the RI is sufficient to delineate the distribution of contaminants in groundwater at the Site. A summary table of data for chemical analyses performed on groundwater samples is included in **Tables 6**, **7**, **8** and **9**. A summary table of the analytical results for the trip and field blanks is included in **Table 10**. **Figures 11, 12** and **13** show the location and posts the values for groundwater that exceed the New York State 6NYCRR Part 703.5 Class GA groundwater standards. A copy of the laboratory report is provided in **Appendix H**.

Groundwater samples collected during the RI showed no PCBs, pesticides or chlorinated VOCs at concentrations exceeding the Part 703.5 GQS. Total VOCs range from 4 ppb in MW-2 to 78 ppb detected in MW-3. Three VOCs, Isopropylbenzene (maximum of 15 ppb), n-Propylbenzene (maximum of 37 ppb) and sec-Butylbenzene (maximum of 12 ppb) were detected in the groundwater sample collected from MW-3 located in the southwest portion of the Site at concentrations exceeding the GQS. Other VOCs including 1,2,4-Trimethylbenzene, Acetone,

MTBE and sec-Isopropyltoluene were detected in this groundwater sample at concentrations below the GQS. PCE and TCE were not detected in any of the groundwater samples. Three SVOCs were detected in MW-3 at concentrations exceeding the GQS. These SVOCs are identified as Benzo(a)pyrene (maximum of 2.32 ppb), Benzo(b)fluoranthene (maximum of 2.23 ppb) and Chrysene (maximum 2.55 ppb). No other SVOCs were detected in any of the groundwater samples at concentrations exceeding the GQS.

Several metals were detected in the unfiltered groundwater samples from the Site. Four (4) dissolved metals were detected in the filtered groundwater samples at concentrations above their respective GQS. These include Magnesium (maximum of 51,600 ppb), Manganese (maximum of 1,450 ppb), Selenium (maximum of 14 ppb) and Sodium (maximum of 328,000 ppb).

5.4 Soil Vapor Chemistry

The soil vapor results collected during the RI were compared to the compounds listed in Table 3.1 Air Guideline Values Derived by the NYSDOH located in the New York State Department of Health (NYSDOH) Final Guidance for Evaluating Soil Vapor Intrusion. Petroleum related and chlorinated VOCs were detected in soil vapor samples collected during the RI. All contaminant concentrations were below 100 ug/m^3 except for Acetone (maximum of 1,200 ug/m^3). Chlorinated VOCs including Tetrachloroethylene (PCE) was detected in all of the soil vapor samples at a maximum concentration of 90 ug/m^3. Trichloroethylene (TCE) was not detected in any of the soil vapor samples.

Data collected during the RI is sufficient to delineate the distribution of contaminants in soil vapor at the Site. A summary table of data for chemical analyses performed on soil vapor samples is included in **Table 11.**

5.5 Prior Activity

Based on an evaluation of the data and information from the RIR, disposal of significant amounts of hazardous waste is not suspected at this site.

5.6 Impediments to Remedial Action

There are no known impediments to remedial action at this property.