REMEDIAL INVESTIGATION WORK PLAN

Former Bridge Cleaners Site
NYSDEC Site No. C241127
39-26 30th Street
Long Island City, New York

Prepared for:

Zhong Chuang Properties LLC
c/o Mr. Al Nesheiwat
Sustainable Development, LLC
166 Woodside Avenue
West Harrison, New York 10604

James J. Periconi, Esq.
260 Madison Avenue
15th Floor
New York, New York 10016

for submission to

Ms. Ruth Curley, P.E.
NYSDEC
Div. of Env. Remediation
625 Broadway, 11th Floor
Albany, New York 12233-7016

John Byrne, Esq.
NYSDEC
Office of General Counsel
1 Hunters Point Plaza, 47-40 21st St.
Long Island City, New York 11101

Mr. Christopher Doroski
NYSDOH
Bureau of Environmental Exposure Investigation
Empire State Plaza
Corning Tower Room 1787
Albany, NY 12237

October 2013

TechSolutions Engineering, P.C
52 Oceanview Boulevard
Manorville, New York 11949
Phone: (914) 319-9375

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Engineering Certification:

I, Daniel J. Smith, P.E. certify that I am currently a New York State registered Professional Engineer and Qualified Environmental Professional as defined in 6 NYCRR Part 375 and that this Remedial Investigation Work Plan was prepared in general accordance with applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10) and agreements between NYSDEC and the Volunteer under the applicable Brownfield Cleanup Agreement.

Please note that nothing in this certification shall preclude field changes that are determined to be necessary in the event of an emergency to be protective of human health and / or the environment or minor modifications that do not impact the overall intent of the Remedial Investigation. Any such emergency actions / field changes will be coordinated with DER as soon as practical following resolution the emergency situation or the necessary field modification.

Daniel J. Smith, P.E.
NYS PE License No. 073173

TechSolutions Engineering, P.C
52 Oceanview Boulevard
Manorville, New York 11949
Phone: (914) 319-9375

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1.0 INTRODUCTION AND BACKGROUND INFORMATION

On or about May 17, 2013, the Site was accepted into the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP) as Site No. C241127. The applicant, Zhong Chuang Properties LLC, is participating in the BCP as a Volunteer as defined in Environmental Conservation Law (ECL) 27-1405(1)(b).

Under the BCP, the Volunteer has agreed to undertake certain environmental actions, including the development of this Remedial Investigation (RI) Work Plan and implementation of the RI as outlined herein. Based upon discussions between the Volunteer and NYSDEC, the proposed RI will be completed in a phased approach with the initial phase of work including on-site soil and groundwater sampling and a Soil Vapor Intrusion (SVI) investigation. In addition, a SVI Mitigation design and installation program will also be completed as part of the initial phase of work if SVI investigation data confirm that mitigation is warranted. The scope and schedule for subsequent phases of work, if determined to be necessary, will be developed based upon the findings of the initial phase of investigation and the results of discussions with NYSDEC. This RI Work Plan outlines the scope of work to be implemented during the initial phase of the RI. If additional investigation is to be completed following the initial scope of work outlined herein, an addendum to this RI Work Plan will be provided for subsequent phase(s) of investigation consistent with NYSDEC's letter, dated July 9, 2013.

1.1 Site Location and Description

The subject property is located at 39-26 30th Street, between 39th Avenue and 40th Avenue, in Long Island City, Queens, New York (hereinafter the "Site"). The site is designated as Tax map ID No. 4-399-31 and is located in an urban area consisting of a mix of industrial commercial and residential structures. The site includes a 7,500 square foot one-story concrete building that occupies the entire lot. The back (north-northwest side) of the lot abuts adjacent buildings and a small driveway is located immediately to the west of the site building (see ***Figure 1***). The building has no basement. As of the date of this RI Work Plan, the building is occupied with limited operations.

The section of Long Island City containing the Site is zoned Special Purpose District which allows mixed residential and commercial use. The specific designation for the site is M1-3/R7X. Buildings within the city block are primarily commercial. There are residential units including a three-story apartment building along 29th Street. The downgradient block also contains a limited number of residential buildings.

1.2 Site History and Ownership

The site was occupied by a commercial laundry and dry cleaner starting in approximately 1997. The dry cleaning operations reportedly continued until May 2011. Historic dry cleaning operations were performed under the name Bridge Cleaners and also formerly as Queens Boro Cleaners.

Based upon review of the New York City (NYC) Department of Finance, Office of the City Register Database, the earliest deed for the property on file is dated June 5, 1992, under the names Alenat Corp. and Jarco Realty Company. Between 2007 and 2012 there were several deed notations however, no detailed information pertaining to operations was available in the data base. Based upon information provided by SDI, It is believed that the property was constructed in the 1950s. The property was used for warehousing and distribution until 1988. From 1988 to 1994, the property was occupied by LSL Hydro and was used for water bottling and distribution. From 1994 to 1995, Main Trading Company occupied the site and was used for fabric cutting and sewing. From 1995 to 1997, the site was occupied by Aersonic Company and was used as a courier service.

1.3 Regional Issues

Additional information provided to TechSolutions by Sustainable Development indicates that the neighboring property (39-27 29th Street) was at one time a greeting card manufacturer. Greeting card and similar printing operations often utilize various solvents (including chlorinated solvents) to degrease and clean the printing equipment and therefore it is possible that operations of adjacent properties have adversely impacted the subsurface of the subject property. Further, there are a number of historical dry cleaning operations that have been located in both cross- and up-gradient locations from the subject site indicating that there may be regional areas of concern.

1.4 Previous Investigations and Environmental Studies

There are reportedly two (2) historic environmental investigations / studies that have been completed at the site:

- Soil and Groundwater Sampling Program, Long Island Analytical Laboratories (LIAL), September 2011; and,

- Site Characterization Report, E&E Engineering, May 2012. Please note that this report was completed for the NYSDEC. A copy of the Site Characterization Report, including tables summarizing analytical data and figures showing historic sample locations, is provided in ***Appendix A***

In addition, the following assessments were conducted for an adjacent property located at 39-27 29th Street:

- Phase I Environmental Site Assessment, E&E Engineering, 2007; and,
- Phase II Environmental Site Assessment, Preferred Environmental, Inc. (Preferred), 2010.

1.4.1 Long Island Analytical Investigation (September 2011)

A soil and groundwater sampling program was completed at the subject site by Long Island Analytical Laboratories (LIAL) in September 2011. Five soil borings were installed within the site building, with three of those borings being completed as monitoring wells. The depth to groundwater at the subject site was observed to be approximately 22 feet below ground surface (bgs). Soil and groundwater samples were collected and analyzed for the presence of volatile organic hydrocarbons. The results of the soil sampling indicated minor detections of tetrachloroethylene (PCE) at all five locations, though no results exceeded application regulatory criteria. The results of the groundwater sampling indicated regulatory exceedances at all three locations:

- GW-1:
  - Tetrachloroethene (PCE): 1,470 µg/L;
  - Trichloroethene (TCE): 12.5 µg/L;
- GW-2:
  - PCE: 537 µg/L;
- GW-3:
  - PCE: 841 µg/L;
  - TCE – 11 µg/L;
  - sec/tert-butylbenzene: total of 19.52 µg/L;
  - 1,2,4-trimethylbenzene:13.9 µg/L;
  - 4-isobutylbenzene: 6.45 µg/L;
  - 1,4 diethylbenzene: 35.9 µg/L; and,

- 1,2,4,5-tetramethylbenzene: 11.2 µg/L.

Based on the sampling results, LIAL concluded that due to the fact that no significant levels of PCE were identified in site soils, it thus appeared that groundwater impacts at the site were attributable to an off- site/upgradient source.

1.4.2 E&E Engineering Groundwater Investigation (February 2012)

In February 2012, E&E installed five (5) monitoring wells in the vicinity of the subject site. Groundwater samples were then collected from all five monitoring wells. Based on the direction of groundwater flow in the area of the site, SDI determined that sampling locations MW-2, MW-3 and MW-5 are the most relevant to the subject site (i.e., immediately adjacent to the subject property), and as such, only the sampling results from these locations will be discussed herein. It should be noted that sampling location MW-1 is located upgradient of the subject site and will be used as an off-site, upgradient control for the purposes of discussion.

The results of soil sampling indicated the presence of PCE at each of the three aforementioned monitoring well locations; however, the detected levels were all extremely low and did not exceed applicable regulatory criteria. TCE was also detected, though only at the MW-3 location, and at low levels, i.e., below regulatory criteria. The soil sample collected from upgradient location MW-1 contained PCE at a similarly low level.

The results of the groundwater sampling indicated the presence of PCE at levels exceeding regulatory criteria in the three pertinent monitoring wells as well as upgradient monitoring well MW-1. It should be noted that PCE detected in MW-3 (440 µg/L) was approximately 10 to 15 times higher than the levels in the other wells. TCE was also detected at monitoring wells MW-3 (32 µg/L) and MW-5 (2.1 µg/L), as well as upgradient monitoring well MW-1 (1.1 µg/L), with only MW-3 exceeding regulatory criteria. Previous groundwater sampling conducted at a neighboring and cross/up-gradient property (39-27 29th Street) indicated the presence of PCE at levels exceeding regulatory criteria (910 µg/L and 120 µg/L, respectively). See ***Appendix A*** for data summary tables and a figure showing historic sample locations.

Taking into account sampling data collected during previous investigations, E&E concluded that a chlorinated groundwater plume is present under the area of the subject site, with a possible source of chlorinated impacts being located in the southwest corner of the subject site. E&E thus recommended that additional investigation, including that related to possible vapor-mitigation, be conducted around the inferred source area at the subject site.

1.4.3 Adjacent Off-Site Investigations

The following information is provided based upon a summary of prior investigations that was included in the May 2012 Site Characterization Report completed by E&E Engineering at an adjacent property (39-27 29th Street). Although the Phase I and the below mentioned Phase II ESA (Preferred, 2010) were both conducted for the property at the rear of and adjacent to the Bridge Cleaners site, both sites are in very close proximity to the subject property immediately along the property line. A copy of the Site Characterization Report, including tables summarizing analytical data and figures showing historic sample locations, is provided in ***Appendix A***

The 2010 Phase II ESA completed by Preferred Environmental, Inc. (Preferred) included the collection of six soil samples from four soil borings; two groundwater samples collected from temporary wells installed at two of the four soil borings; and, four soil vapor samples from below the basement and first floor of the building. The soil and groundwater samples were submitted for volatile organic compound (VOC), semi-volatile organic compound (SVOC), pesticides, polychlorinated biphenyl compounds (PCBs), Target Analyte List (TAL) metals and mercury analysis. Soil vapor samples were only submitted for VOCs analysis.

No PCBs were detected in any of the soil samples. Only one soil sample, SB-4, collected from 0 to 2 feet below grade surface (bgs) on the west portion of the site, revealed VOCs and SVOCs above method detection limits. However, concentrations of these compounds were well below Unrestricted Use SCOs. Low levels of various TAL metals were detected in all six soil samples; also well below Unrestricted Use SCOs. The pesticide Aldrin was reported in two soil samples, one of which slightly exceeded the Restricted-Residential SCO of 97 µg/kg. The pesticide Dieldrin was also reported in two soil samples, both exceeding the Residential SCO of 39 µg/kg but below the Restricted-Residential SCO of 200 µg/kg.

No SVOCs or PCBs were reported in either of the two groundwater samples. However, both groundwater samples exceeded the NYSDEC Class GA Ambient Water Quality Standard of 5 µg/L, with 910 µg/L of PCE detected in sample GW-1 (the eastern portion of the property closest to the Bridge Cleaners site), while 120 µg/L of PCE was detected in sample GW-2 (the western portion of the property farther away from Bridge Cleaners). Elevated iron, magnesium, manganese, and sodium were reported in total metals analysis; however, only sodium and magnesium were reported in the dissolved metals analysis.

Both PCE and TCE were detected in all four soil vapor samples collected from 6 feet below grade in the cellar and first floors at the site. PCE was detected above the NYSDOH Air Guidance Value of 100 µg/m^3, in two of the samples, at 400 µg/m^3 in one

sample and at 16,900 µg/m^3 in another, indicating that vapor mitigation may be warranted.

1.5 Geology and Hydrogeology

Site-specific soil and geology data was not provided in any of the historic reports available to TechSolutions[2]. Based upon review of the NYSDEC site remediation database for the Site, soils in the area are identified as "primarily sand".

Groundwater elevation levels vary from 11.04 above mean sea level (amsl) to 10.01 amsl in the vicinity of the site based upon the NYSDEC site remediation database. Depth to groundwater at the site ranges from approximately 16 to 28 feet bgs based upon data provided by others. Groundwater flow is reportedly toward the south-southwest.

[2] *Appendix C of the E&E Report was identified as soil boring logs that would likely contain site-specific soil information. However, Appendix C was not included in the copy of the E&E report provided to TechSolutions.*

2.0 REMEDIAL INVESTIGATION OBJECTIVES

This section of the RI Work Plan outlines the investigation objectives and presents an overview of the proposed scope of work, including the discussion of the phased approach planned for site investigation and characterization. This phased approach was discussed during SDI's September 4, 2013 telephone call with NYSDEC.

2.1 Remedial Investigation Objectives

In accordance with DER-10, a RI is necessary where data indicate disposal of contaminants at the site has occurred and contamination is potentially present at levels and/or at frequencies sufficient for DER to require a full delineation of the nature and extent of the contamination, to allow a decision by DER regarding any necessary remediation. On this site, the applicable objectives of the RI are:

- Delineation of the areal and vertical extent of contaminants in all media at or emanating from the site;
- Determination of the surface and subsurface characteristics of the site, including topography, geology and hydrogeology, including depth to groundwater;
- Identification of the sources of contamination, migration pathways, and actual or potential receptors of contaminants on or through air, soil, groundwater, utilities, and structures at a contaminated site, without regard to property boundaries;
- Collection and evaluation of data necessary to evaluate the actual and potential threats to public health and the environment; and,
- Collection of data necessary to evaluate any release to an environmental medium and develop remedial alternative(s) to address the release.

It is important to note that some of this information has already been obtained through work completed historically at the site. Historic work will be summarized in the RI Report to be issued upon completion of the activities outlined herein to provide a comprehensive summary of site conditions in one document. In addition, per discussions between the Volunteer and NYSDEC, the objectives outlined above may be met by completing site investigation activities in phases. This RI Work plan focuses on the initial phase of investigation only which includes on-site soil, soil vapor, indoor air, and groundwater investigation of the shallow groundwater zone. Additional investigation needs consistent with NYSDEC requirements for the RI work plan for this site, as set forth in the letter dated July 9, 2013, as applicable, will be re-assessed after completion of this initial phase of investigation. Subsequent phases (if deemed necessary) may include deep groundwater and off-site assessment.

2.2 Remedial Action Objectives (RAOs)

Although the extent, if any, of remediation to be completed has not yet been defined, it is beneficial to establish Remedial Action Objectives (RAOs) at the onset of the RI to ensure that data obtained are directly related to the ultimate goal of remediating the property. In accordance with DER-10, RAOs must consider the following:

- Applicable Standards, Criteria and Guidance (SCGs) considering the current, intended and reasonably anticipated future use of the site and its surroundings;
- All contaminants exceeding applicable SCGs;
- Environmental media impacted by such contaminants;
- Extent of the impact to the environmental media;
- All actual or potential human exposures and/or environmental impacts resulting from the contaminants in environmental media identified above; and,
- Any site-specific cleanup levels developed.

The RAOs identified in ***Sections 2.2.1 through 2.2.3*** are applicable at the site.

2.2.1 Groundwater RAOs

The following RAOs shall apply to groundwater:

- *RAO for Public Health Protection:* (1) Prevent contact with, or inhalation of, volatiles from contaminated groundwater; and,
- *RAO for Environmental Protection:* (1) Restore the groundwater aquifer to pre-disposal / pre-release conditions to the extent practicable, and (2) Remove the source of ground or surface water contamination to the extent practicable.

2.2.2 Soil RAOs

The following RAOs shall apply to soil:

- *RAO for Public Health Protection:* (1) Prevent ingestion / direct contact with contaminated soil; and, (2) Prevent inhalation of, or exposure from, contaminants volatilizing from contaminants in soil.

2.2.3 Soil Vapor RAOs

The following RAOs shall apply to soil vapor:

- *RAO for Public Health Protection:* (1) Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into the building(s) at the site.

2.3 Standards, Criteria and Guidelines

Standards, Criteria and Guidance (SCGs) are defined as "mean standards and criteria that are generally applicable, consistently applied, and officially promulgated, that are either directly applicable, or that are not directly applicable but are relevant and appropriate, unless good cause exists why conformity should be dispensed with, and with consideration being given to guidance determined, after the exercise of scientific and engineering judgment, to be applicable." SCGs are essentially similar to the CERCLA concept of Applicable or Relevant and Appropriate Requirements (ARARs).

The most common SCGs applicable in New York State and at the former Bridge Cleaners site are the following:

- Soil: SCOs and supplemental SCOs identified in 6 NYCRR 375-6.8 and the Commissioner's Policy on *Soil Cleanup Guidance* (CP-Soil), as amended, including but not limited to CP-51 - Soil Cleanup Guidance;

- Groundwater: Groundwater cleanup guidelines and standards identified in the form of Class GA Groundwater Quality Standards / Guidelines in TOGS 1.1.1, Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations, June 1998, as amended; and,

- Soil Vapor / Indoor Air Quality: NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York, October 2006, as amended.

In addition to the regulatory SCGs identified above, the follow regulations *may* also apply to the remedy selection and implementation process that will be better defined following completion of the RI:

- New York Codes, Rules and Regulations (NYCRR) Part 175 - Special Licenses and Permits--Definitions and Uniform Procedures;

- NYCRR Part 371 - Identification and Listing of Hazardous Wastes;

- NYCRR Part 372 - Hazardous Waste Manifest System and Related Standards for Generators, Transporters and Facilities (November 1998);

- NYCRR Subpart 374-1 - Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities;

- NYCRR Part 375 - Environmental Remediation Programs;

- NYCRR Part 376 - Land Disposal Restrictions;

- NYCRR Part 608 - Use and Protection of Waters;
- NYCRR Parts 700-706 - Water Quality Standards;
- NYCRR Part 750 through 758 - Implementation of NPDES Program in NYS (SPDES Regulations);
- Code of Federal Regulations (CFR) Part 1910.120 - Hazardous Waste Operations and Emergency Response; and,
- CFR Part 144 - Underground Injection Control Program

Formal regulations are not the only SCGs that may be applicable. The following regulatory guidance documents *may* be applicable and also will be considered in the final remedy design and implementation:

- United States Environmental Protection Agency (USEPA) Office of Solid Waste and Emergency Response (OSWER) Directive 9355.047FS Presumptive Remedies: Policy and Procedures;
- USEPA OSWER Directive 9355.048FS Presumptive Remedies: Site Characterization and Technology Selection for CERCLA sites with Volatile Organic Compounds in Soils;
- Department of Environmental Remediation (DER)-10 - Technical Guidance for Site Investigation and Remediation;
- DER-15 - Presumptive/Proven Remedial Technologies;
- Technical and Administrative Guidance Memorandum (TAGM) 4013 - Emergency Hazardous Waste Drum Removal/ Surficial Cleanup Procedures;
- TAGM 4059 - Making Changes To Selected Remedies;
- TAGM 3028 - "Contained In" Criteria for Environmental Media: Soil Action Levels;
- TOGS 1.1.1 - Ambient Water Quality Standards & Guidance Values and Groundwater Effluent Limitations;
- TOGS 1.3.8 - New Discharges to Publicly Owned Treatment Works;
- TOGS 2.1.2 - Underground Injection/Recirculation (UIR) at Groundwater Remediation Sites;
- Cleanup Program (CP) - 43 - Groundwater Monitoring Well Decommissioning Procedures;
- CP-51 - Soil Cleanup Guidance;
- Air Guide 1 - Guidelines for the Control of Toxic Ambient Air Contaminants;

- Citizen Participation in New York's Hazardous Waste Site Remediation Program: A Guidebook;
- OSWER Directive 9200.4-17 - Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites; and,
- NYSDOH Environmental Health Manual CSFP-530 - "Individual Water Supplies - Activated Carbon Treatment Systems".

It should be noted that these SCGs are only potentially applicable at this stage of the remedial investigation program and a more detailed applicability review will be completed as part of the future Remedial Design / Remedial Action (RD/RA) process.

3.0 REMEDIAL INVESTIGATION SCOPE OF WORK

This section of the RI Work Plan provides the specific investigative activities to be performed at the site including sampling procedures and protocols.

3.1 Overview of Investigation Approach

Investigation of the site is proposed to be completed in a phased approach to ensure that the site is thoroughly characterized in the most cost-effective manner that focuses on site-specific issues without bias in relation to regional concerns. The initial phase of work outlined in this RI Work Plan includes the following general scope of work:

- *Soil Sampling*: Historic investigations have identified soil impacts at the subject property; however, there was little information made available to Sustainable Development regarding site specific geology and impacts to soil as a function of depth. In addition, the parameters included in historic investigations were incomplete with respect to initial DER-10 investigation guidance. The work proposed in this RI will address those data gaps in the soil investigation work completed to date at the site;

- *Groundwater Sampling*: Given the small size of the subject property, the historic groundwater sampling program was sufficient to provide a good overview of the areas of potential concern at the site. However, the parameters analyzed were not wholly consistent with DER-10 and an update of historic data for confirmation purposes is desirable.

- *Soil Vapor and Indoor Air Quality Sampling*: Although there has been some limited soil vapor sampling performed at the site in the past by others, a formal Soil Vapor Intrusion (SVI) investigation in conformance with NYSDOH guidance has not yet been performed. This RI Work Plan outlines additional SVI investigation to provide a more comprehensive SVI characterization that will be sufficient to design SVI mitigation measures, if determined to be applicable.

A more detailed description of each of these elements of the proposed scope of work is outlined in the following sections.

3.2 Preliminary Activities / Non-Intrusive Investigation

Before starting intrusive drilling and investigation, several office-based and non-intrusive field activities are to be completed as outlined below.

3.2.1 Utility Clearance

Prior to the start of any field work, a public utility mark out will be performed by calling the ONE-CALL center and recording the ticket number assigned. As utility markouts are completed, all documentation will be retained to document compliance with mark out requirements. A minimum of 72 hours will be allowed for mark outs starting on the

business morning following the time of the initial mark out call. Additional time may be required to ensure that all markouts are completed. At the Volunteer's discretion, a private utility detection company may also be employed to verify the location of utilities and subsurface structures and to ensure clearance for proposed boring and sample locations.

3.2.2 Initial Site Inspection

Prior to intrusive sampling, a site walk through will be completed to verify access to proposed sample locations and to coordinate work with site occupants and regulators as appropriate. This initial inspection may also be utilized to complete the inventory documentation part of the proposed SVI investigation and to identify locations of historic operations or potential concern (if possible) to meet NYSDEC requests for additional research into historic site operations.

As a minimum, the preliminary site inspection shall assess and document the following:

- Identification of current and former equipment locations to the degree possible. It should be noted that the building has been significantly renovated and visual inspection may not be able to determine historic information;
- Identification of any floor drains or other subsurface features that may be evident from at-grade infrastructure and (e.g., vent pipes, access hatches, floor patches, utility chases, etc.);
- The location and condition of any pre-existing monitoring wells. This inspection shall determine the usability of any existing wells. Wells determined not to be usable will be replaced / repaired as discussed further in ***Section 3.5***; and,
- Any storage or use of hazardous materials.

The proposed investigation locations discussed later in this section may be modified as appropriate based upon this inspection and the results of the FOIA review process. Any proposed modifications would be coordinated with the NYSDEC.

3.2.3 Historic Records Searches and Permits

Given the relative lack of historic information available regarding site operations, a Freedom of Information Act (FOIA) request package will be made to Local, State and Federal agencies to determine if there is any additional information that will assist in optimizing investigation activities. Work under this task will also include review of New York City online databases related to site activities and possible historic permits. Data obtained will be used to optimize the investigation program and will be summarized in the final RI Report.

In addition to the FOIA records review, permits may be needed for aspects of the investigation program. As a minimum, NYC Sidewalk / Street opening permits will be obtained as required for the work. Depending upon the characterization of investigation derived wastes (IDW), a hazardous waste generator ID number may also be required to facilitate disposal of IDW.

Work shall be scheduled so that historic research will not adversely impact the field implementation schedule.

3.3 General Investigation Guidance

Environmental sampling will be conducted in general accordance with the appropriate techniques presented in the following guidance documents as well as the protocols outlined in the QAPP under separate cover:

- Sampling Guidelines and Protocols, NYSDEC, Division of Water, March 1991;
- Compendium of Superfund Field Operations Methods, US EPA, December 1987 (EPA/540/P-87/001);
- RCRA Ground-Water Monitoring: Draft Technical Guidance, US EPA, November 1992 (EPA/530-R-93-001);
- Soil Sampling Quality Assurance User's Guide (Second Edition), US EPA, March 1989, (EPA/600/8-89/046);
- USEPA Region II CERCLA Quality Assurance Manual, Revision 1, USEPA Region II, October 1989;
- NYSDEC DER-10 – Technical Guidance for Site Investigation and Remediation, May 2010; and,
- NYSDEC New York State Brownfield Cleanup Program Development of Soil Cleanup Objectives Technical Support Document, September 2006.

Samples must be collected using equipment that has been properly decontaminated and procedures appropriate to site-specific factors including the matrix, the parameters to be analyzed, and the Data Quality Objectives (DQOs) of specific tasks.

The volume of the sample collected must be sufficient to perform the analyses requested, as well as the Quality Assurance / Quality Control (QA/QC) requirements. Sample volumes, container types, and preservation techniques will also be confirmed with the approved laboratory.

Before leaving the facility, the sampler will:

- Check all paperwork for accuracy and completeness;

- Match the physical samples with the associated paper work. The sampler will check for proper samples in the correct containers and that the field number on the samples correspond with the numbers on the completed Chain of Custodies (COCs);
- Verify that samples are properly stored and secure for transport;
- Clean and package all non-disposable equipment;
- Make sure the items on the sample tags, request forms, COC record, and log book match;
- Bag all disposable items that need to be discarded; and,
- Ensure that all sample containers are free of any debris.

To avoid cross contamination, sampling equipment (defined as any piece of equipment which may contact a sample) will be decontaminated as outlined in the QAPP.

3.4 Soil Investigation and Sampling

The following sections provide detailed of the proposed soil investigation program.

3.4.1 Soil Borings / Sample Locations

Proposed soil sampling locations are identified in ***Figure 2***. A summary of the soil investigation program, as well as proposed investigation of other media, is provided in ***Table 1***.

As indicated in ***Figure 2***, five (5) soil borings are proposed to obtain additional data and to identify the site-specific geology. Soil borings will be extended to the water table (borings to be completed as wells following soil sampling will be extended deeper to the targeted well depth, see ***Section 3.5*** for additional information). Soil samples will be collected from each five-foot depth interval from grade to the termination of the boring at each sampling location.

Based upon the anticipated depth to groundwater (approximately 25 to 30 feet below grade surface maximum), a maximum of twenty-five to thirty soil samples are anticipated to be collected from the five soil boring locations.

3.4.2 Soil Sampling Procedures

The following procedures will be utilized to collect soil samples at each location (see ***Figure 2***):

- An access hole will be cut through the concrete slab utilizing a drive hammer or concrete corer at each location;

- Soil samples will be collected on a nominal basis from the surface to the targeted termination depth (see ***Table 1***) or until groundwater is encountered, whichever occurs first;

- Soil samples will be inspected and classified in accordance with the Unified Soil Classification System. Soil samples will be field screened utilizing a photo-ionization detector (PID) and by visual and olfactory inspection for the presence of impact. A graphic log of each soil boring will be prepared with appropriate stratification lines, lithologic descriptions, sample identifications, PID readings, sample depth intervals and dates.

- At each soil boring location, soil samples will be collected on a nominal continuous basis by advancing a four-to-five-foot-long stainless steel macrocore sampler with a direct-push drill rig. Each macrocore sampler will be equipped with factory-decontaminated, plastic acetate liners;

- Representative soil samples will be placed into laboratory-supplied glassware and stored on ice pending the final selection of samples to be analyzed. At each sampling interval (i.e., every five feet vertically), the appropriate soil sample volume will be transferred into laboratory-supplied glassware (the VOC aliquot will be placed in En Core or Terra Core samplers per EPA Method 5035A), which will immediately be placed on ice; and,

- Upon termination of each boring, the boring will either be converted to a monitoring well (see ***Section 3.5***) or backfilled with site soils and grade restored to match existing conditions.

3.4.3 Soil Analytical Parameters

The following analytical parameters shall be included in the soil sampling program:

- All soil samples collected (i.e., at each vertical interval and at each of the five soil boring locations) shall be analyzed for Target Compound List (TCL) Volatile Organic Compounds (VOCs). This results in a maximum of approximately 25 to 30 samples for VOCs analyses depending upon the depth to groundwater at each boring location; and,

- One soil sample from each boring location (at a depth to be determined in the field based upon field-screening and visual observations) will be analyzed for TCL Semi-Volatile Organic Compounds (VOCs), polychlorinated biphenyl compounds (PCBs), pesticides, and Target Analyte List (TAL) Metals. Based upon the number of borings proposed, this will result in five total samples for these additional parameters.

All analyses will be performed by an Environmental Laboratory Approval program (ELAP) certified laboratory for the parameter being run. Results will be provided with Analytical Services Protocol (ASP) Category B deliverables electronically.

Quality control samples shall be collected and analyzed as outlined in the QAPP under separate cover. A Data Usability Summary Report (DUSR) will also be completed in accordance with DER-10 requirements.

3.5 Groundwater Investigation and Sampling

The following sections outline the proposed groundwater investigation at the site.

3.5.1 Existing Well Search and Contingent Replacement

The first step of the groundwater investigation will be the completion of the existing well inspection discussed previously in ***Section 3.2.2***. Attempts will be made to locate any of the pre-existing wells identified in historic investigation reports. If located, the viability of these existing monitoring wells will be assessed. Replacement monitoring wells will be installed if any or all of the former LIAL-installed wells are not able to be located or are found to be not be viable for sampling.

3.5.2 New Monitoring Well Installation

In addition to the use or replacement of the three existing monitoring wells that may still be usable on-site, two additional shallow monitoring wells will be installed in order to sufficiently characterize shallow groundwater at the site, as well as to provide a comprehensive assessment of the groundwater flow direction. The locations of the final five (5) wells to be used for groundwater monitoring, which may be a combination of new and existing wells based upon the initial site inspection, are shown on ***Figure 3***. During monitoring well installation, soils will be logged and screened as discussed previously.

New monitoring wells (including replacement of the three reportedly existing wells if necessary) will be constructed with 2-inch ID, Schedule 40 polyvinyl chloride (PVC) screen and riser. A ten-foot-long, 0.010-inch slot screen is proposed. The screen will be set so as to straddle the groundwater table surface with approximately seven foot into the water table and three foot above the water table (see ***Table 1*** for the proposed well installation summary). This proposed screened interval may be modified in the field based upon the judgment of the environmental professional overseeing work in the field. Any changes will be coordinated with the NYSDEC. A #1 size sand pack will be installed from the bottom of the well up to two feet above the top of the well screen. Bentonite slurry will then be installed around the riser to an elevation of 0.5-foot below grade. Each monitoring well will be finished with a locking well cap, a concrete apron (if necessary), and a flush-mounted road box. Security bolts will be installed in the well covers to minimize the potential for unauthorized well access. A New York State-licensed surveyor will survey all monitoring wells so that an accurate calculation of groundwater elevations can be made.

3.5.3 Well Development Procedures

At least 24 hours after the monitoring wells are installed, each well will be developed with the pump and surge development method using a ½" diameter HDPE tubing with a surge block and pumping with a peristaltic pump. During well development, water quality parameters (pH, specific conductivity, temperature and turbidity) will be measured using a Horiba U-22 Multiparameter Meter and a Lamotte 2020 turbidimeter (or equivalent / similar equipment) and the data recorded on well development logs. A monitoring well will be considered developed when three consecutive water quality parameter readings have stabilized and turbidity is consistently below 50 NTU. If the turbidity cannot be maintained below 50 NTU, the NYSDEC will be contacted to coordinate further actions. Monitoring well development logs will be completed for inclusion in the RI report. Following development of the monitoring wells, groundwater samples will then be collected from all existing/new monitoring.

3.5.4 Well Sampling Procedures

A minimum of seven (7) days after completion of well development, groundwater sampling will be initiated. Groundwater samples will be collected from all existing / new monitoring wells (total of five wells) utilizing the low-flow sampling technique in accordance with the following protocols (see QAPP for additional information):

- A decontaminated low-flow, electric submersible pump will be lowered to the bottom of a well and then raised approximately two feet to ensure that the pump intake is within the well's screened interval;
- The pump will be turned on with an initial high flow rate to initiate the pumping process;
- Once flow is established, the flow rate will be lowered to less than or equal to 100 milliliters per minute (ml/m) and field parameters (i.e., pH, dissolved oxygen, conductivity, temperature, turbidity and oxidation reduction potential) will be measured and recorded on a two-to-five minute; and,
- Once the field parameters stabilize (i.e.., three readings within ten percent of one-another), laboratory-supplied glassware will be filled directly from the pump discharge.

One round of groundwater sampling is included in the RI. All sampling activities, including well purging, will be documented in a field notebook.

3.5.5 Groundwater Analytical Parameters

The following analytical parameters shall be included in the groundwater sampling program:

- All groundwater samples collected (i.e., at each existing and new well – total of five wells) shall be analyzed for TCL VOCs, TCL SVOCs, and TAL Metals; and,

- PCBs and pesticide sampling is proposed for one upgradient well and two downgradient wells to be determined after confirmation of the site-specific groundwater flow direction. Based upon gauging performed in the past by others, it is anticipated that GW-3 will serve as the upgradient well and GW-2 will serve as one of the two downgradient wells. The second downgradient well will likely be GW-4 or GW-5 (locations to be finalized in the field).

All analyses will be performed by an ELAP-certified laboratory for the parameter being run. Results will be provided with ASP Category B deliverables electronically. Quality control samples shall be collected and analyzed as outlined in the QAPP under separate cover. A Data Usability Summary Report (DUSR) will also be completed in accordance with DER-10 requirements.

3.5.6 Well Surveying and Gauging

Following well installation, all newly installed wells and pre-existing wells will be surveyed by a New York State licensed surveyor for location and north edge, top of casing elevation. One round of well gauging will be performed following well development and a second gauging event will be completed immediately prior to well sampling. Elevation data will be used in conjunction with depth to water elevation measurements to determine the potentiometric surface of groundwater and inferred groundwater flow direction.

An interface probe will also be utilized during gauging events to determine the absence or presence of separate phase hydrocarbons (SPH, if any) and the apparent thickness of any SPH detected.

3.6 Soil Vapor Intrusion Investigation

A SVI investigation in general conformance with NYSDOH guidance is proposed. The following sections outline the scope of work to be completed.

3.6.1 Site Reconnaissance / Inventory

The initial task of the SVI investigation will be completion of a site reconnaissance to understand current site operations and to document any activities or chemical usage that may bias the results of the soil vapor and indoor air quality sampling program. As a minimum work under this task will include the following:

- As site inspection to determine the building layout and to optimize sampling locations;

- Review of site operations and current hazardous materials usage. To the degree possible, historic chemical usage will also be considered;

- Review of the heating ventilation and air conditioning system to determine air flow patterns, sources of makeup air, and possible preferential exposure pathways; and,

- Documentation of a facility chemical inventory.

All work completed will be included in the SVI investigation phase of the RI Report to be developed upon completion of work.

3.6.2 Proposed Soil Vapor and Indoor Air Quality Sample Locations

The proposed scope of work will include installation of seven "permanent" soil vapor implants to facilitate the collection of sub-slab vapor samples. A minimum of four indoor air quality samples will be co-located with four of the seven sub-slab soil vapor sampling locations (in the former office, along the northeast and southwest sides of the building, and near the far end of the building) to allow direct use of the NYSDOH matrix for evaluation of SVI investigation data. The approximate locations of these soil vapor implants will include the former LIAL soil sampling locations, as well as additional locations to provide sufficient coverage to properly assess sub-slab vapor conditions at the site. The proposed locations of the sub-slab soil vapor implants and co-located indoor air quality samples are shown on ***Figure 4***.

In addition to the locations indicated on ***Figure 4***, an upwind sample location at the exterior of the building will also be selected on the day of sampling to assist in documentation of background, ambient conditions.

3.6.3 Installation of Soil Vapor Probes

Soil vapor probes will be installed as follows:

- A drill will bore through the concrete floor of the building and a six-inch double woven stainless steel vapor sampling implant (screen) will be lowered into the boring to a depth of approximately four inches (4") below the underside of the concrete slab;

- The vapor sampling implant will be connected to a short length of Teflon-lined polyethylene tubing (length sufficient to extend to grade for subsequent sampling). Tubing will be coiled in the well and temporarily sealed when not actively used for soil vapor sampling;

- The implant will be positioned so that the lowest three inches of the screen will be below the base of the concrete floor. The annular space around the implant will be backfilled with #1 silica sand to two inches above the implant. A two-inch thick hydrated granular bentonite seal will be placed immediately above the sand;

- Each implant will be completed with a four-inch diameter aluminum flush-mount protective casing secured to the concrete with hydraulic cement.

Care will be taken to ensure a good surface seal and that all fittings and seals are properly positioned and effective so as not to allow ambient air (i.e., non-subsurface vapor) into the implant screen and tubing assembly.

3.6.4 Sub-slab Vapor and IAQ Sampling Procedures and Analyses

Sample collection of sub-slab vapor samples and IAQ samples will be completed according to the following procedures:

- Sub-slab soil vapor and IAQ samples will be collected using laboratory-evacuated six-liter Summa® canisters with eight-hour flow regulators calibrated by the laboratory to ensure an 8-hour sampling duration. The flow rate will be less than the maximum flow rate of 0.2 LPM as established in the NYSDOH Guidance Document) provided by a NYSDEC-certified analytical laboratory[3].

- An approximate one-quart enclosure will be placed over the implant protective casing and the interface between the enclosure and the ground surface will be sealed with modeling clay or a polyurethane foam gasket to prevent intrusion of outside air into the sampling apparatus;

- Per New York State Department of Health (NYSDOH) Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006), a helium tracer gas will be utilized during the sampling of each soil vapor implant. The tracer gas is used to verify that the infiltration of outdoor (ambient) air is not occurring during sample collection. A tank containing ultra-high purity UHP helium (99.999%) will be connected to the side port of the enclosure and enough helium released to displace any ambient air within the enclosure and to maintain a positive pressure within the enclosure;

- Following the application of the tracer gas, one to three volumes of soil vapor / trapped air will be purged from the soil vapor implant using a Gilian GilAir-3 air sample pump (or equivalent method). A Dielectric MGD-2002 helium detector (or equivalent) will used to check for the presence of the tracer gas in the purged soil vapor; if less than 10% of the tracer gas is detected, a soil vapor sample will then be collected;

- At the four locations where co-located IAQ samples are also to be collected, sampling times will be coordinated so that sub-slab vapor and IAQ samples at the same location are collected at the same time. IAQ samples shall be located in the breathing zone (3 to 5 feet above the finished floor) within 5 feet of the soil vapor probe locations;

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[3] *Note: One liter canisters may also be utilized consistent with NYSDOH approved protocols. Flow rates and sample times would be adjusted accordingly to meet NYSDOH requirements.*

- Summa canisters will be completely evacuated to negative pressure (30"Hg vacuum) before use. To start sampling of both the sub-slab sample and the IAQ sample, the valve on the Summa canisters will be opened and sample will be drawn into the canister at the pre-defined rate in accordance with laboratory calibration of the Summa canisters. The following specific procedures will be utilized to ensure proper collection of samples with the Summa canisters:

    - Verify the initial vacuum reading of the canister and record the reading;

    - Ensure the canister valve is fully closed. The knob should be turned clockwise;

    - With a 9/16" wrench, remove the brass fitting from the top of the canister and store it in the flow controller box for safe keeping;

    - Attach the flow controller to the top of the canister, screwing on by hand and gently tightening the fitting with the wrench to allow for an airtight seal. Do not over tighten;

    - Open the valve on the canister counter clockwise and record the "start" time. (The blue valve will open ½ turn; the green valve will open 1 full turn[4]);

    - Monitor sampling progress periodically making note of the vacuum. It may be necessary to terminate sampling slightly before the desired full sampling duration if the canister vacuum is waning near the end of sampling;

    - At the end of the sampling period, close the valve on the canister by turning clockwise until hand tight. Record the "end" time. While the ideal reading on the can gauge should be slightly negative, the actual Summa canister pressure will be tested with a calibrated gauge at the laboratory;

    - Remove the flow controller and put it into its appropriate box (the number etched into the flow controller or identified on a semi-permanent tag will match the number on the end of its box);

    - Replace the brass fitting on top of the canister;

    - Record the final vacuum of the canister and complete the Chain of Custody Record/Field Test Form (to be provided by the laboratory);

- The sample containers and chain-of-custody form will be placed in a secure container, taped shut, and secured with a chain of custody seal. The samples will then be submitted to an ELAP certified analytical laboratory for VOC analysis by US Environmental Protection Agency Method TO-15 (enhanced for low level detection less than NYSDOH matrix levels).

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[4] *Note colors may vary depending upon they laboratory – follow lab instructions to ensure proper use.*

The HVAC system will be in operation a minimum of 24 hours before the sample collection commences (during the heating season between November 2013 and March 2014) and will be set for its normal heating season operation as if the building were occupied during the sub-slab and IAQ sample events. All sample containers will be certified clean by the laboratory.

3.7 Investigation Derived Waste (IDW) Management

Several types of IDW will be generated during the RI, most notably, drill cuttings, purge and development waters, decontamination fluids, and personnel protective equipment wastes. All wastes will be managed in accordance with applicable Federal, State and Local regulations.

All IDW including soil cuttings, purge waters, development waters and decontamination fluids will be containerized for off-site disposal. Soil boring cuttings not used to backfill borings will be collected into DOT-approved 55-gallon drums and staged on-site temporarily for off-site disposal at a permitted facility. Well purge and development water will be collected into DOT-approved 55-gallon drums and staged on-site temporarily for eventual off-site disposal at a permitted facility. PPE wastes will be disposed in the trash unless significantly soiled.

If any wastes are determined to be hazardous waste, appropriate EPA ID numbers will be utilized for waste disposal.

3.8 Community Air Monitoring Plan (CAMP)

A Community Air Monitoring Plan (CAMP) will be implemented as part of the RI. The CAMP is provided in ***Appendix B.***

3.9 RI Report

Upon completion of activities, work performed will be documented in a RI Report consistent with DER-10 requirements. As a minimum the RI Report will include the following:

- Documentation of the results of file reviews and the initial site inspection with emphasis on determining historic operations to the degree possible so that sampling locations and programs are geared toward areas of concern;
- Documentation of field activities performed including soil boring and well installation; soil vapor probe installation; and, soil, groundwater, soil vapor and IAQ sampling;
- Determination of site-specific geology, depth to groundwater, and the site-specific groundwater flow direction. Data will be presented in tabular and graphic format;

- A summary of analytical data including soil, groundwater, soil vapor and IAQ sample results. Data will be discussed in comparison to applicable regulatory standards and guidelines, and will be presented in tabular and graphic form showing sample locations;

- Completion of a *qualitative* (i.e., not *quantitative*) off-site exposure assessment. This assessment will focus on on-site property line data to be determined and review of publicly available information to assess the likelihood of off-site migration and impacts; and,

- Conclusions with respect to the extent of contamination.

Appendices will be provided as appropriate with backup data and full analytical laboratory deliverable packages (ASP Category B) will be provided electronically.

4.0 RELATED WORK PLANS

4.1 Citizen Participation Plan (CPP)

A Citizen Participation Plan (CPP) already exists for the Site cleanup. The NYSDEC CPP has been provided under separate cover previously.

4.2 Quality Assurance Project Plan (QAPP)

A QAPP has been developed for the site and has been provided under separate cover. The QAPP shall apply to sampling and analysis activities at the site. It should be noted that as per the QAPP, all laboratory data will be submitted to the NYSDEC in accordance with the NYSDEC-Approved Electronic Data Deliverable (EDD) format.

4.3 Health and Safety Plan (HASP)

A HASP already exists for the Site and has been provided to NYSDEC previously. The HASP shall be followed by all on-site personnel involved in the RI. It should be noted that each contractor may elect to prepare and follow their own HASPs for the project. TechSolutions is only responsible for the H&S of its own staff.

Safety will always be the number one priority without exception. In the event elements of the investigation are deemed to pose a health and safety concern, activities will be suspended until the concern can be evaluated and remedied as necessary to ensure a safe work environment for personnel and the protection of the site assets.

5.0 SCHEDULE FOR IMPLEMENTATION

The RI will be implemented upon NYSDEC approval of this RI Work Plan and related documents. Work will be initiated with the start of the FOIL process and call-in of markouts and then will proceed with soil and groundwater sampling. The SVI investigation will be completed following soil and groundwater sampling.

In accordance with DER-10, seven (7) calendar days prior notification regarding the start of any field activities associated with the investigation will be provided prior to the actual start of any such field activities. Although the exact project schedule cannot be finalized until after NYSDEC approvals are received, the following is a general timeline of planned project activities:

- Day 1: NYSDEC Approval of Work Plans (and related documents)
- Days 1-45: Preparation of fact sheets, notifications and 30-day public comment period. Project mobilization including FOIL submittal requests and initial site visit(s) will also be conducted during this public comment period.
- Days 45-90: Completion of field program including soil borings, well installation, soil vapor probe installation and sampling of soil, groundwater, soil vapor and IAQ (assuming no significant revisions to scope are required following the public comment period);
- Days 90-111: Laboratory analyses and office documentation of field sampling, logs, etc.
- Days 111-135: Completion of RI Report for submittal to NYSDEC.

TABLES

Table 1
Remedial Investigation Summary

Soil Investigation:

Soil Boring ID	Total Depth*	Sample Depths*	Analytical Parameters**
S-1	Approx. 30' bgs maximum	0-5', 5'-10', 10-15', 15-20, 20-25', 25'-water table	All samples TCL VOCs, one depth TBD for TCL SVOC, PCBs, Pesticides and TAL Metals
S-2	Approx. 30' bgs maximum	0-5', 5'-10', 10-15', 15-20, 20-25', 25'-water table	All samples TCL VOCs, one depth TBD for TCL SVOC, PCBs, Pesticides and TAL Metals
S-3	Approx. 30' bgs maximum	0-5', 5'-10', 10-15', 15-20, 20-25', 25'-water table	All samples TCL VOCs, one depth TBD for TCL SVOC, PCBs, Pesticides and TAL Metals
S-4	Approx. 30' bgs maximum	0-5', 5'-10', 10-15', 15-20, 20-25', 25'-water table	All samples TCL VOCs, one depth TBD for TCL SVOC, PCBs, Pesticides and TAL Metals
S-5	Approx. 30' bgs maximum	0-5', 5'-10', 10-15', 15-20, 20-25', 25'-water table	All samples TCL VOCs, one depth TBD for TCL SVOC, PCBs, Pesticides and TAL Metals

The borings will be completed to the water table which appears to be encountered at varying depths between 15 and 30 feet bgs based upon historic reports.* ***Not all sample depths and intervals will be required**.*

*** In addition, QA/QC samples will be collected per the QAPP.*

Groundwater Investigation:

Well ID*	Screen Detail**	Analytical Parameters***
GW-1	Ten foot screen, interval TBD in field	All samples TCL VOCs, TCL SVOC and TAL Metals. One upgradient well and two downgradient wells (TBD) to also include PCBs and Pesticides
GW-2	Ten foot screen, interval TBD in field	All samples TCL VOCs, TCL SVOC and TAL Metals. One upgradient well and two downgradient wells (TBD) to also include PCBs and Pesticides
GW-3	Ten foot screen, interval TBD in field	All samples TCL VOCs, TCL SVOC and TAL Metals. One upgradient well and two downgradient wells (TBD) to also include PCBs and Pesticides
GW-4	Ten foot screen, interval TBD in field	All samples TCL VOCs, TCL SVOC and TAL Metals. One upgradient well and two downgradient wells (TBD) to also include PCBs and Pesticides
GW-5	Ten foot screen, interval TBD in field	All samples TCL VOCs, TCL SVOC and TAL Metals. One upgradient well and two downgradient wells (TBD) to also include PCBs and Pesticides

**Existing wells will be used if still present and usable. If not they will be repaired / replaced to result in five usable wells as indicated above and in Figure 3.*

***The actual screened interval will be a field determination targeting 3 foot above the water table and 7 foot below the water table.*

**** In addition, QA/QC samples will be collected per the QAPP.*

Table 1
Remedial Investigation Summary (cont'd)

Soil Vapor Intrusion Investigation:

Soil Vapor Point ID	Sample Locations*	Type of Samples to Be Collected	Analytical Parameters**
SS-1 / IAQ-1	Sub-slab approx. 4" below slab; IAQ at 3'-5' above finished floor	Sub-slab vapor and co-located IAQ samples	All samples VOCs by TO-15 using Summa canisters. Low-detection limits required
SS-2 / IAQ-2	Sub-slab approx. 4" below slab; IAQ at 3'-5' above finished floor	Sub-slab vapor and co-located IAQ samples	All samples VOCs by TO-15 using Summa canisters. Low-detection limits required
SS-3 / IAQ-3	Sub-slab approx. 4" below slab; IAQ at 3'-5' above finished floor	Sub-slab vapor and co-located IAQ samples	All samples VOCs by TO-15 using Summa canisters. Low-detection limits required
SS-4 / IAQ-4	Sub-slab approx. 4" below slab; IAQ at 3'-5' above finished floor	Sub-slab vapor and co-located IAQ samples	All samples VOCs by TO-15 using Summa canisters. Low-detection limits required
SS-5	Sub-slab approx. 4" below slab only	Sub-slab vapor only	All samples VOCs by TO-15 using Summa canisters. Low-detection limits required
SS-5	Sub-slab approx. 4" below slab only	Sub-slab vapor only	All samples VOCs by TO-15 using Summa canisters. Low-detection limits required
SS-7	Sub-slab approx. 4" below slab only	Sub-slab vapor only	All samples VOCs by TO-15 using Summa canisters. Low-detection limits required

**In addition to the samples indicated above, an additional upwind ambient air sample must also be included on the day of sampling at a location TBD.*

*** In addition, QA/QC samples will be collected per the QAPP.*

FIGURES

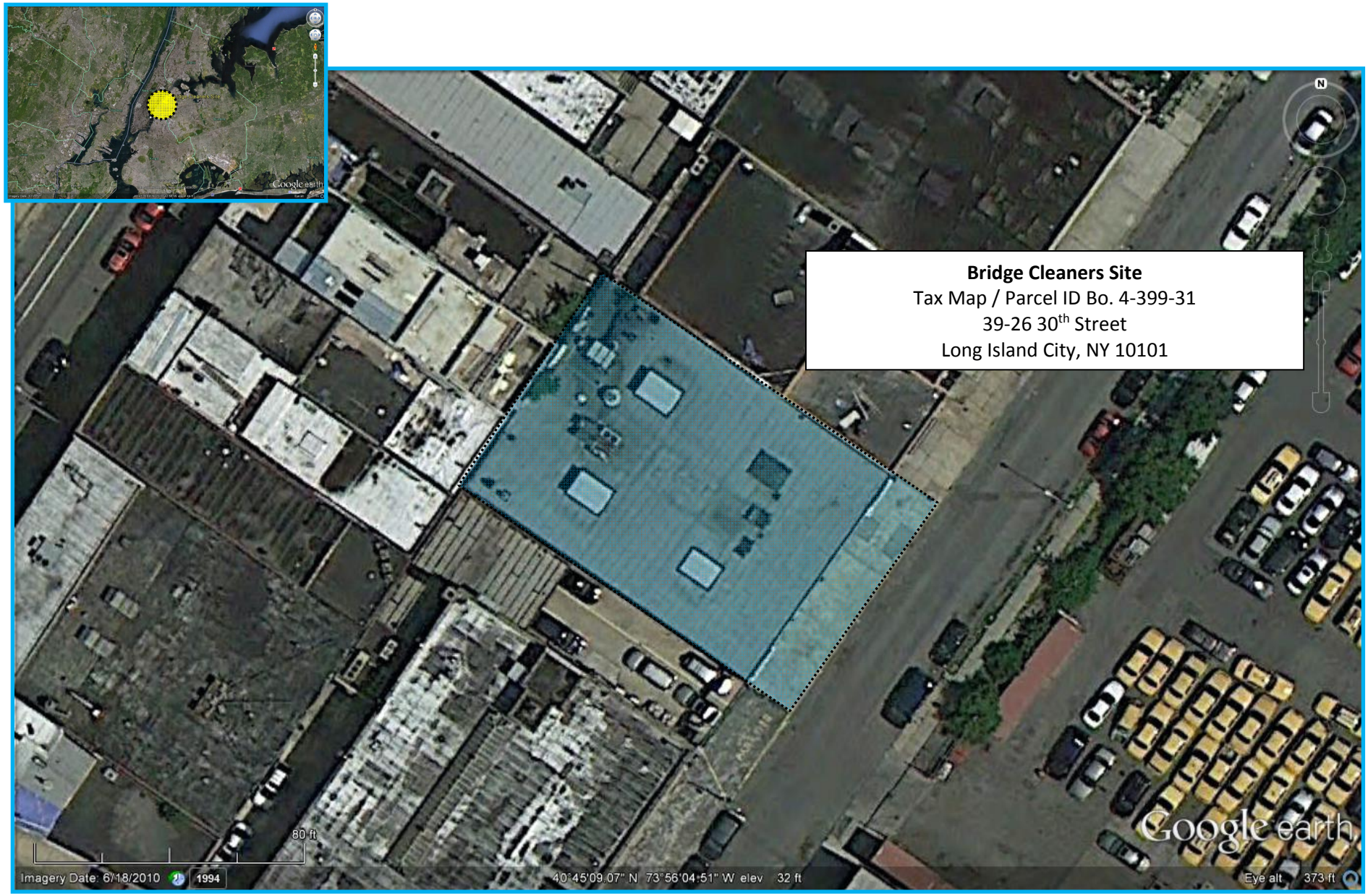


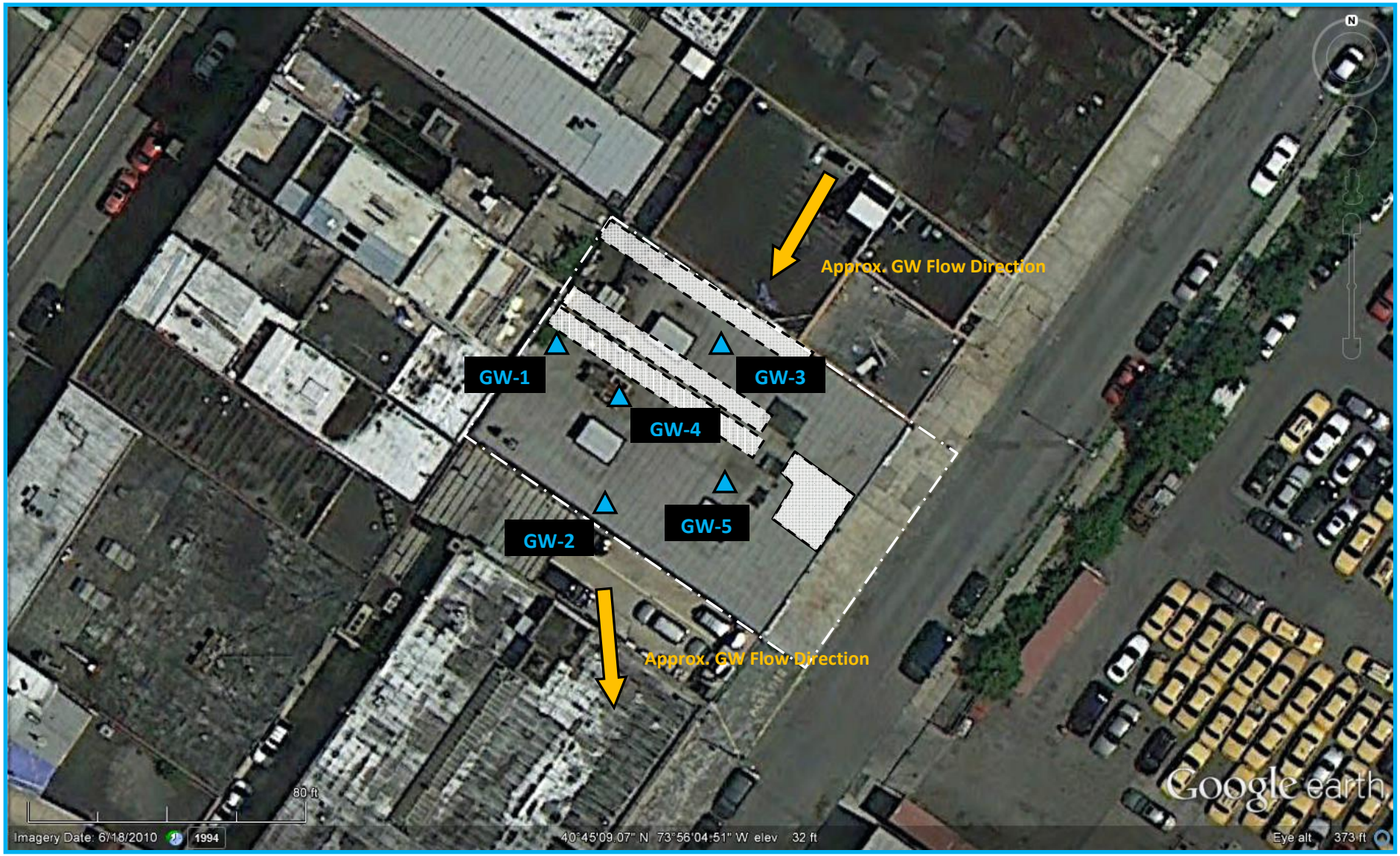
Figure 1
Site Plan
Bridge Cleaners Site
(Basemap: Google Earth Image

Obstructed areas (immovable objects that prevent access)

SB-#, Proposed Soil Boring Location
NOTE – Borings B-4 and B-5 are to be located in the field in coordination with NYSDEC.

NOTE: All proposed locations are approximate only and may be changed in field based upon utility clearance and access restrictions. Attempts will be made to install borings and wells as close to the locations indicated as possible.

Figure 2
Proposed Soil Boring and Sample Locations
Bridge Cleaners Site
(Basemap: Google Earth Image)



Obstructed areas (immovable objects that prevent access)

Well / Groundwater Sample Location
(New Well or Existing Well – TBD Based upon Well Survey)

NOTE: All proposed locations are approximate only and may be changed in field based upon utility clearance and access restrictions. Attempts will be made to install borings and wells as close to the locations indicated as possible.

Figure 3
Proposed Groundwater Investigation Locations
Bridge Cleaners Site
(Basemap: Google Earth Image)

Former LIAL or E&E Investigation Locations

Proposed Sub-Slab and Co-Located IAQ Sample Location

Proposed Sub-Slab Location Only

NOTE: All proposed locations are approximate only and may be changed in field based upon utility clearance and access restrictions. Attempts will be made to install borings and wells as close to the locations indicated as possible.

Figure 4
Proposed Sub Slab Vapor and IAQ Sample Locations
Bridge Cleaners Site
(Basemap: Google Earth Image)

Appendix A

E&E Engineering Site Characterization Report (Partial)

Site Characterization Report
Bridge Cleaners
39-26 30th Street
Long Island City, Queens County, New York

Site Number: 2-41-127

May 2012

Prepared for:

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
625 Broadway
Albany, New York 12233

Prepared by:

ECOLOGY AND ENVIRONMENT ENGINEERING, P.C.
368 Pleasant View Drive
Lancaster, New York 14086

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List of Abbreviations and Acronyms

ASP	Analytical Services Protocol
BGS	below ground surface
Con-Test	Con-Test Analytical Laboratory
°C	degrees Celsius
DER	Division of Environmental Remediation
DOT	(United States) Department of Transportation
DUSR	Data Usability Summary Report
EDR	Environmental Data Resources Inc.
EEEPC	Ecology and Environment Engineering, P.C.
EPA	(United States) Environmental Protection Agency
EPS	Environmental Products and Service of Vermont, Inc.
GC/MS	gas chromatography/mass spectroscopy
HASP	health and safety plan
HVAC	heating, ventilating, and air conditioning
ID	inner diameter
IDW	investigation-derived waste
LAWES	Land, Air, and Water Environmental Services, Inc.
MD	matrix duplicate
µg/L	micrograms per liter
mg/kg	milligrams per kilogram
MS/MSD	matrix spike/matrix spike duplicate
NAD	North American Datum
NAVD 88	North American Vertical Datum of 1988
NTU	nephelometric turbidity units
NYCRR	New York Codes Rules and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health

List of Abbreviations and Acronyms (cont.)

PCE	perchloroethylene
PID	photoionization detector
PPE	personal protective equipment
PVC	polyvinyl chloride
QA/QC	quality assurance/quality control
QAPP	Quality Assurance Project Plan
SC	site characterization
SCO	Soil Cleanup Objective
SOW	scope of work
SVOC	semivolatile organic compound
TCE	trichloroethylene
USCS	Unified Soil Classification System
VOC	volatile organic compound

1 Site Assessment Summary

1.1 Introduction

Pursuant to Work Assignment Number D007617-1, Ecology and Environment Engineering, P.C. (EEEPC) performed a site characterization (SC) at the Bridge Cleaners site (Site No. 2-41-127).

1.2 Purpose

The primary objective of this SC is assessment of subsurface soil and groundwater conditions to identify the possible source area of chlorinated volatile organic compounds (VOCs) in the area around the Bridge Cleaners site.

1.3 Site Description

The Bridge Cleaners site is a 0.1700-acre parcel located at 39-26 30th Street (Block 00399, Lot 0031), Long Island City, borough of Queens, Queens County, New York (see Figure 1-1). The Bridge Cleaners property consists of a single-story, 7,500-square-foot concrete building that occupies the entire lot (see Figure 1-2). The building was vacant at the time of this investigation; however, records indicate the building was occupied by a commercial laundry and dry cleaner since 1997. A list of former tenants is presented in Appendix A.

The study area consists of the city block surrounding the Bridge Cleaners site and is zoned in an area of mixed residential and manufacturing. The study area is bounded by 39th Avenue to the north, 30th Street to the east, 40th Avenue to the south, and 29th Street to the west. Other properties located on this block include: a faith-based organization, a parking garage, a vacant lot, and a telecommunications wholesaling business along 30th Street (east side of site). Occupants along 29th Street (west side of site) include another faith-based organization, a plumbing and heating, ventilating, and air conditioning (HVAC) business, the same parking garage also found on 30th Street, a greeting card publishing company, a multi-story concrete building under renovation, and a hotel.

The study area is approximately 30 feet above mean sea level and the topography is relatively flat with a gentle slope to the south and southeast. The nearest water bodies are Dutch Kills, approximately 3,500 feet to the south of Bridge Cleaners site, and the East River, located approximately 4,500 feet to the northwest.

1.4 Previous Investigations

Previous investigations conducted in the area include Phase I and Phase II environmental assessments performed on the adjoining property at 39-27 29th Street (the multi-story concrete building under renovation). The Phase I assessment conducted in 2007 stated that Bridge Cleaners was in operation as a commercial dry cleaner at that time (AVT Enterprises 2007). The Phase II assessment conducted in 2010 included installation of soil borings and collection of soil, groundwater, and soil vapor samples (Preferred Environmental Solutions 2010). Results of the assessment supported the conclusion that groundwater contamination may come from the Bridge Cleaners property. Additional information from the Phase II assessment is presented in Section 3.3.

A limited sub-surface investigation was conducted on the Bridge Cleaners property in 2011 by Long Island Analytical Laboratories Inc. This investigation was performed on behalf of the property owner and included installation of five soil borings and collection of soil and groundwater samples. Sample results indicated the presence of trichloroethylene (TCE), PCE, and petroleum hydrocarbons in groundwater samples; perchloroethylene (PCE) was present in soil samples (Long Island Analytical Laboratories Inc. 2011). Additional information from the limited subsurface investigation conducted on the Bridge Cleaners property is presented in Section 3.3.

2 Site Characterization

The SC for the Bridge Cleaners site was designed to identify the source of the area of contamination by investigating the magnitude and extent of chlorinated VOC contamination in soils and groundwater in the study area. These activities included a review of previous site investigations; development of a work plan; installation of five soil borings; collection of subsurface soil samples from the borings; installation of five groundwater monitoring wells in the borings; well development and groundwater sample collection; laboratory analysis of soil and groundwater samples; a site survey; and preparation of a summary report.

The study area consists of the city block surrounding the Bridge Cleaners site. Specific areas where intrusive work was conducted during this investigation include the east sidewalk along 29th Street between 39th and 40th Avenue; the west sidewalk along 30th Street between 39th and 40th Avenue; and the north sidewalk along 40th Avenue between 29th and 30th streets.

The SC field work was conducted between February 13 and 23, 2012. Photos from the field work are presented in Appendix B. Figure 2-1 depicts locations of the wells installed as part of this investigation. SC activities were performed in accordance with the scope of work described in the Work Assignment cost estimate submitted on January 11, 2012. A summary of the field procedures and modifications to the planned field investigation is provided below.

2.1 Preliminary Activities

Prior to beginning field activities, the EEEPC team reviewed the initial scope of work (SOW) and discussed the purpose of the investigation with the NYSDEC project manager. The original SOW included the collection of indoor air and soil vapor samples from inside the building, as well as the installation and sampling of monitoring wells both inside and outside of the building. Drilling subcontractors were initially consulted to discuss equipment options and identify specific methodologies to conduct the indoor work. All indoor work was subsequently cancelled due to site access challenges and limitations imposed by the property owner.

Following additional discussions with the NYSDEC project manager, a modified SOW was agreed upon as described in the January 11, 2012, Work Authorization cost estimate letter. The letter described the proposed investigation activities, methodologies, and schedule. It also identified the number and locations of monitoring wells. Detailed sampling methodologies and standard operating procedures were completed in accordance with applicable NYSDEC protocols, including DER-10 (NYSDEC 2010a).

After NYSDEC's approval of the final budget estimate, subcontracts were completed for drilling, analytical, survey, and waste disposal services; and a site-specific health and safety plan (HASP) was prepared.

2.2 Health and Safety Monitoring

During the intrusive site activities, EEEPC performed air monitoring to characterize airborne contaminant concentrations, including those of volatile organic vapors and explosive gases. A photoionization detector (PID) was used to monitor the concentration of organic vapors in the workers' breathing zone and adjacent to the boreholes during intrusive sampling. An oxygen/explosive gas meter was also used during intrusive activities to monitor for potentially explosive conditions. The monitoring indicated that there were no chemical impacts on worker or nearby resident health and safety and all work was performed in "Level D" personal protective equipment (PPE; i.e., no respiratory protection was required).

2.3 Direct-Push Activities

Monitoring well installation activities were conducted at the site between February 13 and 16, 2012. EEEPC subcontracted Land, Air, and Water Environmental Services, Inc. (LAWES), of Center Moriches, New York, to drill and install five monitoring wells in the sidewalks of three streets (29th Street, 30th Street, and 40th Avenue) around the Bridge Cleaners property (see Figure 2-1). LAWES used a Geoprobe Model 6610DT to conduct soil core collection and install the wells.

2.3.1 Subsurface Soil Sampling

Prior to initiating intrusive subsurface activities, LAWES obtained the proper drilling permits from New York City and coordinated with the Underground Facilities Protection Organization to identify and locate underground utilities in the vicinity of the soil borings. After the proposed drilling locations were cleared of utilities, a diamond hole saw was used to core through surface concrete at each well location. In accordance with New York City requirements, the top 5 feet of soil was then hand-dug at each location to verify buried utilities were not present. No utilities or other buried hazards were observed at any of the locations, so drilling activities at each location commenced when hand-clearing was complete.

The purpose of the subsurface soil investigation was to assess the extent of VOC contamination present in subsurface soil, as well as provide lithologic information and estimate the depth of groundwater. At each borehole, the Macro-Core system

was used to collect continuous soil cores in discrete, 5-foot-long dedicated acetate liners from 5 feet below grade to approximately 8 feet below the estimated depth of groundwater. Upon retrieval, each acetate liner was cut longitudinally and the EEEPC field geologist screened the soil for organic vapors using a PID and logged soil characteristics in accordance with the Unified Soil Classification System (USCS). Soil boring logs completed at each monitoring well location are provided in Appendix C.

A minimum of two subsurface soil samples were collected for laboratory analysis from each soil boring, one from soil believed to be contaminated (based on PID response, odor, or visual indicators) and the other collected from the estimated top of the water table. All 13 soil samples (plus one duplicate sample) were submitted for both VOC (United States Environmental Protection Agency [EPA] Method SW8260B) and percent solids analyses (EPA Method SM 2540G). A hydrocarbon-like odor similar to gasoline was detected in MW-4 starting at 29.5 feet below ground surface (BGS). Based on discussions with the NYSDEC Project Manager, the four samples from MW-4 were also analyzed for semivolatile organic compounds (SVOCs) (EPA Method 8270D). Table 2-1 presents depths that soil samples were collected as well as laboratory analytical data.

Soil samples were submitted to Con-Test Analytical Laboratory (Con-Test), of East Longmeadow, Massachusetts, under subcontract with EEEPC. All subsurface soil samples collected for VOC analysis were collected using the procedures described in EPA Method 5035: an approximately 5-gram subsample was collected with a dedicated polyethylene syringe and placed into pre-weighed vials containing methanol and deionized water. An additional aliquot was placed in a glass jar for percent solids determination. Upon collection, the sample containers were labeled and immediately placed in a cooler maintained with ice at 4°Celsius (C). Samples packaging and transportation were performed in accordance with the procedures outlined in the Master Quality Assurance Project Plan (QAPP) (EEEPC 2011).

2.3.2 Monitoring Well Installation

Upon completion of soil core collection, all boreholes were constructed as flush-mount monitoring wells (MW-1 through MW-5). Each monitoring well was constructed using 10 feet of 1.5-inch inner diameter (ID) polyvinyl chloride (PVC) well screen with a 0.010-inch slot size pre-packed inside a 40-mesh size sand filter surrounded by stainless-steel mesh followed by 1.5-inch ID Schedule 40 PVC riser to approximately 6 inches below grade. All PVC connections were flush-threaded, with a PVC cap placed on the bottom of the screen. The pre-packed well assembly and riser were installed through 3-inch ID coring rods advanced to the target well depth. After the well screen reached the desired depth, the 3-inch probe rids were retracted to near the top of the screen and 2 feet of U.S. Silica #0 sand was installed through the rod annulus, followed by a 2-foot-thick pelletized bentonite seal. Following a minimum 30-minute respite that allowed the bentonite to hydrate, a 5% bentonite/cement grout was installed from the top of the seal

to 1 foot BGS. The monitoring wells were constructed with flush-mount protective casings and fitted with a locked water tight cap (J-plug). Well construction details are summarized in Table 2-2 and well construction logs are provided in Appendix C.

2.4 Monitoring Well Development

Following a minimum of 24 hours after well installation activities were complete, the EEEPC field team developed the five monitoring wells on February 20 and 21, 2012. Development was performed by bailing the wells using dedicated 0.75-inch ID by 3-foot-long weighted polyethylene bailers. Development was performed to remove fine sediments from the sand pack and maximize hydraulic communication with the surrounding formation. Temperature, pH, conductivity, and turbidity measurements were recorded to monitor the progress of the development process. Water level in the wells remained relatively unchanged during well development. Due to the fine sandy and silty nature of the overburden aquifer, turbidity remained high in all wells except MW-3, in which turbidity was estimated to have reduced below 50 NTU. In the remaining wells, development was considered complete after at least five well volumes were removed. Development water was containerized and managed as IDW as discussed in Section 2.6. Well development records are included in Appendix C.

2.5 Monitoring Well Sampling

All monitoring wells were sampled at least 24 hours following well development using dedicated polyethylene bailers. Prior to purging and sampling the monitoring wells, static water levels were measured and used to determine the volume of standing water in each well. Temperature, pH, conductivity, and turbidity measurements were recorded throughout the well purging process and immediately prior to sampling. Due to the fine sand and silty nature of the overburden aquifer, groundwater turbidity was never below 50 nephelometric turbidity units (NTUs) in any of the wells. As such, purging continued until a minimum of five well volumes of water were removed from the wells (as per NYSDEC requirements), at which point all the groundwater quality parameters besides turbidity were stable (varying less than 10%) for three consecutive readings. Final groundwater quality parameters measured at the time of sampling are provided in Table 2-3. Monitoring well purge and sample records are included in Appendix C.

Upon collection, the sample containers were labeled and immediately placed in a cooler maintained with ice at 4°C. Samples were packaged and submitted to Con-Test for VOC analysis (EPA Method 8260B). A trip blank accompanied each shipment of water samples.

2.6 Investigation-Derived Waste (IDW) Management

The SC field effort generated investigation-derived waste (IDW) that included soil cuttings from monitoring well installation; groundwater from monitoring well development; purging and sampling; and spent PPE.

Due to site access limitation requirements by the site owner, IDW was not allowed to be stored on the Bridge Cleaners site overnight. As such, EEEPC subcontracted Environmental Products and Service of Vermont, Inc. (EPS) to pick-up and dispose of soil and water IDW on a daily basis. The soil cuttings and groundwater IDW were placed in U.S. Department of Transportation (DOT)-approved steel 55-gallon drums and transported to Cycle Chem, Inc., of Lewisberry, Pennsylvania, for disposal. Based on the expected contamination levels in the soil and water, no waste disposal analytical samples were collected as the IDW was classified as F-Listed waste by EPS for disposal purposes.

Spent macrocore liners were wiped clean and properly disposed of off-site as non-regulated solid waste with the PPE by LAWES.

2.7 Site Survey

YEC, Inc., of Valley Cottage, New York, was subcontracted to perform the site survey at the end of the well sampling phase on February 23, 2012. Surveying included setting a benchmark at the site, as well as measuring the horizontal locations and vertical elevations of pertinent features in the site area (e.g., monitoring well locations, building corners, and conventional and overhead doors). Horizontal control for the site benchmark was established in the New York State Plane East Zone (feet), North American Datum (NAD) 1983 to an accuracy of ±0.1 foot. The vertical control for the site benchmark was established to the nearest ±0.05 foot relative to the North American Vertical Datum of 1988 (NAVD 88). All ground level readings and monitoring well inner casing elevations were surveyed using a site level and rod measured to the nearest 0.01 foot relative to the NAVD 88, with an estimated accuracy of ±0.05 feet.

2.8 Static Groundwater Elevation Measurement

Depth-to-water measurements were collected from all monitoring wells on February 23, 2012. Measurements were made using an electronic water level indicator capable of measuring depth to water to within 0.01 feet and were taken from a surveyed point at the top of each inside well casing at least 24 hours after well development. Depth-to-water measurements were used in conjunction with surveyed top of casing elevations to establish static groundwater level elevations for each measured location (see Table 2-2). Static water level elevations were used to plot interpreted groundwater isopleths presented on Figure 2-1 and indicate groundwater flow to the south-southwest. Estimated horizontal groundwater gradient ranges from 0.002 to 0.005 foot per foot across the site.

2.9 Sample Analysis

Soil and groundwater sample analyses were performed by Con-Test using EPA SW-846 Methods as noted above (EPA 1996). These analytical protocols are incorporated by reference into the NYSDEC Analytical Services Protocol (ASP) (NYSDEC 2005). Laboratory reports were consistent with NYSDEC ASP Cate-

gory B deliverable requirements and were provided in a format consistent with the NYSDEC Environmental Information Management System.

2.10 Work Plan Deviations

The initial intent of the SC was to install two wells each on the sidewalks of 29th and 30th Streets and one well on the sidewalk of 40th Avenue. As a result of the use of an outdated site plan figure to establish well locations, well MW-2 was installed an estimated 75 feet south-southwest of the correct location. To remedy the situation, two options were considered. One was to install all five wells as planned and to install a sixth well, at the location at which well MW-2 was intended. This option was considered feasible due to drilling and well installation proceeding ahead of schedule. Another option was to install one well on 29th Street instead of two, and install a third well on 30th Street, at the location at which well MW-2 was intended. The NYSDEC project manager selected the latter option, so a total of five wells were installed, including one on the sidewalk of 29th Street, three on the sidewalks of 30th Street, and one on the sidewalk of 40th Avenue.

During soil coring at MW-04, a gray-stained sandy soil with a strong gasoline-type odor and substantially elevated PID readings was observed beginning at a depth of approximately 29.5 feet BGS and below. At the request of the NYSDEC project manager, a fourth soil sample was collected from the soil cores and all soil samples were analyzed for VOCs by EPA SW-846 Method 8260B and SVOCs by EPA SW-846 Method 8270D.

During well development the turbidity meter malfunctioned. After numerous attempts to recalibrate the instrument and after consultation with the instrument vendor the only option identified to remedy the situation was to have a replacement unit shipped to the site. This was not feasible, however, because sampling would have been completed before the replacement instrument could arrive. Well development and sampling proceeded using visual estimation and photo documentation to show groundwater turbidity.

2.11 Quality Assurance/Quality Control

Quality assurance/quality control (QA/QC) samples, including field duplicates, trip blanks, and additional volume for matrix spike/matrix spike duplicate (MS/MSD) analysis were collected for groundwater and soil samples in accordance with the specifications of EEEPC's *Master Quality Assurance Project Plan (QAPP) for NYSDEC Projects* (2011). For groundwater and soil samples, field duplicates and MS/MSD samples were collected at the rate of one per 20 field samples. Trip blanks were included with each laboratory shipment of groundwater samples. Samples were collected using dedicated sampling equipment for each individual location.

Duplicate samples provide insight into the homogeneity of the sample matrix and establish a degree of confidence that the sample represents site conditions.

Groundwater duplicates were collected by filling additional laboratory vials. Soil duplicates consisted of additional volume and were collected directly into a separate VOC sample collection syringe immediately adjacent to the original sample. A review of the duplicate sample results is provided in the Data Usability Summary Reports (DUSRs) provided in Appendix D. Where the relative percent difference between the original and duplicate sample results exceeded data review guidelines, "J" flags were added to indicate that the results are estimated; however, there were no significant impacts on data usability associated with the field duplicate sample results.

In addition to analytical error introduced by machinery and sample handling, error can also occasionally result from analytical process interference by a sample matrix. This can result in the reporting of analytes at concentrations higher or lower than the true concentrations. Laboratory or matrix spike duplicates are aliquots of the same sample that are split prior to analysis and are treated exactly the same throughout the analytical method. The relative percent difference (RPD) between the values of the MS and MSD or between the original and the matrix duplicate (MD) was taken as a measure of the precision of the analytical method.

Trip blanks were collected to establish that the transport of sample vials to and from the field did not result in the contamination of the samples from external sources. Trip blanks consisted of laboratory vials containing deionized water. One trip blank was shipped to and from the field with each sample shipment of groundwater samples. Trip blank results are discussed in the DUSRs (see Appendix D). For the groundwater samples, no compounds were detected in the trip blanks; therefore, there were no impacts on data usability associated with the trip blank sample results.

2.12 Data Validation Review

All laboratory deliverables were reviewed in accordance with the QAPP (EEEPC 2011). The data were qualified following general guidelines in the *EPA CLP National Functional Guidelines for Organic Data Review, EPA 540/R-99-008* (October 1999). DUSRs were prepared for each laboratory report (based on sample delivery group) as specified in NYSDEC's *Guidance for the Development of Quality Assurance Plans and Data Usability Summary Reports* (2010b). The data review included an evaluation of the following:

- Holding times;
- Initial and continuing calibration;
- Reporting limits;

- Laboratory blanks;
- MS/MSD samples;
- Laboratory control samples;
- Field duplicates;
- Sample result verification; and
- Method-specific QC samples (e.g., gas chromatography/mass spectroscopy [GC/MS]).

DUSRs were prepared by EEEPC's data validation chemist (see Appendix D). Any deviations from acceptable QC specifications are discussed in the DUSRs. Qualifiers were added to the data, if appropriate, to indicate potential concerns with data usability and these qualifiers were transferred to the data summary tables discussed in Section 3. In general, there were no significant impacts on data usability.

3 Analytical Results

This section presents the analytical results of field sampling activities in order to develop an understanding of the nature and extent of soil and groundwater contamination at the Bridge Cleaners site. Tables 3-1 and 3-2 summarize current analytical results by presenting the analytes that were present in at least one sample at a concentration exceeding the analyte-specific detection limit. Complete laboratory analytical results are presented in Appendix E. Data in Tables 3-1 and 3-2 were screened against New York State Standards, Criteria, and Guidelines to identify the samples containing analytes that may represent a possible threat to human health and the environment. This screening process involved comparison of current soil analytical results in Table 3-1 to the NYSDEC 6 New York Codes Rules and Regulations (NYCRR) Subpart 375-6 Remedial Program Soil Cleanup Objectives (SCOs) for both Unrestricted Use and Restricted-Residential Use (NYSDEC 2006). The Unrestricted Use SCO is defined as a use without imposed restrictions, such as environmental easements or other land use controls. The Restricted-Residential Use SCO is a land use category that is considered when there is common ownership or a single owner/managing entity of the site, which at a minimum prohibits any vegetable gardens on a site (although community vegetable gardens may be considered with NYSDEC's approval) and single-family housing. Active recreational uses, which are public uses with a reasonable potential for soil contact, such as parks, are also included under this category.

Groundwater standards are promulgated standards with which all ambient waters of the state of New York must comply. The groundwater analytical results summarized in Table 3-2 were compared to Class GA Groundwater Standards and Guidance Values where applicable (NYSDEC 1999).

3.1 Subsurface Soil Sampling Results

A total of 13 soil samples (and one duplicate sample) were collected from the five monitoring well locations (MW-1 through MW-05) to characterize the horizontal and vertical extent of soil contamination at the site. All soil samples were submitted to the laboratory for VOC (EPA Method 8260B) and percent solids analysis. In addition, based on the hydrocarbon-like odor similar to gasoline that was detected in MW-4, these four samples were also analyzed for SVOCs (EPA Method 8270D). The percent solids ranged from 80% to 99%, with an average percent

solid value of 86.6%. A summary of the analytical results is provided below, as well as in Table 3-1.

VOCs

Fourteen VOCs (PCE, TCE, and 12 petroleum hydrocarbons) were detected in the 13 soil samples submitted to the laboratory for analysis. PCE was detected in nine of 13 soil samples, with only one sample (MW4-02) exceeding the Unrestricted Use SCO of 1.3 milligrams per kilogram (mg/kg) and no samples exceeding the Restricted-Residential use SCO of 19 mg/kg. TCE was reported in two of 13 soil samples, with no samples exceeding the Unrestricted Use SCO of 0.47 mg/kg or the Restricted-Residential Use SCO of 21 mg/kg. Soil sample MW4-02 was collected below the water table, which likely explains the detection of PCE and other compounds.

A total of 12 non-chlorinated petroleum hydrocarbon VOCs (m- and p-xylenes were reported as a sum) were detected between two soil samples collected from monitoring well MW-04 (MW4-02 from 29.8 feet BGS and MW4-04 from 31.8 feet BGS. Seven non-chlorinated contaminants from the MW4-02 sample exceeded Unrestricted SCOs (m- and p-xylenes were reported as a sum), with five of the compounds (1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, ethylbenezene m- and p-xylenes and o-xylene) also exceeding Restricted-Residential SCOs.

SVOCs

SVOCs were not detected in any of the four samples from MW-4 submitted for analysis.

3.2 Monitoring Well Sampling Results

A total of 12 VOCs (PCE, TCE, chloroform, and eight petroleum hydrocarbons) were detected in the five groundwater samples submitted for VOC (Method 8260B) analysis to characterize the horizontal extent of groundwater contamination at the site. A summary of groundwater data from the current and previous investigations is presented in Figure 2-1.

PCE was detected above the Class GA Groundwater Standard of 5 micrograms per liter (µg/L) in all five groundwater samples, with the highest concentration of PCE (440 µg/L) reported in sample MW3-01W. PCE concentrations in the remaining four samples ranged from 18 µg/L in sample MW1-01W to 31 µg/L in samples MW4-01W and MW5-01W.

TCE was detected in four of the five groundwater samples, with the highest concentration of TCE (31 µg/L) reported in sample MW3-01W, exceeding the Class GA Groundwater Standard of 5 µg/L. TCE concentrations in the remaining samples ranged from 1 µg/L in sample MW1-01W to 5 µg/L in sample MW4-01W.

Chloroform was detected in monitoring well MW1-01 at 9.9 µg/L, which exceeds the Class GA Groundwater Standard of 7 µg/L.

Nine petroleum hydrocarbons were detected in sample MW4-01W, all of which exceed their Class GA Groundwater Standards. M- and p-xylenes were reported as a sum, at 1,300 µg/L, while the groundwater standard is 5 µg/L for each isomer. The total concentration of non-chlorinated VOCs detected in sample MW4-01W was approximately 2,437 µg/L.

One petroleum hydrocarbon (naphthalene) was also detected in the MW5-01W sample, but it was below the 10 µg/L Class GA Groundwater Standard.

3.3 Previous Investigation Sampling Results

Two previous investigations were conducted at the adjacent property 39-27 29th Street, and a limited subsurface investigation was performed on the Bridge Cleaners site in 2010. The 2007 Phase I ESA completed at 39-27 29th Street was completed as a precursor to a possible real estate transaction and did not include collection of samples for laboratory analysis. However, the 2010 Phase II ESA included the collection of six soil samples from four soil borings; two groundwater samples collected from temporary wells installed at two of the four soil borings; and four soil vapor samples from below the basement and first floor of the building. The soil and groundwater samples were submitted for VOC, SVOC, pesticides, PCBs, TAL metals and mercury analysis, while the soil vapor samples were only submitted for VOCs analysis.

No PCBs were detected in any of the soil samples. Only one soil sample, SB-4, collected from 0 to 2 feet BGS on the west portion of the site, revealed VOCs and SVOCs above method detection limits. However, concentrations of these compounds were well below Unrestricted Use SCOs. Low levels of various TAL metals were detected in all six soil samples; also well below Unrestricted Use SCOs. The pesticide Aldrin was reported in two soil samples, one of which slightly exceeded the Restricted-Residential SCO of 97 µg/kg. The pesticide Dieldrin was also reported in two soil samples, both exceeding the Residential SCO of 39 µg/kg but below the Restricted-Residential SCO of 200 µg/kg.

No SVOCs or PCBs were reported in either of the two groundwater samples. However, both groundwater samples exceeded the NYSDEC Class GA Ambient Water Quality Standard of 5 µg/L, with 910 µg/L of PCE detected in sample GW-1 (the eastern portion of the property closest to the Bridge Cleaners site), while 120 µg/L of PCE was detected in sample GW-2 (the western portion of the property farther away from Bridge Cleaners). Elevated iron, magnesium, manganese, and sodium were reported in total metals analysis; however, only sodium and magnesium were reported in the dissolved metals analysis.

Both PCE and TCE were detected in all four soil vapor samples collected from 6 feet below grade in the cellar and first floors at the site. PCE was detected above the NYSDOH Air Guidance Value of 100 µg/m^3 in two of the samples, at

400 µg/m^3 in one sample and at 16,900 µg/m^3 in another, indicating that mitigation is necessary.

The limited subsurface investigation completed on the Bridge Cleaners property in 2010 by the property owner included installation of five soil borings throughout the Bridge Cleaners building and collection of three soil samples for VOC analysis from each soil boring. Groundwater samples were collected from three of the five soil borings and submitted for analysis of VOCs. PCE was detected in five of 15 soil samples (up to 143 µg/kg) and all five samples exceeded the Unrestricted use SCO of 1.3 mg/kg. One sample exceeded the Restricted-Residential Use SCO of 19 mg/kg. PCE was detected in all three groundwater samples, up to 1,470 mg/L with all three samples exceeding the NYSDEC Class GA Ambient Water Quality Standard of 5 µg/L. TCE was detected in two of the five groundwater samples (up to 12.5 µg/L) and both samples exceeded the NYSDEC Class GA Ambient Water Quality Standard of 5 µg/L. Six non-chlorinated petroleum hydrocarbons were detected in groundwater sample BCGW-3 totaling 86.97 total non-chlorinated VOC, with each compound exceeding applicable NYSDEC Class GA Ambient Water Quality Standards of 5 µg/L.

4 Summary and Conclusions

4.1 Summary

The primary objective of this investigation is to assess subsurface soil and groundwater conditions to identify the possible source area of chlorinated VOCs identified in the area around the Bridge Cleaners site.

Five monitoring wells were drilled and installed in the sidewalks of three streets surrounding the Bridge Cleaners site. During drilling activities, 13 soil samples (plus one duplicate sample) were submitted for both VOC (EPA Method SW8260B) and percent solids analyses (EPA Method SM 2540G). While drilling at location MW-4, a hydrocarbon-like odor similar to gasoline was detected starting at 29.5 feet BGS, so these four samples were also analyzed for SVOC (EPA Method 8270D). After monitoring well construction and well development activities were complete, water level measurements were made and all five monitoring wells were sampled for VOCs (EPA Method 8260B).

Fourteen VOCs were detected in the 13 soil samples submitted to the laboratory for analysis. Samples were screened against the NYSDEC 6 NYCRR Subpart 375-6 Remedial Program SCOs for both Unrestricted use and Restricted-Residential use. PCE was detected in nine of 13 soil samples, with one sample exceeding the unrestricted use SCO and no samples exceeding the restricted-residential use SCO. TCE was reported in two of 13 soil samples. No samples exceeded the unrestricted use or the restricted-residential use SCOs. Twelve non-chlorinated VOCs were detected in two soil samples collected from monitoring well MW-04, however these soil samples were collected below the water table. The majority of the contamination was found in the MW4-02 sample from 29.8 feet BGS. While seven compounds exceed the unrestricted SCOs, four compounds (1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, ethylbenezene and total xylenes) also exceed restricted-residential SCOs. No SVOCs were detected in any of the samples from MW-4. The percent solids ranged from 80% to 99%, with an average percent solid value of 86.6%.

Twelve VOCs were detected in the five groundwater samples submitted for VOC (EPA Method 8260B) analysis and screened against New York State Class GA Groundwater Standards and Guidance Values. M-and p-xylenes were reported as

a sum. PCE was detected and exceeded the Class GA Groundwater Standard of 5 µg/L in all five samples. TCE was detected in four of the five groundwater samples, with one sample (MW3-01W) exceeding the Class GA Groundwater Standard of 5 µg/L. Chloroform was detected in the groundwater sample from MW1-01 exceeding the Class GA Groundwater Standard. Ten petroleum hydrocarbons were detected in the MW4-01W sample (m-and p-xylenes were reported as a sum), all of which exceed their Class GA Groundwater Standards. A total of approximately 2,437 µg/L of non-chlorinated VOCs were detected at MW-4.

Six soil samples from four soil borings, two groundwater samples, and four soil vapor samples were collected from an adjacent property (39-27 29th Street) during the 2010 Phase II ESA. No SVOCs or PCBs were detected in any of the soil and groundwater samples collected at the site. However, low levels of VOCs were reported in one soil sample, two pesticides (Aldrin and Dieldrin) were detected in two soil samples. PCE was detected in both groundwater samples at levels exceeding the NYSDEC Class GA Ambient Water Quality and elevated levels of iron, magnesium, manganese and sodium were also detected. Both PCE and TCE were detected in all four soil vapor samples collected at the site, with the sub-slab PCE results exceeding the New York State Department of Health (NYSDOH) Air Guidance Value of 100 µg/m^3, suggesting that mitigation is necessary.

The Bridge Cleaners property owner completed a limited subsurface investigation at the Bridge Cleaners property in 2010, collecting 15 soil and five groundwater samples for VOC analysis from five soil borings. While PCE was detected in five of 15 soil samples, it was detected in all five groundwater samples. TCE was detected in two of the five groundwater samples, while various low-level petroleum hydrocarbons were detected in one groundwater sample.

4.2 Conclusions

Chlorinated Plume

PCE and, to a lesser extent, TCE appear to be a significant concern in the Bridge Cleaners area. Chlorinated contamination was detected in all groundwater samples.

The soil and groundwater samples collected from inside the Bridge Cleaners building by the site owner and the Phase II conducted at 39-27 29th Street revealed chlorinated contamination generally one to two orders of magnitude higher than the samples collected during this SC near the edges of the city block. This information indicates the source of the chlorinated contamination is from this city block, most likely the southwest corner of the Bridge Cleaners property.

Groundwater elevations indicate that groundwater flow is to the south-southwest, with the highest chlorinated groundwater contamination found along the southern portion of the investigation area (MW3-01W). This matches the conclusion that

the chlorinated contamination likely originates from the southwest corner of the Bridge Cleaners building as this monitoring well is directly downgradient of that area.

At one location, MW-04, on the western portion of the site, a second plume comprised of petroleum hydrocarbons appears to be a concern (see discussion below).

Secondary Plume

Although the focus of this SC was to track down the source of PCE and TCE contamination in the area, during the investigation a second contamination plume was identified at monitoring well location MW-4. Although PCE was detected in the soil and groundwater samples, a variety of "other" VOC contaminants were identified at this location. Approximately 589 mg/kg of total VOCs were detected in a soil sample from MW-4 and approximately 2,437 µg/L of total VOCs were detected in the groundwater sample. In general, the five main contaminants found at this location were 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, ethylbenzene, N-proplbenzene, and xylenes.

Based on the common uses of these compounds, the source of this second contamination plume is likely an aged gasoline spill (based on the lack of lighter benzene and toluene compounds). Based on the observed groundwater flow direction, the source of this second contamination plume is likely located on the city block northwest of the project area (between 28th and 29th Street).

4.3 Recommendations

EEEPC recommends that NYSDEC consider the following:

- Performing an additional investigation at the Bridge Cleaners site as well as in the vicinity of the 39-27 29th Street property to determine whether vapor mitigation is necessary.
- Performing further investigations around the inferred Bridge Cleaners source area in the southwest portion of the building to determine the extent of contamination and to assess feasible in situ remediation options.
- Performing additional investigation along and to the north and west of 29th Street to determine the source of a second non-chlorinated hydrocarbon contamination plume.
- Performing further studies in each of these areas, which include installation and sampling of additional monitoring wells; collection of additional soils data vertical profiling; or vapor intrusion studies.

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Tables

Table 2-1 Soil Sampling Depths, Bridge Cleaners, Long Island City, New York

Sample ID	Depth (ft BGS)	Sample ID	Depth (ft BGS)
MW1-01	14.5	MW4-01	7.8
MW1-02	23.0	MW4-02	29.8
MW2-01	18.8	MW4-03	27.3
MW2-02	23.8	MW4-04	31.8
MW3-01	19.9	MW5-01	10.5
MW3-02	23.8	MW5-02	17.8
		MW5-03	23.5

Key:

BGS = Below Ground Surface

ft = feet

Table 2-2 Summary of Field Water Quality Data
Bridge Cleaners Site Characterization

Well ID	Sample Date	pH	Temperature (° Celcius)	Specific Conductance (mS/cm)	Turbidity* (NTU)
MW-01	22-Feb-2012	7.37	12.10	113.7	250
MW-02	21-Feb-2012	6.78	15.40	194.5	500
MW-03	22-Feb-2012	7.47	16.90	104.7	500
MW-04	22-Feb-2012	7.62	16.20	120.8	250
MW-05	21-Feb-2012	6.82	16.20	199.1	250

Key:
* = Visual estimate due to turbidity meter malfunction
(mS/cm) = milliSiemens per centimeter
mg/L = milligrams per liter
NTU = nephelometric turbidity unit

Table 2-3 Well Construction and Groundwater Elevation Summary, Bridge Cleaners, Long Island City, New York

Well ID	Latitude	Longitude	TOIC Elevation (ft AMSL) [1]	Ground Surface Elevation (ft AMSL) [1]	Depth to Water (ft TOIC) [2]	Groundwater Elevation (ft AMSL) [1]	Total Well Depth (ft BGS) [3]	Screen Interval (ft BGS)	Sand Pack Interval (ft BGS)	Seal Interval (ft BGS)
MW-01	40.752735	-73.934135	34.74	35.05	23.70	11.04	30.30	20.30 - 30.30	18.8 - 31.0	16.8 - 18.8
MW-02	40.752206	-73.934619	26.15	26.55	16.00	10.15	26.64	16.64 - 26.64	15.0 - 27.0	13.0 - 15.0
MW-03	40.752173	-73.935161	29.70	30.15	19.69	10.01	27.29	17.29 - 27.29	15.8 - 27.8	13.8 - 15.8
MW-04	40.752670	-73.935170	38.36	38.72	27.85	10.51	34.10	24.10 - 34.10	22.0 - 34.1	20.0 - 22.0
MW-05	40.752345	-73.934491	28.49	28.78	18.01	10.48	25.89	15.89 - 25.89	14.0 - 26.5	12.0 - 14.0

Notes:

1 North American Vertical Datum 1988.

2 Measured on February 23, 2012.

3 Measured after well development on February 20 or 21, 2012.

Key:

AMSL = Above Mean Sea Level

BGS = Below Ground Surface

ft = feet

TOIC = Top of Inside Casing

Table 3-1 Bridge Cleaners Soil Analytical Results, February 2012

Analyte[1]	Unrestricted SCO[2]	Sample ID: Date: Depth (feet bgs): Restricted-Residential SCO[3]	MW1-01 02/13/12 14.5	MW1-02 02/13/12 23.0	MW2-01 02/14/12 18.8	MW2-02 02/14/12 23.8	MW2-02/D 02/14/12 23.8	MW3-01 02/14/12 19.9	MW3-02 02/14/12 23.8	MW4-01 02/15/12 7.8	MW4-03 02/15/12 27.3	MW4-02 02/15/12 29.8	MW4-04 02/15/12 31.4	MW5-01 02/16/12 10.8	MW5-02 02/16/12 17.6	MW5-03 02/16/12 23.5
Percent Solids by Method SM 2540G (%)																
SOLIDS, PERCENT	NA	NA	99	92	82	85	83	89	88	97	81	80	81	94	82	80
VOCs by Method SW8260B (mg/kg)																
1,2,4-TRIMETHYLBENZENE	3.6	52	0.00043 U	0.00058 U	0.00052 U	0.00065 U	0.00048 U	0.00049 U	0.00044 U	0.00051 U	0.0005 U	***120***	**0.071**	0.00059 U	0.00058 U	0.00057 U
1,3,5-TRIMETHYLBENZENE (MESITYLENE)	8.4	52	0.00032 U	0.00043 U	0.00039 U	0.00048 U	0.00036 U	0.00037 U	0.00033 U	0.00039 U	0.00037 U	***60***	**0.028**	0.00044 UJ	0.00043 UJ	0.00043 UJ
CYMENE	NA	NA	0.00043 U	0.00058 U	0.00052 U	0.00065 U	0.00048 U	0.00049 U	0.00044 U	0.00051 U	0.0005 U	**10**	**0.0023**	0.00059 U	0.00058 U	0.00057 U
ETHYLBENZENE	1	41	0.00043 U	0.00058 U	0.00052 U	0.00065 U	0.00048 U	0.00049 U	0.00044 U	0.00051 U	0.0005 U	***43***	**0.067**	0.00059 U	0.00058 U	0.00057 U
ISOPROPYLBENZENE (CUMENE)	NA	NA	0.00038 U	0.00051 U	0.00045 U	0.00056 U	0.00042 U	0.00043 U	0.00039 U	0.00045 U	0.00044 U	**50**	**0.023 J**	0.00052 U	0.00051 U	0.0005 U
M AND P XYLENES [4]	0.26	100	0.00091 U	0.0012 U	0.0011 U	0.0014 U	0.001 U	0.001 U	0.00094 U	0.0011 U	0.0011 U	***130***	**3.1**	0.0013 U	0.0012 U	0.0012 U
NAPHTHALENE	NA	100	0.00038 U	0.00051 U	0.00045 U	0.00056 U	0.00042 U	0.00043 U	0.00039 U	0.00045 U	0.00044 U	0.32 U	**0.0031**	0.00052 U	0.00051 U	0.0005 U
N-BUTYLBENZENE	12	100	0.00038 U	0.00051 U	0.00045 U	0.00056 U	0.00042 U	0.00043 U	0.00039 U	0.00045 U	0.00044 U	**6.3**	**0.0017**	0.00052 U	0.00051 U	0.0005 U
N-PROPYLBENZENE	3.9	100	0.00038 U	0.00051 U	0.00045 U	0.00056 U	0.00042 U	0.00043 U	0.00039 U	0.00045 U	0.00044 U	**55**	**0.02**	0.00052 UJ	0.00051 UJ	0.0005 UJ
O-XYLENE (1,2-DIMETHYLBENZENE) [4]	0.26	100	0.00038 U	0.00051 U	0.00045 U	0.00056 U	0.00042 U	0.00043 U	0.00039 U	0.00045 U	0.00044 U	***11***	**0.07**	0.00052 U	0.00051 U	0.0005 U
SEC-BUTYLBENZENE	11	100	0.00054 U	0.00072 U	0.00065 U	0.00081 U	0.00061 U	0.00061 U	0.00055 U	0.00064 U	0.00062 U	**11**	**0.0021**	0.00074 U	0.00072 U	0.00072 U
T-BUTYLBENZENE	5.9	100	0.00048 U	0.00065 U	0.00058 U	0.00073 U	0.00054 U	0.00055 U	0.0005 U	0.00058 U	0.00056 U	**2.5**	0.00055 U	0.00067 U	0.00065 U	0.00064 U
TETRACHLOROETHYLENE (PCE)	1.3	19	**0.0018**	0.00094 U	**0.0018**	**0.0024**	**0.002**	**0.014**	**0.076**	0.00084 U	**0.0061**	**3.3**	0.00079 U	0.00096 U	**0.0044**	**0.0048**
TRICHLOROETHYLENE (TCE)	0.47	21	0.00048 U	0.00065 U	0.00058 U	0.00073 U	0.00054 U	**0.0028**	**0.005**	0.00058 U	0.00056 U	0.18 U	0.00055 U	0.00067 U	0.00065 U	0.00064 U

Key:

-- = Analyte not analyzed for.
bgs = below ground surface
/D Designates field duplicate sample.
(g) = Guidance value (no applicable standard).
J = Estimated value.
mg/kg = Milligrams per kilogram.
SCO = Soil Clean-up Objectives (6 NYCRR Part 375-6)
SVOCs = Semi-Volatile organic compounds.
U = Not detected (lab reporting limit shown).
UJ = Not detected/Estimated Value.
VOCs = Volatile organic compounds.

Notes:

1) Bold values in unshaded cell denotes analytes reported above method detection limits.
2) Bold values in shaded cell denotes analytes reported to exceed Part 375 Unrestricted SCO.
3) Bold, italicized values in shaded cell dentoes analytes reported to exceed Part 375 Unrestricted and Restricted-Residential
4) The Part 375 SCO for xylene (mixed), and the sum of the xylene detections was used for comparison.

Table 3-2 Bridge Cleaners Groundwater Analytical Results, February 2012

Analyte[1]	Screening Criteria [2, 3]	Sample ID: MW1-01W Date: 02/22/12	MW1-01W/D 02/22/12	MW2-01W 02/21/12	MW3-01W 02/22/12	MW4-01W 02/22/12	MW5-01W 02/21/12	TB022112 02/21/12	TB022212 02/22/12
VOCs by Method SW8260B (µg/L)									
1,2,4-TRIMETHYLBENZENE	5	0.06 U	0.06 U	0.06 U	0.6 U	**220**	0.06 U	0.06 U	0.06 U
1,3,5-TRIMETHYLBENZENE	5	0.06 U	0.06 U	0.06 U	0.6 U	**83**	0.06 U	0.06 U	0.06 U
CHLOROFORM	7	**9.9**	**9.7**	0.04 U	0.4 U	0.2 U	0.04 U	0.04 U	0.04 U
ETHYLBENZENE	5	0.05 U	0.05 U	0.05 U	0.5 U	**290**	0.05 U	0.05 U	0.05 U
ISOPROPYLBENZENE	5	0.06 U	0.06 U	0.06 U	0.6 U	**80**	0.06 U	0.06 U	0.06 U
M AND P XYLENES [4]	5	0.07 U	0.07 U	0.07 U	0.7 U	**1300**	0.07 U	0.07 U	0.07 U
NAPHTHALENE	10	0.21 UJ	0.21 UJ	0.21 UJ	2.1 UJ	**18 J**	**3.2 J**	0.21 UJ	0.21 UJ
N-PROPYLBENZENE	5	0.04 U	0.04 U	0.04 U	0.4 U	**60**	0.04 U	0.04 U	0.04 U
O-XYLENE	5	0.05 U	0.05 U	0.05 U	0.5 U	**380**	0.05 U	0.05 U	0.05 U
SEC-BUTYLBENZENE	5	0.05 U	0.05 U	0.05 U	0.5 U	**5.6**	0.05 U	0.05 U	0.05 U
TETRACHLOROETHYLENE (PCE)	5	**18**	**21**	**25**	**440**	**31**	**31**	0.14 U	0.14 U
TRICHLOROETHYLENE (TCE)	5	**1**	**1.1**	0.12 U	**32**	**5**	**2.1**	0.12 U	0.12 U

Key:

-- = Analyte not analyzed for.

/D Designates field duplicate sample.

(g) = Guidance value (no applicable standard).

J = Estimated value.

mg/L = Milligrams per liter.

U = Not detected (lab reporting limit shown).

UJ = Not detected/Estimated Value.

µg/L = Micrograms per liter.

VOCs = Volatile organic compounds.

Notes:

1) Bold values in unshaded cell denotes analyte reported above method detection limits.

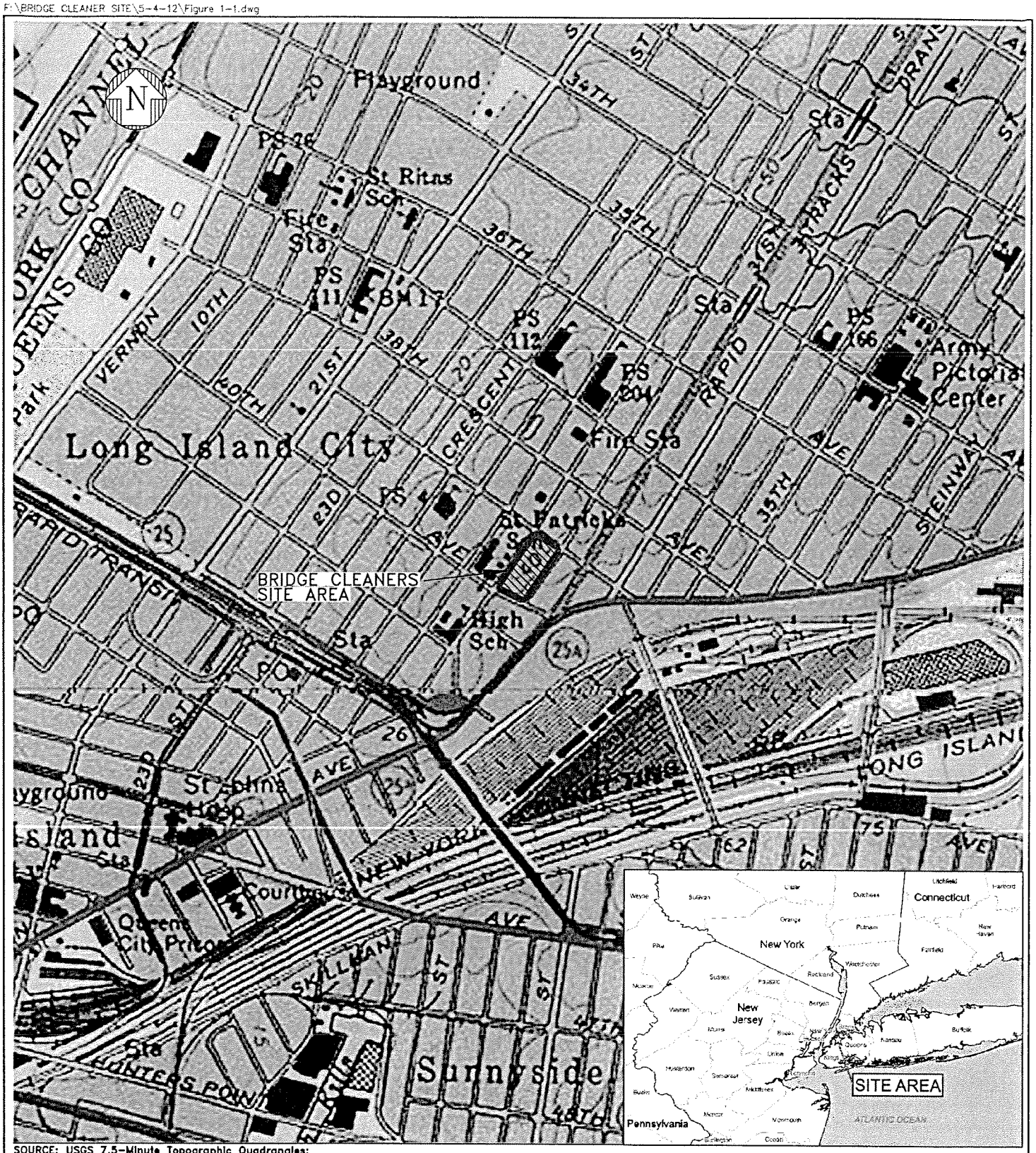
2) Bold values in shaded cell denotes analyte reported above the screening criteria.

3) New York State Department of Environmental Conservation, Technical and Operational Guidance Series Memorandum #1.1.1: Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations, 1998 (with updates), Class GA Groundwater Standards and Guidance Values.

4) The groundwater standard is 5 ug/L for each isomer.

Figures

F:\BRIDGE CLEANER SITE\5-4-12\Figure 1-1.dwg



SOURCE: USGS 7.5-Minute Topographic Quadrangles:
Central Park, NY-NJ 1979; Brooklyn, NY 1980

SCALE IN FEET

0 1000 2000 3000

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FIGURE 1-1 SITE LOCATION MAP
BRIDGE CLEANERS SITE CHARACTERIZATION
LONG ISLAND CITY, NEW YORK

F:\BRIDGE CLEANER SITE\Bridge cleaner_gw elev and isopleths.dwg

SCALE IN FEET

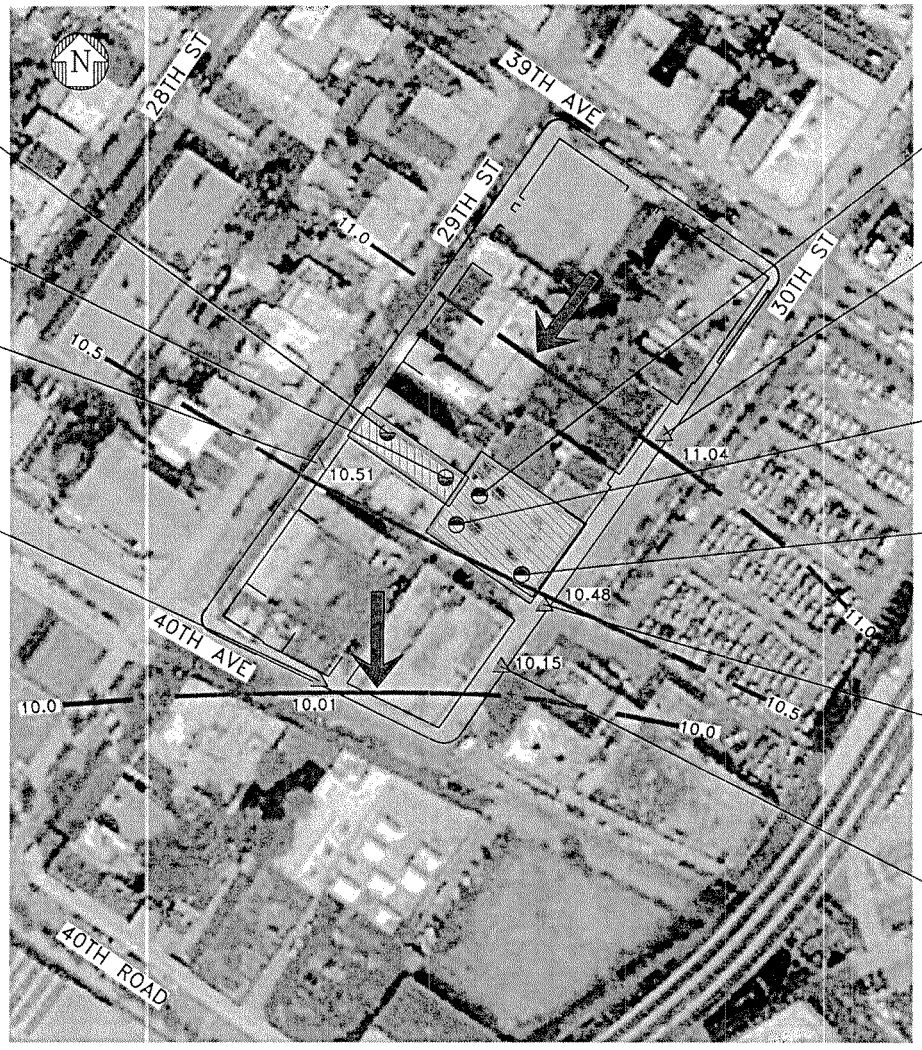
0 100 200 300

LEGEND

39-26 30TH STREET (BRIDGE CLEANERS)

ecology and environment

FIGURE 1-2 ENLARGED SITE PLAN
BRIDGE CLEANERS SITE CHARACTERIZATION
LONG ISLAND CITY, NEW YORK



GW-2	
ANALYTE	ug/L
MTBE	6
NAPTHALENE	30
PCE	120

GW-1	
ANALYTE	ug/L
PCE	910

MW-4	
ANALYTE	ug/L
PCE	31
TCE	5
TOTAL NON-CHLORINATED VOCs	2,436.6

MW-3	
ANALYTE	ug/L
PCE	440
TCE	32

BCGW-2	
ANALYTE	ug/L
PCE	537

MW-1	
ANALYTE	ug/L
PCE	21
TCE	1.1
CHLOROFORM	9.9

BCGW-1	
ANALYTE	ug/L
PCE	1,470
TCE	12.5

BCGW-3	
ANALYTE	ug/L
PCE	841
TCE	1.1
TOTAL NON-CHLORINATED VOCs	87

MW-5	
ANALYTE	ug/L
NAPTHALENE	3.2
PCE	31
TCE	2.1

MW-2	
ANALYTE	ug/L
PCE	25

LEGEND

- PREFERRED ENVIRONMENTAL SERVICES GROUNDWATER SAMPLE (DECEMBER 2009; APPROXIMATE LOCATION)
- LONG ISLAND ANALYTICAL LABORATORIES INC. GROUNDWATER SAMPLE (SEPTEMBER 2011; APPROXIMATE LOCATION)
- NYSDEC/EEEPC GROUNDWATER SAMPLE (FEBRUARY 2012)
- 10.15 GROUNDWATER ELEVATION (FEET ABOVE MEAN SEA LEVEL)
- ESTIMATED GROUNDWATER FLOW DIRECTION
- 10.0 GROUNDWATER ISOPLETH (DASHED WHERE INFERRED)
- 39-27 29TH STREET
- 39-26 30TH STREET (BRIDGE CLEANERS)

NOTE

1. TOTAL NON-CHLORINATED VOC's VALUE DOES NOT INCLUDE TENTATIVELY IDENTIFIED COMPOUNDS (TICs).
2. 2009 INVESTIGATION ANALYZED GROUNDWATER FOR VOC, SVOC, PCB, PESTICIDES, TAL METALS AND MERCURY. RESULTS PRESENTED HERE FOR VOC ONLY. 2011 AND 2012 INVESTIGATIONS ANALYZED GROUNDWATER FOR VOC ONLY.
3. HIGHLIGHTED VALUES EXCEED NYSDEC CLASS GA AMBIENT WATER QUALITY OF 5 ug/L FOR PCE/TCE.

SCALE IN FEET
0 100 200 300

ecology and environment

FIGURE 2-1 GROUNDWATER DATA SUMMARY AND ISOPLETHS
BRIDGE CLEANERS SITE CHARACTERIZATION
LONG ISLAND CITY, NEW YORK

Appendix B

Community Air Monitoring Plan (CAMP)

APPENDIX B
COMMUNITY AIR MONITORING PLAN

Former Bridge Cleaners Site
NYSDEC Site No. C241127
39-26 30th Street
Long Island City, New York

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.

The CAMP presented below will be sufficient to cover the 39-26 30th Street site. In addition to the information provided herein, specific requirements should be reviewed during every site activity. The NYSDOH may need to be consulted if any field conditions change from those discussed in previously approved NYSDEC and / or NYSDOH work plans to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical-specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

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

Community Air Monitoring Plan

Given the presence of VOCs on-site, real-time air monitoring for VOCs levels at the perimeter of the exclusion zone or work area will be necessary. In addition, if any dust generating activities are being performed (e.g., drilling, coring, earth-moving, etc.) particulate monitoring will also be required. Radiological contamination is not considered a concern at the site.

- **Continuous monitoring** will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive

activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

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

VOC Monitoring, Response Levels, and Actions

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

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

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

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

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

Particulate Monitoring, Response Levels, and Actions

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

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

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

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