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# REMEDIAL INVESTIGATION REPORT

for

**Former ACME Steel/Metal Works  
95 Lombardy Street/46 Anthony Street  
Brooklyn, New York**

**NYSDEC Site No. 224131**

*Prepared For:*

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## ACRONYM LIST

Acronym	Definition
1,1,1-TCA	1,1,1-Trichloroethane
1,1,2-TCA	1,1,2-Trichloroethane
1,1-DCE	1,1-Dichloroethene
1,2-DCA	1,2-Dichloroethane
AGV	Air Guideline Values
AMSL	Above Mean Sea Level
AOC	Area of Concern
ASP	Analytical Services Protocol
AST	Aboveground Storage Tank
AWQS	Ambient Water Quality Standards
bgs	Below Grade Surface
BDL	Below Detection Limit
CAMP	Community Air Monitoring Plan
CC	Chain of Custody
cDCE	cis-1,2-dichloroethene
cm/s	centimeters per second
COC	Contaminant of Concerns
CSIA	Compound-Specific Stable Isotope Analysis
CVOC	Chlorinated Volatile Organic Compounds
DCE	Dichloroethene
DER	Division of Environmental Remediation
DNAPL	Dense, Non-Aqueous Phase Liquid
DO	Dissolved Oxygen
DOT	Department of Transportation
DUSR	Data Usability Summary Report
EM	Electromagnetic Detector
ELAP	Environmental Laboratory Approval Program
ESA	Environmental Site Assessment
ESI	Environmental Site Investigation
feet/day	Feet per Day
ft/ft	Foot per foot
gpm	Gallon per Minute
GPR	Ground Penetrating Radar
HEI	Health Effects Institute
IAQ	Indoor Air Quality
IDW	Investigation-Derived Wastes
IHWDS	Inactive Hazardous Waste Disposal Site
LCS	Laboratory Control Sample

Acronym	Definition
LNAPL	Light Non-Aqueous Phase Liquid
mg/kg	Milligrams per Kilogram
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NAD83	North American Datum of 1983
NAVD88	North American Vertical Datum of 1988
NTU	Nephelometric Turbidity Units
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSDOT	New York State Department of Transportation
ORP	Oxidation Reduction Potential
PAH	Polynuclear Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
PCE	Tetrachloroethene
PID	Photoionization Detector
PM <sub>10</sub>	Particulate matter with aerodynamic diameter <10 µm
ppm	Parts per million
PVC	Polyvinyl Chloride
QAO	Quality Assurance Officer
QA/QC	Quality Assurance/Quality Control
RI	Remedial Investigation
RIR	Remedial Investigation Report
RIWP	Remedial Investigation Work Plan
RSCO	Recommended Soil Cleanup Objectives
SCO	Soil Cleanup Objectives
SSDS	Subslab depressurization system
SVOC	Semi-Volatile Organic Compound
TAGM	Technical and Administrative Guidance Memorandum
TAL	Target Analyte List
TCE	Trichloroethene
TCL	Target Compound List
tDCE	trans-1,2-Dichloroethene
TIC	Tentatively Identified Compounds
TOGS	Technical & Operational Guidance Series
TOV	Total Organic Vapors
µg/L	micrograms per liter
µg/m <sup>3</sup>	micrograms per cubic meter
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UST	Underground Storage Tank
VOC	Volatile Organic Compound

## **1.0 INTRODUCTION**

This Remedial Investigation (RI) Report presents the results of the remedial investigation performed at 95 Lombardy Street and 46 Anthony Street in the Greenpoint section of Brooklyn, New York (the "Site"). The Site is a New York State Department of Environmental Conservation (NYSDEC) Class 2 Inactive Hazardous Waste Disposal Site (IHWDS), Site No. 224131. The RI was implemented as specified in the Remedial Investigation Work Plan (RIWP), prepared for the Former ACME Steel/Metal Works Site, dated March 14, 2012, with certain field modifications approved by NYSDEC. The NYSDEC approved the revised RIWP in a letter dated March 30, 2012. This RI report was prepared in accordance with the process identified in the NYSDEC Division of Environmental Remediation Technical Guidance for Site Investigation and Remediation (DER-10).

### **1.1. Project Background**

The Site, located within the Meeker Avenue Plume Trackdown (Trackdown) site in the Greenpoint/East Williamsburg Industrial Area section of Brooklyn, New York, has been used as a metal-fabrication and painting facility since the 1930s. The Trackdown site is located within a region of historic petroleum refining and storage operations that occupied a significant part of the Greenpoint neighborhood. The Trackdown site straddles the Brooklyn-Queens Expressway and extends southwest to northeast from Kingsland Avenue to the Newtown Creek. Northern borders of the study area include Meserole and Norman Avenues and Bridgewater Street. The main southern border of the study area is Lombardy Street, with the exception of two blocks between Kingsland and Morgan Avenues where the area extends to Frost Street and one block between Morgan and Vandervoort Avenues where the area extends to Withers Street. Part of the Trackdown site is underlain by a petroleum free-phase product plume that originates at the British Petroleum (BP) bulk storage terminal north of the Site.

Investigations conducted by the URS Corporation (URS) on behalf of the NYSDEC and others within the Trackdown site identified chlorinated volatile organic compounds (CVOCs) — including tetrachloroethene (PCE) and trichloroethene (TCE) — in soil, soil vapor, and groundwater. In response to these findings, the NYSDEC initiated several investigations to identify the sources of chlorinated solvents. The former Acme Steel facility, which operated at the Site, reportedly generated F001 waste (i.e., spent halogenated solvents used in degreasing). Based on the findings of their investigations and the historic generation of F001 waste, URS Corporation and NYSDEC identified the Site as a source of CVOCs in the subsurface.

## **1.2. Remedial Investigation Objective**

The RI was performed to investigate and characterize the nature and extent of environmental concerns at the Site and provide sufficient information to evaluate remedial actions, if required. The RI consisted of an investigation of areas of concern (AOCs) that were identified in a Records Search Report, prepared by Langan (May 27, 2011). The goals of the RI were as follows:

1. Determine whether AOCs identified in the Records Search Report are sources of PCE and TCE;
2. Evaluate whether these AOCs have impacted soil, groundwater and/or soil vapor;
3. Interpret the stratigraphy of the Site using observations obtained during the RI and previous investigations performed by URS;
4. Determine the direction of groundwater flow; and
5. Determine geotechnical properties of Site soil and aquifer properties of saturated soil to evaluate potential remedial alternatives.

The RIWP was implemented between September 18 and December 13, 2012, in general accordance with the NYSDEC-approved RIWP. A copy of the RIWP is provided in Appendix A. Regulatory correspondence relevant to the RI is included in Appendix B.

## **1.3. Remedial Investigation Report Outline**

The Remedial Investigation Report is organized as follows:

- Section 1.0 presents the project background and objectives.
- Section 2.0 describes the Site setting and physical characteristics.
- Section 3.0 describes the Site background including results of previous investigations and identification of the AOCs.
- Section 4.0 presents the RI field procedures.
- Section 5.0 describes the subsurface conditions encountered during the RI.
- Section 6.0 presents the results of RI.
- Section 7.0 presents the nature and extent of contamination in media as determined through the field investigation and analysis of environmental samples.
- Section 8.0 presents an assessment of the exposure risks of Site contaminants to human, fish, and wildlife receptors.
- Section 9.0 summarizes the results of the investigation and presents conclusions and recommendations based on field observations and analytical results.

## 2.0 SITE CHARACTERISTICS

### 2.1 Site Overview

The Site occupies an approximate area of 44,000 square feet at 95-99 Lombardy Street and 46-52 Anthony Street (Tax Block 2819, Lots 8 and 11) in the Greenpoint section of the borough of Brooklyn, New York. Adjoining properties include Porter Avenue to the east, Vandervoort Avenue to the west, Lombardy Street and warehouse buildings to the south, and Anthony Street to the north. The Site is owned by the Whitehead Company, LLC and consists of one 2-story granite and marble warehouse and three 1-story buildings occupied by a paper distributor warehouse, granite and marble warehouse, and office space. A Site Location Map is provided as Figure 1. An aerial plan of the Site is presented on Figure 2.

### 2.2 Surrounding Property Land Use

The Site is located in an urban setting that is characterized by industrial and manufacturing developments. The following is a summary of surrounding property usage:

DIRECTION	ADJACENT PROPERTIES	SURROUNDING PROPERTIES
North	<ul style="list-style-type: none"><li>- Sargent William Dougherty Playground</li><li>- 513 Porter Avenue (one-story industrial and manufacturing building; former metal works [URS 2008])</li></ul>	<ul style="list-style-type: none"><li>- Various one-story industrial and manufacturing buildings and the Brooklyn-Queens Expressway</li><li>- Various one- and two-story residential buildings</li></ul>
South	<ul style="list-style-type: none"><li>- 96 Lombardy Street (one-story industrial and manufacturing building; former drum storage [URS April 2008])</li><li>- 103 Lombardy Street (one-story industrial and manufacturing building)</li><li>- 105-111 Lombardy Street (one-story industrial and manufacturing building)</li><li>- 113 Lombardy Street (one-story industrial and manufacturing building)</li><li>- 115-129 Lombardy Street (one-story industrial and manufacturing building)</li></ul>	<ul style="list-style-type: none"><li>- Various one- and two-story industrial and manufacturing buildings</li><li>- Various one- and two-story residential buildings</li></ul>
East	<ul style="list-style-type: none"><li>- 72 Anthony Street (one-story industrial and manufacturing building; NYSDEC IHWDS No. 224132; ACME steel facility/brass foundry [URS 2008])</li><li>- 498 Porter Avenue (bus parking lot)</li></ul>	<ul style="list-style-type: none"><li>- Various one-story industrial and manufacturing buildings</li></ul>

DIRECTION	ADJACENT PROPERTIES	SURROUNDING PROPERTIES
West	- 30 Anthony Street (parking lot/scrap metal and recycling facility) - 509 Vandervoort Avenue (parking lot)	Various one-story industrial and manufacturing buildings

Land use within a half mile of the Site is densely urbanized. Surrounding land use within a half-mile radius includes numerous industrial and manufacturing facilities, Newtown Creek, cross streets and avenues, residential neighborhoods, park land, and school facilities.

The nearest ecological receptor is Newtown Creek, which is approximately a half mile to the north and east of the Site. The nearest sensitive receptor is a playground located approximately 50 feet north of the Site. Sensitive receptors within a half mile of the Site include the following:

Number	NAME	ADDRESS
1	Sargent William Dougherty Playground	Anthony Street and Vandervoort Avenue
2	The Monitor School – P.S. 110	124 Monitor Street
3	Monsignor McGolrick Park	Monitor Street and Driggs Avenue
4	Frost Playground	Frost Street and Debevoise Avenue
5	Red Shed Garden	Kingsland Avenue and Skillman Avenue
6	Lentol Garden	Humboldt Street and Meeker Avenue
7	Cooper Park	Maspeth Avenue and Morgan Avenue
8	Greenpoint Little League Ball Field	Division Place and Vandervoort Avenue

Major infrastructure systems (i.e., storm drains, sewers, and underground utility lines) exist within the streets surrounding the Site

### 2.3 Location and Physical Setting

The Site lies within an M3-1 manufacturing zoning district in the borough of Brooklyn, New York City in the Greenpoint/East Williamsburg Industrial Area neighborhood (Brooklyn Community District 1). The nearest surface water body is the Newtown Creek, which is approximately a half-mile east and north of the Site.

Topography was assessed relative to the North American Vertical Datum of 1988 (NAVD88). The Site slopes gradually from east to west. Site elevation varies from a high of 54.80 feet in the eastern part of the Site along Porter Avenue to a low of 41.06 feet in the northwest corner of the Site at the intersection of Vandervoort Avenue and Anthony Street.



### 3.0 SITE BACKGROUND

#### 3.1 Historical Operation and Land Use

The Site was used as a metal fabrication and painting facility from the 1930s to circa 2000. As recently as 1998, the Site was occupied by the former Acme Steel facility, which manufactured metal doors and frames. A variety of solvents and chemicals were used in the manufacturing and finishing processes, including phosphate washes, paints, zinc precipitator, cutting oil, hydraulic oil, cold degreaser (petroleum distillate), adhesives, primer, and unspecified degreasers. Waste solvents and products were transferred to 72 Anthony Street for bulking and disposal. Small quantity generator permits for F001 wastes were obtained in 1991 for 60 Anthony Street and 95 Lombardy Street. No record of TCE or PCE use at the Site was found during report review.

According to a review of the Phase I Environmental Site Assessment (ESA) prepared by Impact Environmental Consulting (refer to section 3.2.1), the Site was historically used for industrial and manufacturing purposes. The following table summarizes the historical use of the Site.

Year	Description
Circa 1933	Eastern part of the Site (Lot 11) – Undeveloped Western part of the Site (Lot 8) – Occupied by an iron-working and painting facility.
Circa 1951	Eastern part of the Site (Lot 11) – Undeveloped, except for a painting operation facility that occupied the southwestern part of the lot. Western part of the Site (Lot 8) – A metal-shearing facility occupied the northwestern portion of the lot and an iron-working facility occupied the southwestern portion of the lot.
Circa 1977	The entire Site was developed and used for manufacturing purposes. Eastern part of the Site (Lot 11) – Occupied by a metal-product manufacturing facility. A painting operation facility occupied the southwestern part of the lot. Western part of the Site (Lot 8) – Occupied by an iron-working facility.
Circa 1991	Eastern part of the Site (Lot 11) - Occupied by a metal-product manufacturing facility. Western part of the Site (Lot 8) – Occupied by an iron-working facility.

Year	Description
1998 (Phase I ESA Site visit on March 23, 1998)	Eastern part of the Site (Lot 11) – Occupied by a door manufacturing facility.  Western part of the Site (Lot 8) – Occupied by a knock-down/unwelded frames manufacturing facility.  Each facility was comprised of offices and operational space, which was used for the machining, finishing, and storage of the materials and products used in the manufacture of doors and knock-down frames.

As of the conclusion of the RI activities, the building at 46 Anthony Street (Lot 11) is used as a paper-distribution warehouse to the west and by a decorative granite and marble warehouse and showroom to the east. The building at 95 Lombardy Street (Lot 8) is also used as a granite and marble warehouse and showroom.

### 3.2 Summary of Previous Investigations

The following reports were reviewed and are discussed in detail in the Records Search Report, prepared by Langan and dated May 27, 2011:

- Phase I Environmental Site Assessment, prepared by Impact Environmental Consulting, March 1998;
- Phase II Environmental Site Assessment, prepared by Impact Environmental Consulting, July 1998;
- Phase I Site Characterization Data Summary Report, prepared by the URS Corporation, October 2007;
- Phase II Site Characterization Data Summary Report, prepared by the URS Corporation, April 2008;
- Phase III Site Characterization Data Summary Report, prepared by the URS Corporation, October 2008;
- Phase IV Site Characterization Data Summary Report, prepared by the URS Corporation, dated May 2009;
- Site Characterization; Public Version – Soil Vapor Intrusion Data Summary Report, 2008-2009 Heating Season, Greenpoint/East Williamsburg Industrial Area, prepared by the URS Corporation, dated July 2009;
- Phase V Site Characterization Data Summary Report, prepared by the URS Corporation, dated October 2009;
- Letter Report – November 2009 Groundwater Sampling Event; Meeker Avenue Plume Trackdown – Greenpoint/East Williamsburg Industrial Area, prepared by the URS Corporation, dated January 2010;

- Chlorinated Solvent Plume – Meeker Avenue, prepared by Zymax Forensics, dated October 29, 2009;
- Groundwater Split Sampling Letter Report, prepared by the URS Corporation, February 2010; and
- Phase VI Site Characterization Data Summary Report, prepared by the URS Corporation, April 2012.

These reports are summarized below, and electronic copies of these reports are provided in Appendix C.

3.2.1 Phase I Environmental Site Assessment, prepared by Impact Environmental Consulting, March 30, 1998

Impact Environmental Consulting, Inc. (IEC) prepared a Phase I ESA in March 1998 to understand past and present uses and to identify recognized environmental conditions (REC) at the Site and surrounding properties. The Site was historically used for iron works, metal shearing, and metal finishing operations. Site operations at the time of the Phase I ESA included office and operational spaces. The operational space was used for the machining, finishing, and storage of materials and products used in the manufacture of doors and knock down frames. The Phase I ESA identified the following recognized environmental conditions (RECs):

- Site use as an iron-working, metal-fabrication, shearing and finishing operations and a painting facility. Two finishing operations were observed at the Site:
  - Door manufacturing finishing operations performed in the eastern part of the Site included a spray booth and natural-gas-fired drying oven. A degreaser was applied via hand rollers prior to finishing in this portion of the Site.
  - Knock-down frame manufacturing finishing operations performed in the western part of the Site included a pre-painting cleaning system with a phosphate and rinse-water wash system, a dip tank, and a natural-gas-fired drying oven.
- Numerous floor drains with unknown outfall locations were identified as potential injection wells. Based on the historic use of the property, it was inferred that these floor drains are potential sources of organic and inorganic contaminants;
- Several confirmed contamination sources were identified at surrounding properties including a Hazardous Waste Disposal Site and NYSDC major oil storage facilities associated with several petroleum releases at a large Brooklyn Union Gas Co. (BUG) facility south of the site and bound by Lombardy Street, Vandervoort Avenue, Maspeth Avenue, and Newtown Creek;
- An active fuel-oil underground storage tank (UST), a potential former UST, and petroleum-impacted soil were located in the western part of the Site;

- One UST used as a dip tank in the coating process and for storing degreasing products was located in the northwest corner of the Site;
- Two aboveground storage tanks (ASTs) were observed in the western part of the Site: one was used as part of a recirculating phosphate wash to remove oil from materials, and the other was used to recirculate rinse water to remove phosphate residue;
- Multiple 55-gallon drums were observed at the Site. The drums contained cutting oil, hydraulic oil, cold degreaser (petroleum distillate), adhesives, primer, and waste paint; and
- Regulated waste (i.e., waste paint, waste oil, waste degreaser and waste water precipitate) was generated at the property and was transported and stored in a drum storage area located at 72 Anthony Street.

#### 3.2.2 Phase II Environmental Site Investigation, prepared by Impact Environmental Consulting, July 1998

IEC conducted a Phase II Environmental Site Investigation (ESI) in July 1998 to determine whether one of the floor drains with an unknown outfall location that was identified in the Phase I ESA impacted the environmental quality of the property. The floor drain investigated during the Phase II ESI is located in the eastern loading dock of the building at 46 Anthony Street (Lot 11). The investigation consisted of a geophysical survey and collection and analysis of one surficial soil sample. The following is a summary of the Phase II results:

- A geophysical survey confirmed that the floor drain discharges directly to subsurface soil and is classified as an underground injection well; and
- A soil sample collected from the base of the floor drain was analyzed for the full suite of VOCs and semi volatile organic compounds (SVOCs), and RCRA metals. Soil sample results identified the metals cadmium and chromium at concentrations greater than applicable state standards. PCE and TCE were detected concentrations of 1.19 milligrams per kilograms (mg/kg) and 0.0992 mg/kg, respectively, which are below the Technical and Administrative Guidance Memorandum (TAGM) Recommended Soil Cleanup Objectives (RSCO), the applicable standard at the time of the investigation.

With the exception of shallow soil at the base of one floor drain, none of the potential sources of chlorinated VOCs (i.e., several floor drains, a UST dip tank, and historic use) were investigated during this limited Phase II.

#### 3.2.3 Phase I Site Characterization Data Summary Report, prepared by the URS Corporation, October 2007

The Phase I field investigation was conducted from May 7 through July 10, 2007, and was primarily focused on locations that were identified as potential historic sources of PCE and TCE. The following is a summary of the Phase I investigation findings that are relevant to the Site:

- Elevated concentrations of PCE and TCE were detected in soil vapor in the sidewalk of Vandervoort Avenue between Anthony Street and Cherry Street to the north (downgradient) of the Site. Estimated PCE concentrations in soil vapor beneath the Site range from >5,000 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) to about 1,000  $\mu\text{g}/\text{m}^3$ . Estimated TCE concentrations in soil vapor beneath the Site range from >100  $\mu\text{g}/\text{m}^3$  to about 50  $\mu\text{g}/\text{m}^3$ ; and
- PCE and TCE were detected in groundwater at concentrations greater than NYSDEC Class GA (drinking water) groundwater standards. The highest PCE concentrations were detected at 72 Anthony Street (adjoining property to the east and cross gradient, NYSDEC Site No. 224132). The highest TCE concentrations identified during the Phase I investigation were detected in a sidewalk well on Vandervoort Avenue fronting the west side of the Site (DEC-005).

#### 3.2.4 Phase II Site Characterization Data Summary Report, prepared by the URS Corporation, April 2008

The Phase II field investigation was conducted from November 5 through December 27, 2007, and was primarily focused on investigating and delineating the extent of CVOC-impacted soil vapor, soil, and groundwater at locations where elevated PCE and TCE concentrations were detected during the Phase I investigation. The following is a summary of the Phase II investigation findings that are relevant to the Site:

- The highest PCE and TCE concentrations in soil vapor were detected in the sidewalk of Vandervoort Avenue fronting the west side of the Site between Anthony Street and Lombardy Street. TCE was encountered at a higher concentration than PCE (2,100  $\mu\text{g}/\text{m}^3$  and 1,000  $\mu\text{g}/\text{m}^3$ , respectively) at this location. URS concluded that elevated TCE concentrations suggest a source area rather than degradation of PCE and that the soil vapor plume appears to have coalesced with a plume that originates at the former Klink Cosmo Cleaners to the south of the Site; however, based on the Phase II investigation data, URS concluded that there is an individual source area that originates from the Site;
- Based on the groundwater sampling results, the maximum TCE concentration detected during the Phase II investigation (66,000 micrograms per liter [ $\mu\text{g}/\text{L}$ ]) was detected in monitoring well DEC-005 in the sidewalk of Vandervoort Avenue fronting the west side of the Site between Anthony Street and Lombardy Street and adjacent to the soil vapor point with elevated TCE concentration discussed above. URS concluded that the Site was a potential source of TCE and that additional investigations should be conducted to delineate the vertical extent of the TCE plume originating from the Site; and
- Elevated PCE and TCE concentrations (80  $\mu\text{g}/\text{L}$  and 190  $\mu\text{g}/\text{L}$ , respectively) were detected in groundwater in a well (DEC-026) in the sidewalk of Anthony Street to the north (downgradient) of the Site. URS concluded that the source of PCE appears to be

the property that adjoins the Site to the east (72 Anthony Street, NYSDEC Site No. 224132) and/or the former Klink Cosmo Cleaners, located south of the Site at 368 Richardson Street.

3.2.5 Phase III Site Characterization Data Summary Report, prepared by the URS Corporation, October 2008

The Phase III field investigation was conducted from May 5 through July 24, 2008. The objective of the Phase III investigation was to fill data gaps concerning the horizontal extent of soil vapor at three of the five source areas identified during the Phase I and II investigations; determine if impacted soil exists at one potential source area; determine the horizontal extent of impacted shallow groundwater at four of the five potential source areas; and to assess the vertical extent of impacted groundwater at each of the five potential source areas. The following is a summary of the Phase III investigation findings that are relevant to the Site:

- PCE concentrations in soil vapor at the Site appear relatively unchanged with respect to the Phase II soil vapor investigation results, with the highest concentrations found underneath the sidewalk fronting the west side of the Site;
- The TCE soil vapor plume that URS concluded originates at the Site appears to have coalesced with the plume that originates at the former Klink Cosmo Cleaners to the south of the Site. URS concluded that it remains evident that both the Klink Cosmo Cleaners and the Site are two distinct sources of TCE in soil vapor;
- Interpretation of the Phase III groundwater investigation results identified four sources of dissolved-phase chlorinated solvents in shallow groundwater, including the Site (TCE source), the adjoining property to the east (cross gradient) of the Site (PCE source) at 72 Anthony Street (NYSDEC Site No. 224132), the former Klink Cosmo Cleaners (PCE and TCE source) at 368 Richardson Street, to the south and upgradient of the Site, and the Spic and Span Cleaners and Dryers on Kingsland Avenue to the north and downgradient of the Site;
- The results of the Phase III investigation indicate that CVOC impacts to groundwater increase with depth at DEC-005D (PCE concentration of 1,100 µg/L and TCE concentration of 70,000 µg/L) in the sidewalk of Vandervoort Avenue fronting the west side of the Site between Anthony Street and Lombardy Street. Because TCE concentrations increase with depth (35,000 µg/L in DEC-005 and 70,000 µg/L in DEC-005D), there is a potential presence of dense non-aqueous phase liquid (DNAPL) at the Site; and
- Based on the findings of the Site Characterization Studies performed by the NYSDEC, the Site was identified as a source of groundwater contamination and was listed as

NYSDEC Class 2 Inactive Hazardous Waste Disposal with NYSDEC Site Number 224131.

3.2.6 Phase IV Site Characterization Data Summary Report, prepared by the URS Corporation, May 2009

The Phase IV field investigation was conducted from November 3 through December 8, 2008. According to the results of the Phase III field work, the Site and the adjoining property to the east (72 Anthony Street/498 Porter Avenue) were listed as NYSDEC Class 2 Inactive Hazardous Waste Disposal Sites in January 2009. The scope of the Phase IV Site Characterization is not relevant to the Site.

3.2.7 Site Characterization; Public Version – Soil Vapor Intrusion Data Summary Report, 2008-2009 Heating Season, prepared by the URS Corporation, July 2009

This Soil Vapor Intrusion Data Summary Report was prepared to summarize the second round of soil vapor intrusion (SVI) sampling that was performed in the ACME Steel (i.e., the Site)/Klink Cosmo and the Spic and Span Outreach Areas. This sampling was performed to assess the potential for vapor intrusion into residences within each outreach area. Indoor air and subslab analytical results were compared to Matrices 1 and 2 in the New York State Department of Health (NYSDOH) Soil Vapor Intrusion, dated October 2006 (NYSDOH Guidance). Based on a comparison to the NYSDOH guidance, there were three residences with PCE and TCE concentrations that fell under the “mitigate” category and two locations that fell under the “monitor” category. However, it is unclear whether these residences are located within the ACME Steel/Klink Cosmo or the Spic and Span Outreach Areas.

3.2.8 Phase V Site Characterization Data Summary Report, prepared by the URS Corporation, October 2009

The Phase V investigation primarily focused on the area surrounding the former Spic and Span Cleaners (DEC Site ID No. 224129) property, which is located approximately 2,000 feet northwest of the Site. Results of the Phase V investigation did not provide additional information directly relevant to the Site.

3.2.9 Chlorinated Solvent Plume – Meeker Avenue, Prepared by Zymax Forensics, Dated October 29, 2009

Carbon and hydrogen isotope ratio analysis of dissolved chlorinated solvents was performed in September 2009 on samples collected from eight monitoring wells, including two wells adjacent to the Site (DEC-005 and DEC-022), three wells in the perimeter of to the adjoining property to the east (72 Anthony Street/498 Porter Avenue), and three wells to the north, west, and south of the Site. The objective of the isotope analysis was to determine whether the chlorinated solvent plumes at the Site and adjoining properties are from different sources, and, conversely, to determine whether the chlorinated solvent plumes are from the same source.

Based on the carbon isotope ratios, Zymax concluded that there are at least three sources of chlorinated solvents, including:

- One PCE plume to the south, north, and east of the Site;
- One PCE plume to the northeast of the adjoining property to the east (72 Anthony Street/498 Porter Avenue); and
- One TCE plume at the Site (DEC-005) and to the west of the Site.

3.2.10 Letter Report – November 2009 Groundwater Sampling Event, prepared by the URS, dated January 2010

This letter report includes a summary of groundwater samples collected from 20 monitoring wells between approximately 70 and 1,400 feet south-southwest of the Site. The wells were sampled to further investigate a PCE plume originating at the Klink Cosmo Cleaners. Groundwater flow direction was determined to be north-northeast (toward the Site). PCE was detected in 17 of the 20 groundwater samples at concentrations up to 10,000 µg/L, exceeding the NYSDEC Class GA groundwater standard. TCE was detected in 10 of the 20 groundwater samples at concentrations up to 110 µg/L, also exceeding its NYSDEC Class GA standard. The highest concentrations were observed in wells along Division Street, approximately 450 to 500 feet south-southwest of the Site. PCE, TCE, and their degradation products were detected at concentrations greater than Class GA groundwater standards at the adjoining property south (upgradient) of the Site.

3.2.11 Groundwater Split Sampling Letter Report, prepared by the URS Corporation, February 2010

This report summarizes the results of groundwater split samples collected between URS, the NYSDEC's consultant, and ACME Architectural Products. In September 2009, groundwater samples were collected from seven wells at the Site and surrounding properties. Samples were analyzed for compound-specific stable isotope analysis (CSIA) of cis-1,2-dichloroethene (cDCE), PCE, and TCE. The objective of this investigation was to differentiate sources of PCE and TCE impacts. The following is a summary of the results that are relevant to the Site:

- Microseeps, Inc., the forensics laboratory used for this investigation, concluded that PCE in groundwater at the adjoining property to the east is from a common source. URS did not confirm this conclusion but agreed that it was possible based on data gathered during previous investigations;
- The forensic laboratory concluded that TCE contamination in the well on the sidewalk fronting the west side of the Site (DEC-005) is from a different source than that in the adjoining property west of the Site (DEC-004). URS could not confirm this conclusion, but agreed that it was possible based on data gathered during previous investigations. Installation of additional monitoring wells was recommended at the adjoining property



west of the Site to confirm the relationship of TCE in groundwater between these locations;

- The forensic laboratory concluded that PCE in groundwater at the adjoining property south (upgradient) of the Site (in monitoring well DEC-022) is related to a source common to that detected in groundwater at the adjoining property east of the Site (in monitoring well DEC-016); however, URS rejected this conclusion; and
- The forensic laboratory concluded that PCE in groundwater upgradient of the Site is from a unique source and is distinctly different from PCE found in other wells that were sampled. This conclusion was supported by URS.

3.2.12 Phase VI Site Characterization Data Summary Report, prepared by the URS Corporation, April 2012

The Phase VI field investigation was conducted from August 2, 2011 through October 28, 2011, and November 15, 2011, through January 13, 2012. The objectives of the Phase VI investigation were to:

- Determine the horizontal extent of the dissolved-phase plume in groundwater at two of the five source areas identified during the previous investigation phases;
- Identify additional potential source areas north and west of the Site;
- Determine the depth, areal extent, and permeability of the Raritan Formation throughout the Meeker Avenue Plume Trackdown Site;
- Obtain site-specific background soil samples; and
- Establish a baseline for groundwater sample results, which will be used to assess the potential for natural attenuation in groundwater.

The following list summarizes the Phase VI investigation findings relevant to the Site:

- Site-Specific Background Soil Samples: URS collected surface soil samples from 0 to 2 feet bgs from eight locations in the vegetated areas of McGolrick Park on August 3, 2011, to obtain site-specific background soil samples to assist in characterizing the Meeker Avenue Plume Trackdown Site-related contaminants. The park is approximately 1,000 feet northwest of the Site.
  - VOCs were not detected above the Unrestricted Use SCOs in any of the soil samples.
  - One SVOC, di-n-butylphthalate, exceeded its Unrestricted Use SCO in one soil sample.

- Pesticides, including 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, and dieldrin, were detected above their respective Unrestricted Use SCOs in two or more of the soil samples.
- Metals, including arsenic, copper, iron, lead, mercury, and zinc, exceeded their Unrestricted Use SCOs in one or more of the soil samples.

As a result, URS concluded that all compounds exceeding Unrestricted Use SCOs in background samples are considered background conditions for the Meeker Avenue Plume Trackdown Site, which includes the Site.

Groundwater Sampling Baseline: The baseline groundwater sampling indicated that PCE concentrations have generally decreased in most of the shallow overburden monitoring wells throughout the Meeker Avenue Plume Trackdown Site except in the monitoring wells closest to the adjoining property east of the Site and in monitoring well DEC-022D on the sidewalk of Lombardy Street.

### 3.3 Summary of Areas of Concern

The following AOCs were identified in a Records Search Report, dated May 27, 2011, based on a review of the previous environmental reports, site observations, and the development history of the Site. The locations of the AOCs are shown on Figure 3.

- **AOC 1: Former Metal Fabrication Area** – Sheet metal was shaped in the southwestern part of the 95 Lombardy Street building (Lot 8) during former operations by ACME Steel. An oily residue was identified during a site inspection in floor trenches that are remnants of the former metal works equipment. The floor trenches have since been sealed to grade with concrete.
- **AOC 2: Dry Well/Underground Injection Well** – A dry well or underground injection well with unknown outfall location is located near the northwest corner of the 95 Lombardy Street building (Lot 8).
- **AOC 3: Dip Tank and Associated Piping and Floor Trench** – A dip tank historically used in the door-coating process is located in the northwest corner of the 46 Anthony Street building (Lot 11) and the northeast corner of the 95 Lombardy Street building (Lot 8). According to the IEC reports, a phosphate wash was used in the dip tanks. Several pipes that originate from the dip tank discharge to a floor drain in the loading dock area. According to the Phase I ESA report prepared by IEC, the outfall location of the floor drain is unknown (refer to Section 3.2.1).
- **AOC 4: Apparent Dry Well** – A dry well or underground injection well with unknown outfall location in the eastern part of the 46 Anthony Street building (Lot 11).

#### **4.0 REMEDIAL INVESTIGATION**

Langan implemented the RIWP between September 18 and December 13, 2012. The objectives of the remedial investigation were to evaluate the AOCs that were identified in the Records Search Report, dated May 27, 2011, and to determine whether these AOCs are sources of PCE and TCE that have impacted groundwater, soil, and soil vapor. A full delineation of the nature and extent of both site and off-site impacts was not an objective of the RIWP and will be performed as part of a supplemental RI.

The RI was conducted in accordance with New York Codes, Rules and Regulations (NYCRR) Title 6 Part 375 (6 NYCRR Part 375), the NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation (May 2010), and NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006).

The scope of the RI included the following activities:

- A geophysical investigation to identify potential USTs, subsurface structures, and utilities in the vicinity of each AOC;
- Advancement of coupled shallow and deep soil borings in AOC 1, AOC 3, and AOC 4, and conversion of each boring into a permanent monitoring well;
- Advancement of four soil borings at AOC 2 and conversion of two borings into one shallow and one deep permanent monitoring wells to investigate potential off-site migration of PCE and TCE associated with AOC 2;
- Installation of two permanent monitoring wells, coupled with existing wells DEC-039, to evaluate deep groundwater at the upgradient Site perimeter, and DEC-026, to evaluate deep groundwater at the downgradient Site perimeter;
- Visual, photoionization detector (PID), and field screening of soil and collection of soil samples from each boring for laboratory analysis;
- Field screening of soil using SUDAN IV dye to qualitatively test for the presence of TCE and/or PCE;
- Collection of soil samples for laboratory analysis of geotechnical parameters;
- Survey and gauging of monitoring wells to determine groundwater flow and contour;
- Development of monitoring wells installed during the RI;
- Collection of 15 groundwater samples from 10 newly installed and 5 existing monitoring wells;
- Slug testing at two monitoring well couplets (ACME-MW-1/ ACME-MW-1D and ACME-MW-4/ ACME-MW-4D); and
- Installation of four soil vapor-survey points and the collection of four coupled subslab soil vapor and indoor air samples.

The investigation was performed in general accordance with the RIWP, with the following exceptions:

- Because DNAPL was not encountered during this RI, deep monitoring wells were constructed using schedule 40 polyvinyl chloride (PVC) and 0.01-inch slot well screen. Stainless steel well construction materials were not used, as specified in the RIWP.
- A hand-auger sample was not collected from the presumed dry well at AOC 2. The presumed dry well, with dimensions 3 feet wide by 3.5 feet long by 8 feet deep, was accessed on October 25, 2012. Four vertical pipes were observed at the bottom of the dry well and the dry well had a sewer-like odor. Upon further inspection, the presumed dry well in AOC 2 appeared to be a sanitary connection to the New York City sewer system. Based on this observation, a soil boring was not advanced, as proposed in the RIWP. Rather than advancing a single boring through the presumed dry well in AOC 2, as proposed in the RIWP, four borings were advanced surrounding the presumed dry well. Three borings, ACME-SB-2A, ACME-SB-2B, and ACME-SB-2C, were advanced to 55 feet bgs, 80 feet bgs, and 55 feet bgs, respectively. The offset boring south of the presumed dry well in AOC 2, ACME-SB-2D, was advanced to 5 feet bgs using a Vac-Tron® truck equipped with an air knife and compressor. This boring was not advanced beyond 5 feet bgs because it was not accessible with the sonic drilling equipment and there was no evidence of CVOC impacts in any of the other AOC 2 borings. A loading dock immediately adjacent to soil boring location ACME-SB-2D was inaccessible during the RI; however, the loading dock was observed to be accessible during an August 14, 2015 site walk. An additional soil boring will be advanced within this loading dock and between soil boring locations ACME-SB-2D and ACME-MW-3D/EB-3 during the supplemental RI.
- Soil sample collection began at 40 feet bgs during installation of monitoring well DEC-026D and 50 feet bgs at monitoring well DEC-039D. These wells were installed to further investigate existing monitoring wells that were installed by the NYSDEC. Geologic and analytical data was already obtained from the coupled shallow wells (DEC-026 and DEC-039) installed during previous NYSDEC investigations (URS April and October 2008).
- Soil was screened continuously to the deep boring termination depth instead of the shallow boring. No soil samples were collected from the shallow borings because these borings were located within 5 to 10 feet from its coupled deep boring.
- No groundwater sample was collected from monitoring well DEC-022 on the sidewalk of Lombardy Street because the monitoring well was decommissioned prior to implementation of the RIWP.
- No ambient air sample was collected during the RI because the ambient air sample regulator leaked. By the time the leaking regulator became apparent, the ambient

Summa® canister was full, sample collection at the indoor air and soil vapor locations had commenced and the laboratory was not able to provide a backup Summa® canister.

- An in-house data validator was used instead of Alpha Geoscience Services, Inc., as specified in the RIWP.

Each deviation was conferred in the field with the NYSDEC representative. Daily site observation reports provide documentation of the NYSDEC's concurrence with the RIWP deviations and are provided in Appendix D.

#### **4.1 Preliminary Work Utility Clearance and Mark-out**

Prior to the start of any subsurface work, the drilling contractor, Aquifer Drilling and Testing, Inc. (ADT) of New Hyde Park, New York, contacted the New York City One-Call Center and requested a utility mark-out to locate buried utilities within the sidewalk and streets surrounding the Site. ADT obtained the required New York City Department of Transportation (NYCDOT) permits to drill on the sidewalks of Vandervoort Avenue, Lombardy Street, Anthony Street, and Porter Avenue.

Diversified Geophysics, Inc. (DGI) of Mineola, New York conducted a geophysical investigation under the supervision of a Langan geologist. The survey included ground penetrating radar (GPR) and electromagnetic detector (EM) equipment to investigate for the presence of USTs and underground structures and locate buried utilities in the vicinity of each boring location. Borings were relocated as necessary to avoid subsurface utilities and anomalies (i.e. other subsurface impediments).

After boring locations were confirmed, but before the borings were drilled, ADT hand-cleared all the boring and monitoring well locations. Boring locations were cleared using a combination of hand tools and a Vac-Tron® truck equipped with an air knife and compressor to a minimum depth of 5 feet bgs to verify that no subsurface utilities would be encountered during drilling activities. Soil borings were backfilled with soil cuttings and surfaces were finished in-kind. Hand clearance was performed between September 20 and October 1, 2012.

#### **4.2 Soil Investigation**

The soil investigation included nine environmental soil borings (ACME-EB-1, ACME-SB-2A, ACME-SB-2B, ACME-SB-2C, ACME-SB-2D, ACME-EB-3, ACME-EB-4, DEC-026D, and DEC-039D) completed under the supervision of a Langan field geologist.

With the exception of soil boring ACME-SB-2D, all borings were completed by ADT using a Compact Roto Sonic 17-C track mounted drill rig (Sonic rig). Soil borings ACME-EB-1, ACME-EB-3, and ACME-EB-4 were advanced at AOC 1, AOC 3, and AOC 4 respectively. Soil borings ACME-SB-2A, ACME-SB-2B, and ACME-SB-2C were advanced on Anthony Street and Vandervoort Avenue sidewalks, within the vicinity of AOC 2 in the northwestern corner of the

Site. Soil boring ACME-SB-2D was hand cleared to 5 feet bgs in the warehouse east of AOC 2; this boring was not advanced further because it was not accessible with the sonic drill rig and evidence of CVOC impacts were not apparent in any of the other AOC 2 borings. A loading dock immediately adjacent to soil boring location ACME-SB-2D was inaccessible during the RI; however, the loading dock was observed to be accessible during an August 14, 2015 site walk. An additional soil boring will be advanced within this loading dock and between soil boring locations ACME-SB-2D and ACME-MW-3D/EB-3 during the supplemental RI.

Soil borings DEC-026D and DEC-039D were advanced on the sidewalks of Anthony and Lombardy Streets, respectively, next to existing NYSDEC monitoring wells, DEC-026 and DEC-029. Soil boring locations are shown on Figure 3. The following table summarizes the location and termination depth of each soil boring.

Location	Area of Concern	Soil Boring ID	Boring Termination Depth (feet bgs)
<b>On-site</b>			
Southeastern part of the 95 Lombardy Street building	AOC 1	ACME-EB-1	77
Northwest corner of the 95 Lombardy Street building	AOC 2	ACME-SB-2A	55
		ACME-SB-2B	80
		ACME-SB-2C	55
		ACME-SB-2D	5
Northeast corner of 95 Lombardy Street building	AOC 3	ACME-EB-3	75
Eastern part of the 46 Anthony Street building	AOC 4	ACME-EB-4	90
<b>Off-site – NYSDEC Site Perimeter Wells</b>			
Sidewalk of Anthony Street	–	DEC-026D	85
Sidewalk of Lombardy Street	–	DEC-039D	66

#### 4.2.1 Soil Sampling Methodology

Soil samples were collected continuously from each sonic boring in a 3<sup>1</sup>/<sub>4</sub>-inch-diameter by 5-foot-long core barrel sampler into dedicated polyethylene bags. Soil samples retrieved from each boring were visually classified for soil type, grain size and texture. Each sample was screened for visual, olfactory and instrumental evidence of a chemical or petroleum release. Instrumental screening for the presence of VOCs was performed with a PID equipped with a 10.6 electron-volt lamp. Soil that was suspected to contain dense non-aqueous phase liquid (DNAPL) was field-screened using the OIL-IN-SOIL™ field-screening test kit with SUDAN IV dye to qualitatively test for the presence of PCE and TCE. Boring logs that document these observations are included as Appendix E.

#### 4.2.2 Environmental Soil Sampling Analytical Program

Nineteen grab soil samples were collected from eight soil borings (ACME-EB-1, ACME-SB-2A, ACME-SB-2B, ACME-SB-2C, ACME-SB-2D, ACME-EB-3, ACME-EB-4, and DEC-026D) and analyzed for Target Compound List (TCL) VOCs, including tentatively identified compounds (TICs), via EPA method 8260B. In addition, surficial soil samples collected from 0 to 1, 1 to 2, 2 to 3, 3 to 4, and 4 to 5 feet bgs from seven soil borings (ACME-EB-1, ACME-SB-2A, ACME-SB-2B, ACME-SB-2C, ACME-SB-2D, ACME-EB-3, and ACME-EB-4) were analyzed for the following parameters:

- TCL SVOCs via EPA method 8270C;
- Polychlorinated biphenyls (PCBs) via EPA method 8082A;
- Pesticides via EPA method 8081B;
- Target Analyte List (TAL) metals by EPA method 6010B/7000 series; and
- Total cyanide via EPA method 9013A/9010C.

Soil samples were collected into laboratory-supplied containers, including EnCore™ samplers for VOC samples, and were picked up and delivered via courier service to York Analytical Laboratories, Inc. (York), a New York State Department of Health Environmental Laboratory Approval Program (ELAP)-certified laboratory in Stratford, Connecticut, under standard chain-of-custody protocol. A sample log showing soil samples and corresponding analysis is provided as Table 1. Analytical Services Protocol category B (ASP-B) data packages and chain-of-custody documentation are provided in Appendix F.

#### 4.2.3 Geotechnical Soil Sampling Program

Geotechnical laboratory testing was conducted on eight representative soil samples from soil boring ACME-EB-1 at each change of strata (based on visual observation encountered in saturated soil). One clay sample was collected between 75 and 77 feet bgs using a Shelby tube sampler at soil boring ACME-EB-1. The purpose of the laboratory testing is to evaluate index properties and engineering characteristics of the various soil layers. The following table summarizes geotechnical soil analyses.

<b>Analysis</b>	<b>Soil Type</b>	<b>Method</b>
Liquid and Plastic (Atterberg) Limit Determinations	Clayey soil	ASTM D4318
Particle Size Distribution Determinations	Sandy soil	ASTM D422
Organic Content Determinations	Clayey and sandy soil	ASTM D2974
Measurement of Hydraulic Conductivity	Clayey soil	ASTM D5084-90

Analysis	Soil Type	Method
Standard Test Method for Permeability of Granular Soil	Sandy soil	ASTM D2434-68 (2006)

Geotechnical soil samples were collected into laboratory-supplied containers and were hand delivered to TerraSense, LLC of Totowa, New Jersey. The geotechnical laboratory report is provided in Appendix G.

#### 4.3 Groundwater Investigation

Langan installed four coupled shallow and deep monitoring wells (ACME-MW-1 and ACME-MW-1D, ACME-MW-2 and ACME-MW-2D, ACME-MW-3 and ACME-MW-3D, and ACME-MW-4 and ACME-MW-4D) and two deep monitoring wells (DEC-026D and DEC-039D), coupled with existing shallow monitoring wells DEC-026 and DEC-039. The following soil borings and monitoring wells were collocated: ACME-MW-1D/EB-1, ACME-MW-2D/SB-2B, ACME-MW-2/SB-2C, ACME-MW-3D/EB-3, ACME-MW-4D/EB-4. Monitoring wells were installed in accordance with the procedures set forth in the NYSDEC-approved RIWP. Total well depths ranged from 50 to 90 feet bgs. Monitoring well locations are shown on Figure 3. The following table summarizes the location and total depth of each monitoring well.

Location	Area of Concern	Monitoring Well ID	Monitoring Well Total Depth (feet bgs)
<b>On-site</b>			
Southeastern part of the 95 Lombardy Street building	AOC 1	ACME-MW-1 ACME-MW-1D	51.5 77
Northwest corner of the 95 Lombardy Street building	AOC 2	ACME-MW-2 ACME-MW-2D	55 80
Northeast corner of 95 Lombardy Street building	AOC 3	ACME-MW-3 ACME-MW-3D	50 75
Eastern part of the 46 Anthony Street building	AOC 4	ACME-MW-4 ACME-MW-4D	60 90
<b>Off-site – NYSDEC Site Perimeter Wells</b>			
Sidewalk of Anthony Street	–	DEC-026D	85
Sidewalk of Lombardy Street	–	DEC-039D	66



#### 4.3.1 Monitoring Well Construction

Monitoring wells were constructed with 2-inch-diameter, threaded, flush-joint, polyvinyl chloride (PVC) casing and with 10 to 15 feet of 0.01-inch slot screens. The shallow monitoring wells were screened across the water-table interface with approximately 5 feet of screen above and 10 feet below the water table. The deep monitoring wells were constructed with a 10-foot screen and terminated with a 2-foot sump. The deep monitoring wells were either set at the top of the confining clay unit, or if the clay confining layer was not encountered, the screen was set approximately 30 feet below the adjacent shallow well screen. The screen and sump of the following deep monitoring wells were set at the top of the confining clay unit: ACME-MW-1D, ACME-MW-2D, ACME-MW-3D, DEC-026D, and DEC-039D. The screen and sump of the deep monitoring well ACME-MW-4D was set approximately 30 feet below the adjacent shallow well (ACME-MW-4) screen. Clean sand (Morie #1) was used to fill the annulus around the well screen to a height of approximately 3 feet above the top of the screened interval. The annular space around the riser was filled with bentonite slurry and clean sand (Morie #1), as depicted in the well construction details (Appendix H). The monitoring wells were finished with a locking well cap and flush-mounted metal manhole covers. Security bolts provided by NYSDEC were installed at the well cover of DEC-026D and DEC-039D to minimize the potential for unauthorized well access. Monitoring well construction logs are provided in Appendix H.

#### 4.3.2 Monitoring Well Development

Monitoring wells were developed at least 24 hours after installation, between November 20 and 30, 2012. Prior to development, monitoring wells were gauged for DNAPL presence using an interface probe. DNAPL was not encountered during the RI in any of the monitoring wells. The monitoring wells were mechanically surged from the bottom to the top of the screened interval with a Waterra Hydrolift pump combined with a surge block to agitate and remove fine particles. After surging, the wells were purged via pumping with a submersible Monsoon pump at a maximum pumping rate of 1 gallon per minute (gpm). The wells were considered developed when a minimum of three well volumes was removed, the water-quality parameters (pH, temperature, conductivity, reduction oxidation potential [ORP], and dissolved oxygen [DO]) were stable, and the turbidity was below 50 Nephelometric Turbidity Units (NTU). Well-development logs are provided as Appendix H.

#### 4.3.3 Synoptic Groundwater Gauging

A Langan field engineer completed a synoptic groundwater gauging round prior to groundwater sampling on December 3, 2012. The depth to water level was measured with a Solinst interface probe to the nearest 0.01 foot from the surveyed mark on the top of the PVC well casing. Water levels were recorded and converted to elevations relative to NAVD88 for groundwater contouring purposes. The depth to the bottom of each well was also measured. Water level measurements were recorded on the synoptic groundwater level measurement log

provided in Appendix I. Depth to water measurements and groundwater elevations are provided in Table 2. Shallow and deep groundwater contour maps based on measurements collected during the December 3, 2012, sampling event are presented as Figures 4 and 5, respectively.

#### 4.3.4 Groundwater Sampling

Groundwater samples were collected between December 3 and 7, 2012, at least one week after the monitoring wells were developed. The monitoring wells were purged and sampled using low-flow purging techniques to minimize drawdown using a bladder pump with dedicated bladders and polyethylene tubing at a rate of 1-liter per minute or less. Water-quality parameters (pH, temperature, specific conductance, turbidity, ORP, and DO) were measured and recorded at approximately 5-minute intervals. Measurements were collected until the parameters stabilized for at least three consecutive readings.

Groundwater samples were collected from 10 newly installed and 5 existing monitoring wells into laboratory-supplied glassware and delivered via courier service to York under standard chain-of-custody protocol. Groundwater samples were analyzed for TCL VOCs, including TICs, by EPA method 8260B. A sample log showing groundwater samples and corresponding analysis is provided as Table 3. Groundwater sampling logs are provided as Appendix I. ASP-B data packages and chain-of-custody documentation are provided in Appendix F.

#### 4.3.5 Slug Testing

After groundwater sampling was completed, slug tests were conducted in two coupled shallow and deep monitoring wells to measure the hydraulic conductivity of the formation in the immediate vicinity of the monitoring wells. The water column in each well casing was induced to rise by rapidly lowering a slug of known volume into the well and submerging it below the static water level. Slug tests were conducted in the following monitoring wells: ACME-MW-1, ACME-MW-1D, ACME-MW-4, and ACME-MW-4D.

The procedure for the slug test consists of inserting a pressure transducer/datalogger (Micro-Diver) in each monitoring well to measure the temperature and water pressure. The static groundwater level in the monitoring well was then measured using a Solinst interface meter. After the pressure transducer was set in the well and the static water level measured, a solid PVC cylinder of known volume was inserted into the well to displace the water by raising the water level. After displacement occurs, the slug is immediately removed and the pressure transducer measures the time required for the elevated groundwater level to return to its static level. The hydraulic conductivity of the formation in the vicinity of each monitoring well was calculated using the Hvorslev method (1951). Slug test data is provided in Appendix J.

#### **4.4 Subslab Soil Vapor and Indoor Air-Quality Investigation**

A subslab soil vapor and indoor air-quality (IAQ) investigation, consisting of four coupled subslab soil vapor and indoor air samples, was performed as part of this RI. Soil vapor sample points were installed in each AOC on November 16, 2012, and sampled on December 12 and 13, 2012. The soil vapor investigation was conducted in accordance with the protocols outlined in the RIWP and the NYSDOH Guidance. The sampling was completed to evaluate the volatile constituents in soil vapor and determine the potential for intrusion to indoor air. A sample log showing soil vapor and indoor air samples and corresponding analysis is provided in Table 4. Soil vapor and indoor air sample locations are shown on Figure 3.

##### 4.4.1 Subslab Vapor Installation and Sampling

Permanent subslab soil vapor points were installed by coring through the building floor with a concrete core-drilling machine and inserting a dedicated, 0.25-inch, stainless-steel screen implant threaded to polyethylene tubing at depths ranging from approximately 18 to 24 inches below the concrete slab. The annulus around the probe/tubing was filled with sand (Morie #1) to approximately 1 to 2 inches above the screen. The remaining annular space was backfilled to grade with hydrated bentonite to seal the sampling points above the base of the slab. The permanent subslab vapor points were finished with flush-mount manhole covers.

After allowing the bentonite seal to cure, a presample tracer gas test was performed using helium. The helium-tracer test is a quality assurance and quality control (QA/QC) measure to confirm the integrity of the implant seals by evaluating whether ambient air intrusion is impacting the soil-vapor sample (i.e., that no "short circuiting" is occurring). None of the soil-vapor sample locations failed the helium-tracer gas test, indicating that all seals were intact.

With the seal confirmed, a PID (which pumps air at approximately 0.5 liters per minute) or an SKC pump (which was set at a flow rate of approximately 0.2 liters per minute) was attached to the polyethylene tubing, and a total volume of at least three times that of the tubing and screen setup was purged, taking into account the volume purged during the helium-tracer gas test. The purged soil vapor was also monitored with a PID and the PID reading was recorded. After purging was complete, a laboratory-supplied 6-liter Summa® canister with a flow controller set to collect samples over an 8-hour period (.0125 L/min) was attached to the polyethylene tubing. Summa® canisters arrived from the laboratory with approximately 26 to 30 inches of mercury vacuum. The soil vapor samples were transported from the Site to York by a laboratory-provided courier for analysis of VOCs via EPA method TO-15. Subslab vapor-point construction and sampling logs are presented in Appendix K.

##### 4.4.2 Indoor Air Sampling

Indoor air samples were collected concurrently with each coupled subslab sample, approximately 4 feet above the floor to be representative of the breathing zone. The samples

were collected in the main marble warehouse storage space and showroom of the building, which included an 8-inch-thick concrete slab with some penetrations including drains. The building has no heating system and multiple large roll-up doors of the warehouse building were open at the time of sampling, as is the common practice at this facility during business hours. An outdoor air sample (ambient air), which is representative of ambient air quality at the time of sampling, could not be collected outside of the Site building because the Summa® canister regulator leaked and had a vacuum of zero inches of mercury before sampling began. The indoor air samples were collected into laboratory-supplied Summa® canisters. Each Summa® canister arrived from the laboratory with approximately 28 to 30 inches of mercury vacuum and samples were collected over an approximately eight hour period. The soil vapor samples were transported from the Site to York by a laboratory-provided courier for analysis of VOC via EPA method TO-15. The IAQ forms are included in Appendix K.

#### **4.5 Monitoring Well and Boring Survey**

RI sample locations, including new and existing monitoring wells, soil borings, subslab vapor-point locations, and AOCs, were located by Langan, a New York State licensed surveyor, for horizontal location and ground-surface elevation between December 5 and 10, 2012. Monitoring wells were also surveyed for top-of-well casing (measuring point) elevation. Each point was located using ground-survey methods with a vertical accuracy of approximately +0.01 feet and horizontal accuracy of approximately +0.04 feet using established Site benchmarks. All vertical control points were referenced to the North American Vertical Datum of 1988 (NAVD88). The horizontal datum was referenced to the North American Datum of 1983 (NAD83), New York State Plane Coordinate System, Long Island Zone.

#### **4.6 Management of Investigative-Derived Waste**

Investigation-derived waste (IDW), including soil cuttings, drilling fluids, and purge water, that were generated during the RI activities were containerized in 55-gallon drums. Langan collected waste characterization samples from the drums to characterize the IDW. Drums containing water generated from drilling activities were pumped with a vacuum truck during two events:

- Disposal Systems, Inc. transported approximately 2,300 gallons of liquid to the Cycle Chem, Inc. facility in Elizabeth, New Jersey, on November 12, 2012.
- Disposal Systems, Inc. transported approximately 2,600 gallons of liquid to the Cycle Chem, Inc. facility on November 14, 2012.

Seventy-six drums containing soil cuttings and additional waste drums containing water generated during drilling activities, well development, and groundwater sampling were labeled accordingly and were transported by Auchter Industrial Vac Services, Inc. under manifests for off-site disposal as non-regulated (not United States Department of Transportation [DOT])

hazardous materials) waste to the Clean Earth of North Jersey facility in Kearny, N.J. IDW waste-disposal manifests are included in Appendix L.

#### **4.7 Data Validation and Reporting**

Remedial investigation data was validated by a Langan data validator in accordance with USEPA and NYSDEC validation protocols. Copies of the data usability summary reports (DUSRs) and the data validator's credentials are provided in Appendix M.

##### 4.7.1 Data Usability Summary Report Preparation

A DUSR was prepared for each sampling matrix. The DUSR presents the results of data validation, including a summary assessment of laboratory data packages, sample preservation and chain of custody (COC) procedures, and a summary assessment of precision, accuracy, representativeness, comparability, and completeness for each analytical method. For the soil and groundwater samples, the following items were assessed:

- Holding times
- Sample preservation
- Sample Extraction and digestion
- Instrument tuning
- Instrument calibrations
- Laboratory blanks
- Laboratory control samples
- System monitoring compounds
- Internal standard area counts
- Matrix spike (MS) and matrix spike duplicate (MSD) recoveries
- Target compound identification and qualification
- Chromatograms quality
- Overall system performance
- Serial dilutions (if applicable)
- Dual column performance (if applicable)
- Field duplicate, trip blanks, and field blanks sample results

For the air samples, the following items were assessed:

- Holding times
- Canister certification
- Instrument tuning

- Instrument calibrations
- Laboratory blanks
- Laboratory control samples
- System monitoring compounds
- Internal standard area counts
- Target compound identification and qualification
- Chromatograms quality
- Overall system performance
- Field duplicate sample results

Based on the results of data validation, the following qualifiers may be assigned to the data in accordance with USEPA's guidelines and best professional judgment:

- "U" – The analyte was analyzed for but was not detected at a level greater than or equal to the reporting limit (RL) or the sample concentration or the sample concentration for results impacted by blank contamination.
- "UJ" – The analyte was not detected at a level greater than or equal to the RL; however, the reported RL is approximate and may be inaccurate or imprecise.
- "J" – The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample.
- "NJ" – The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
- "R" – The sample results are not useable due to quality of the data generated because certain criteria were not met. The analyte may and may not be present in the sample.

After data validation activities were complete, validated data was used to prepare the tables and figures included in this report.

#### 4.7.2 Quality Control Sampling

Duplicates, field blanks, trip blanks, and MS/MSD samples were collected during the RI and are summarized in Tables 1, 3, and 4. Quality-control sample results were verified during data validation. One duplicate sample was collected from soil, one from groundwater, and two from indoor air. Three field blanks were collected for soil samples and two for the groundwater samples. Four trip blanks and five MS/MSD samples were also collected and analyzed. Duplicate sample results are presented in Tables 6 to 10 with their associated matrices. A summary of QA/QC sample results is also provided in Table 12.

#### 4.7.3 Data Usability

Category B laboratory reports for the soil, groundwater, soil vapor, and air samples were provided by York and were forwarded to Langan's data validator for all samples collected during the RI. Copies of the DUSRs are provided in Appendix M. The results of the data validation review are summarized below.

##### Soil Samples:

The data were determined to be mostly acceptable. Completeness, defined as the percentage of analytical results that are judged to be valid, is 98.5%. The following results were flagged as unusable, indicating that the results are not sufficiently valid or technically supportable to be used for data interpretation:

- EnCore sampling devices for soil sample ACME-SB-2B(40-41) were not received by the laboratory until six days after sample collection, exceeding the extrusion holding time. All associated positive detections are qualified as "J" and nondetects are qualified as "R";
- Laboratory control sample (LCS) BJ20366-BS1 did not recover for hexachlorocyclopentadiene or 2-nitrophenol. The associated sample results were nondetect and are qualified as "R"; and
- LCS/LCSD BJ0403-BS1/BSD1 did not recover for naphthalene. The associated field blank sample result was nondetect and is qualified as "R".

##### Groundwater Samples:

All the data were determined to be usable for qualitative and quantitative purposes with minor qualifications.

##### Air and Soil Vapor Samples:

All the data were determined to be usable for qualitative and quantitative purposes with minor qualifications.

#### **4.8 Air Monitoring**

Worker air monitoring was conducted for total organic vapors (TOV) and a Community Air Monitoring Program (CAMP) was implemented during intrusive investigation activities completed inside buildings during the RI, in accordance with the RIWP. Fugitive dust emissions were not observed during investigation activities. Dust emissions were monitored using a DustTrak, a real-time monitor capable of measuring particulate matter less than 10 micrometers in size (PM-10) and of calculating averages over a period of 15 minutes for comparison to the airborne particulate action level. A MultiRAE was used to screen for TOV. No elevated dust or TOV readings were observed above the background concentrations at the

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Site perimeter or in the work zone during the investigation. Dust-suppression measures were not required. CAMP monitoring data are presented in Appendix N.



## **5.0 SUBSURFACE CONDITIONS**

Provided below is a description of the regional and site specific geology and hydrogeology that was observed during the RI. Shallow and deep groundwater contour maps are provided as Figures 4 and 5, respectively. Subsurface profiles presenting the inferred Site geology are presented on Figures 6 through 8. Top of clay contour maps are presented on Figures 9 and 10.

### **5.1 Site Geology**

#### **5.1.1 Regional Geology**

Available United States Geologic Survey (USGS) reports and maps, historic topographic maps and boring information from subsurface investigations previously performed at or near the Site were reviewed to obtain general geologic information. Regional geologic conditions in this area of Brooklyn generally consist of a thin layer of fill overlying a wedge of unconsolidated sediment deposited during multiple episodes of glaciation during the Pleistocene and Cretaceous epochs on top of a bedrock basement. Total sediment thickness ranges from approximately 100 feet in the northwestern part of Brooklyn to approximately 1,000 feet in the southeastern part of Queens (USGS 2002a). Bedrock outcrops in the northwestern part of Queens.

The Site is located in the Atlantic Coastal Plain physiographic province, which is characterized by highly permeable glacial outwash deposits of clay, sand, gravel, and boulders. Based on a review of investigation reports prepared by others for the Meeker Avenue Plume Trackdown Site, the Site is underlain by the upper glacial aquifer (i.e. Upper Pleistocene deposits), the Raritan Formation, which is a confining unit, and crystalline bedrock. The upper glacial aquifer consists of the following two types of glacial sediments deposited during the Wisconsin glaciation approximately 20,000 years ago (USGS 2002a):

- Terminal moraine and ground-moraine deposits that consist of poorly sorted mixtures of clay, silt, sand, gravel, and boulders; and
- Glaciofluvial outwash deposits that consist of moderately to well-sorted mixtures of sand and gravel.

The thickness of the upper glacial aquifer is typically 100 to 200 feet. The Raritan Formation is comprised of the clay member and the Lloyd sand member and was deposited during the Cretaceous Period (USGS 2002a). The clay member of the Raritan Formation extends throughout most of Brooklyn and Queens but is absent from the northwestern part of Brooklyn and extreme northwestern part of Queens. The clay member of the Raritan Formation generally consists of clay and silty clay with some interbedded sand. The Lloyd sand member of the Raritan Formation was not encountered at the Meeker Avenue Plume Trackdown Site, according to the URS Site Characterization reports.

Based on a review of the "Bedrock and Engineering Geologic Maps of New York County" and "Parts of Kings and Queens Counties, New York and Parts of Bergen and Hudson Counties New Jersey," by Charles A. Baskerville, dated 1994 (Baskerville Map), the Site is underlain by bedrock of the Hartland Formation. Bedrock is between approximately 100 and 200 feet below grade surface (bgs) at the Site (Baskerville Map); however, bedrock was not encountered up to 140 feet bgs during the URS investigations (URS 2012). The Hartland Formation is Middle Ordovician to Lower Cambrian in age and is characterized by dark gray, medium to coarse-grained muscovite-biotite-garnet (mica) schist and gray, fine-grained quartz-feldspar granulite with biotite and garnet, with localized concentrations of granite and intrusions of coarse-grained granitic pegmatite. The competence of the mica schist and granulite is generally fair to good, and tends to improve with depth. However, localized shear zones and zones of decomposed rock are known to exist, sometimes to significant depths.

#### 5.1.2 Site Geology

The following geologic units were observed during the RI:

- Historic fill
- Upper glacial aquifer – The following textural units were identified in the upper glacial aquifer the in most of the borings (listed from shallow to deep):
  - A sand unit with various amounts of fines and gravel
  - A clayey silt and silty clay layer across the Site, except in the southwest portion of the Site where it was not apparent
  - Continuous sand and gravel unit that occurs just below the clayey silt and silty clay layer
  - A fine to coarse sand unit occurs beneath the sand and gravel unit.
  - Deep clay layer. This unit is not consistent with the description of the Upper Glacial Aquifer and may be the clay member of the Raritan Formation.

Further characterization of these units is provided in the following subsections. Interpretation of these units is based on the RI soil borings and the NYSDEC soil borings DEC-005, DEC-005D, DEC-026, and DEC-039. These layers are depicted on two cross sections provided in Figures 7 and 8. Soil borings logs are provided in Appendix E.

#### 5.1.3 Historic Fill

Historic fill that was encountered during the RI is primarily characterized as a brown, fine to coarse-grained sand with some silt and gravel, and trace anthropogenic materials (i.e., coal, brick, concrete, wood, and metal). This fill layer extends up to approximately 3 feet bgs and is underlain by the upper glacial aquifer.

#### 5.1.4 Upper Glacial Aquifer

The upper glacial aquifer was encountered below historic fill in each RI soil boring to termination depths up to 90 feet bgs (el. -38.9 feet<sup>1</sup>). A fine to medium sand and silty sand layer was observed below the historic fill in each boring. This sand unit is represented by stratified sands of varying textures containing some to no fines and gravel. A clayey silt and silty clay layer that thinned across the Site to the west was identified beneath the sand. This clayey silt and silty clay unit is present above the water table and is most shallow near the corner of Anthony Street and Vandervoort Avenue (northwestern portion of the site) where it occurs at around el. 23.8 to 33.4 feet and dips to the east, where it occurs at around el. 9.75 to 11.8 feet. The clayey silt and silty clay layer was not encountered in the southwestern portion of the Site. A contour map depicting the top of the clayey silt and silty clay elevation is provided in Figure 9. The clay/silty clay layer is underlain by a continuous sand/gravel layer, which crosses the water table at the Site. Based on field observations made during an RI that was performed at the adjoining property to the west (72 Anthony Street and 498 Porter Avenue), the clayey silt/silty clay and sand/gravel units continue to the east, across Porter and Varick Avenues. A Deep clay layer was encountered in the western part of the Site between el. -18.90 feet in the southwest corner of the Site and -35.90 feet in the northwestern portion of the Site (63 feet bgs to 80.5 feet bgs). The top of the clay layer slopes toward the north and northwest. The clay layer was not fully penetrated during the RI and was not encountered at ACME-EB-4 in the eastern portion of the Site. A contour map depicting the top of the deep clay elevation is provided in Figure 10.

### 5.2 Site Hydrogeology

#### 5.2.1 Regional Hydrogeology

The upper glacial deposit (i.e. Upper Pleistocene deposits) has a relatively high but locally variable permeability. The hydraulic conductivity of outwash deposits on Long Island is reported to be up to 270 feet per day (feet/day) but is probably lower in poorly sorted moraine deposits (USGS 2002a). The upper glacial aquifer is generally unconfined but is locally confined by layers of silt and clay. The hydraulic conductivity of the clay member of the Raritan Formation is estimated to be approximately 0.001 feet/day (USGS 2002a).

Based on the URS Corporation Site Characterization reports, the regional flow of the shallow groundwater overburden in the Upper Glacial Aquifer is to the north and northeast toward the Newtown Creek. The northern part of the Meeker Avenue Plume Trackdown Site is underlain by a petroleum free product plume (URS 2007), which is being recovered with the operation of an off-site free-product recovery system (off-site system) north of the Brooklyn-Queens Expressway. The off-site system produces localized cones of depression resulting in an inward

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<sup>1</sup> Elevations referenced are relative to NAVD88.

hydraulic gradient around the perimeter of the free-product plume area (URS 2012). Groundwater flow in the northern part of the Meeker Avenue Plume Trackdown Site is drawn toward the off-site system.

According to a review of the URS Corporation Phase VI Site Characterization report, dated April 2008, the sand of the upper glacial aquifer has average permeabilities of approximately  $10^{-2}$  centimeters per second (cm/s) to  $10^{-3}$  cm/s. The silt and clay layers encountered within the upper glacial aquifer have average permeabilities of  $10^{-4}$  cm/s to  $10^{-7}$  cm/s. Horizontal hydraulic gradients ranged from 0.0 to 0.12 foot per foot (ft/ft) at the Meeker Avenue Plume Trackdown Site. The lowest gradient was observed southwest of the Trackdown Site and the steepest gradient was observed east of the Site. The Raritan Formation (clay member) has average permeabilities less than  $10^{-6}$  cm/s.

#### 5.2.2 Site Hydrogeology

The primary hydrogeologic unit identified at the Site during the RI is the upper glacial aquifer. This aquifer appears to be locally semi-confined by a clayey silt and silty clay unit that occurs between el. 33.40 feet and el. 9.75 feet in the northern and eastern portion of the Site. This clayey silt and silty clay unit was encountered above the water table at the Site and presents a potential barrier to the downward migration of contaminants. Another significant hydrogeologic feature that was identified is a sand and gravel layer that occurs just below the clay/silty clay unit. The sand and gravel unit crosses the water table and provides a potential pathway for lateral contaminant migration. A second, deep clay layer was observed in the western portion of the Site at el. -18.90 feet to el. -35.90 feet. This deep clay layer presents a potential barrier to the downward migration of contaminants.

Synoptic water levels of new and existing wells were measured on December 3, 2012. The flow of the shallow overburden groundwater is to the north and northwest toward the corner of Anthony Street and Vandervoort Avenue and is consistent with surficial topography. The shallow groundwater flow at the Site seems to be influenced by the off-site system located to the north of the Brooklyn-Queens Expressway. The flow of the deep overburden groundwater is to the north and northeast toward the Newtown Creek. Light non-aqueous phase liquid (LNAPL) and DNAPL were not detected in any of the monitoring wells during groundwater gauging. A shallow overburden groundwater isocontour map, based on groundwater elevations at the shallow monitoring wells that straddle the groundwater interface, is presented as Figure 4. A deep overburden groundwater isocontour map, based on groundwater elevations at the deep monitoring wells, is presented as Figure 5. The water level data is summarized in the following table and is also provided in Table 2.

Monitoring Well	Ground Surface Elevation (feet)	Top of Casing Elevation (feet)	Groundwater Depth (feet)	Groundwater Elevation (feet)
ACME-MW-1	44.16	43.64	42.7	0.94
ACME-MW-1D	44.12	43.67	41.4	2.27
ACME-MW-2	41.06	42.29	41.32	0.97
ACME-MW-2D	42.76	40.61	38.6	2.01
ACME-MW-3	40.33	39.82	37.82	2.00
ACME-MW-3D	40.42	40.12	38.2	1.92
ACME-MW-4	54.78	54.23	52.48	1.75
ACME-MW-4D	54.79	53.89	52.12	1.77
DEC-005	42.08	41.76	39.78	1.98
DEC-005D	42.09	41.51	41.41	0.10
DEC-022D	51.75	51.36	49.55	1.81
DEC-026	48.73	48.33	46.8	1.53
DEC-026D	48.24	47.86	46	1.86
DEC-039	45.04	44.82	42.8	2.02
DEC-039D	44.07	44.29	42.3	1.99

Note: Groundwater elevations are relative to NAVD88

Horizontal hydraulic gradients measured during the RI ranged from approximately 0.0001 ft/ft and 0.015 ft/ft. The lowest horizontal hydraulic gradients were measured in the southwestern and southeastern parts of the Site between ACME-MW-3 and DEC-039 (0.0001 ft/ft) and ACME-MW-4 and DEC-022D (0.0004 ft/ft). The steepest horizontal hydraulic gradient was observed in the northwest corner of the Site between ACME-MW-2 and ACME-MW-3 (0.015 ft/ft).

Vertical hydraulic gradients in coupled shallow and deep monitoring wells calculated during the RI range from -0.058 ft/ft to 0.080 ft/ft. The steepest downward (positive) gradient was observed in coupled shallow and deep monitoring wells DEC-005 and DEC-005D. The steepest upward (negative) gradient was observed in coupled shallow and deep monitoring wells ACME-MW-1 and ACME-MW-1D. Vertical hydraulic gradients measured at the Site are relatively flat (i.e. vertical gradients approaching zero). The vertical hydraulic gradients in coupled shallow and deep monitoring wells are summarized in the following table and are also provided in Table 5.

Well Clusters	Monitoring Well ID	Date	Groundwater Elevation (feet amsl)	Well Screen Vertical Separation (feet)	Vertical Hydraulic Gradient (ft/ft)
Well Cluster ACME-MW-1	ACME-MW-1	12/3/2012	0.94	23.04	-0.058
	ACME-MW-1D	12/3/2012	2.27		
Well Cluster ACME-MW-2	ACME-MW-2	12/3/2012	0.97	23.8	-0.044
	ACME-MW-2D	12/3/2012	2.01		

Well Cluster	ACME-MW-3	12/3/2012	2.00	25.26	0.003
ACME-MW-3	ACME-MW-3D	12/3/2012	1.92		
Well Cluster	ACME-MW-4	12/3/2012	1.75	29.49	-0.001
ACME-MW-4	ACME-MW-4D	12/3/2012	1.77		
Well Cluster	DEC-005	12/3/2012	1.98	23.47	0.080
DEC-005	DEC-005D	12/3/2012	0.10		
Well Cluster	DEC-026	12/3/2012	1.53	20.22	-0.016
DEC-026	DEC-026D	12/3/2012	1.86		
Well Cluster	DEC-039	12/3/2012	2.02	14.25	0.002
DEC-039	DEC-039D	12/3/2012	1.99		

### 5.2.3 Geotechnical Test Results

Eight soil samples were collected from each change of strata, based on visual observation, encountered in saturated soil from soil boring ACME-EB-1 and were analyzed for geotechnical parameters. The following table summarizes the soil samples that were collected and analyzed for geotechnical analyses:

Soil Boring	Sample Depths (feet bgs)	Sample Elevation (feet)	Soil Type	Analysis
ACME-EB-1	42 – 54	el. 2.1 to el. -9.9	Poorly-graded sand with silt	<ul style="list-style-type: none"> <li>Particle size distribution (ASTM D422)</li> <li>Organic content (ASTM D2974)</li> <li>Permeability of granular soil (ASTM D2434-68 [2006])</li> </ul>
	54 – 57	el. -9.9 to el. -12.9	Silty sand	<ul style="list-style-type: none"> <li>Particle size distribution (ASTM D422)</li> <li>Organic content (ASTM D2974)</li> </ul>
	57 – 58	el. -12.9 to el. -13.9	Poorly-graded sand with gravel	<ul style="list-style-type: none"> <li>Particle size distribution (ASTM D422)</li> <li>Organic content (ASTM D2974)</li> </ul>
	58 – 62	el. -13.9 to el. -17.9	Silty sand	<ul style="list-style-type: none"> <li>Particle size distribution (ASTM D422)</li> <li>Organic content (ASTM D2974)</li> </ul>
	62 – 71	el. -17.9 to el. -26.5	Poorly-graded sand with silt	<ul style="list-style-type: none"> <li>Particle size distribution (ASTM D422)</li> <li>Organic content (ASTM D2974)</li> </ul>
	71 – 73	el. -26.5 to el. -28.9	Clay	<ul style="list-style-type: none"> <li>Organic content (ASTM D2974)</li> <li>Atterberg limits (ASTM D4318)</li> </ul>
	73 – 74	el. -28.9 to el. -29.9	Clay	<ul style="list-style-type: none"> <li>Organic content (ASTM D2974)</li> <li>Atterberg limits (ASTM D4318)</li> </ul>

Soil Boring	Sample Depths (feet bgs)	Sample Elevation (feet)	Soil Type	Analysis
	75 - 77	el. -29.9 to el. -32.9	Clay	<ul style="list-style-type: none"> <li>Organic content (ASTM D2974)</li> <li>Atterberg limits (ASTM D4318)</li> <li>Hydraulic conductivity (ASTM D5084-90)</li> </ul>

Note: Groundwater elevations are relative to NAVD88

The results indicate that the top of the clay layer encountered at the bottom of all the soil borings, except at ACME-EB-4, is a low-permeability confining unit with a permeability of  $5.46 \times 10^{-8}$  cm/s. The sand encountered below the groundwater interface, between approximately 42 and 54 feet bgs, has a permeability of  $8.62 \times 10^{-4}$  cm/s. A copy of the geotechnical laboratory data report is provided in Appendix G.

#### 5.2.4 Slug Test Results

Slug tests were conducted in two coupled shallow and deep monitoring wells (ACME-MW-1/ACME-MW-1D and ACME-MW-4/ACME-MW-4D) to measure the hydraulic conductivity of the formation in the immediate vicinity of the monitoring wells. The water table occurs beneath the shallow clayey silt/silty clay unit at the wells where the slug tests were performed. The results of the slug tests are summarized in the following table.

Monitoring Well	Hydraulic Conductivity (cm/s)
ACME-MW-1	$4.09 \times 10^{-2}$
ACME-MW-1D	$5.76 \times 10^{-3}$
ACME-MW-4	$9.96 \times 10^{-3}$
ACME-MW-4D	$1.92 \times 10^{-2}$

The hydraulic conductivity values measured at the Site are typical of unconsolidated well-sorted sands and glacial outwash. Slug test results are provided in Appendix J.

#### 5.2.5 Groundwater Chemistry

The following table summarizes the final water-quality indicator parameter measurements (pH, temperature, conductivity, reduction oxidation potential [ORP], dissolved oxygen [DO], and turbidity) made with a Horiba U-52 water-quality probe before sampling the shallow and deep monitoring wells.

Monitoring Well	pH	Conductivity (mS/cm <sup>2</sup> )	Turbidity (NTU <sup>3</sup> )	Dissolved Oxygen (mg/L <sup>4</sup> )	Temp (°C)	ORP (mV)
ACME-MW-1	6.39	1.30	0.0	0.42	16.13	39
ACME-MW-1D	6.65	2.13	1.5	0.65	16.13	-105
ACME-MW-2	6.57	1.85	0.1	1.28	15.53	17
ACME-MW-2D	6.52	2.18	0.0	1.51	14.74	-186
ACME-MW-3	6.72	1.90	0.0	7.8	15.99	25
ACME-MW-3D	6.74	1.94	6.1	1.15	15.98	-113
ACME-MW-4	7.48	1.25	2.1	6.78	16.70	186
ACME-MW-4D	6.45	1.98	16.1	0.89	16.49	103
DEC-005	6.42	1.22	3.3	1.43	16.30	140
DEC-005D	6.48	2.13	1.2	0.47	16.25	-124
DEC-022D	6.82	1.35	42.5	1.50	16.39	146
DEC-026	6.66	1.76	25.1	1.38	15.60	157
DEC-026D	6.45	2.06	13.2	0.66	15.71	12
DEC-039	6.39	1.51	17.2	0.97	16.20	187
DEC-039D	6.45	2.05	0.5	0.66	16.47	-50

<sup>22</sup> mS/cm = milliSiemens per centimeter

<sup>3</sup> NTU = nephelometric turbidity units

<sup>4</sup> mg/L = milligrams per liter



## **6.0 DISCUSSION OF AOCs AND NYSDEC SITE PERIMETER MONITORING WELLS**

This section discusses the findings of the RI with respect to the four AOCs identified in the Records Search Report and the RIWP and with respect to the new and existing NYSDEC perimeter monitoring wells. The nature and extent of the Site contamination are discussed separately in Section 8.0.

Soil analytical results are compared to the Part 375-6.8(a) Unrestricted and Commercial Use Soil Cleanup Objectives (SCO) and Protection of Groundwater SCOs. Groundwater analytical results are compared to the NYSDEC Division of Water Technical and Operation Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards (AWQS) for Class GA groundwater. New York State does not have any standards, criteria, or guidance for concentrations of VOCs in subsurface vapor and indoor air. However, as a conservative comparison, analytical results for the subslab soil vapor and indoor air samples were compared to NYSDOH Air Guideline Values (AGV).

For reference, VOC soil sample locations and results are presented on Figure 11 and summarized in Table 6. SVOC, metal, PCB, and pesticide soil sample results are summarized in Tables 7 and 8. VOC groundwater sample locations and results are presented on Figure 12 and summarized in Table 9. Soil vapor and indoor air-sample locations and results are presented on Figure 13 and summarized in Table 10. Copies of the full laboratory analytical reports are provided in Appendix F. The AOCs are described in detail in Section 3.3.

Four field-screening techniques were used to qualitatively determine the presence of CVOC impacts and DNAPL. These techniques consisted of visual assessment, olfactory screening, PID monitoring, and hydrophobic-dye testing. Visual assessment was used to detect staining or discoloration of soil cores. Olfactory screening was used to identify odors that could indicate CVOC impacts. A MiniRAE 2000 PID was used to measure total organic vapor (TOV) concentrations emanating from extracted soil cores. The PID was equipped with a 10.6 electron-volt lamp. The purpose of the PID screening was to qualitatively determine whether soil was impacted by CVOCs and to quantify depth-specific TOV concentrations. Hydrophobic-dye test kits, OIL-IN-SOIL™, were used to detect the presence of DNAPL in soil samples suspected to contain DNAPL. OIL-IN-SOIL™ test kits contain a surfactant-impregnated, SUDAN IV, a red dye that changes color in the presence of DNAPL. Shake tests using the OIL-IN-SOIL™ field-screening test kit were performed on soil that had visual or olfactory evidence of contamination or on soil that displayed elevated TOV concentrations, according to the manufacturer's directions.

### **6.1 AOC 1 – Former Metal Fabrication Area**

The RI scope that was performed at AOC 1 consisted of the following:

- One deep soil boring (ACME-MW1D/EB-1) was completed to the top of the clay layer, which was encountered at approximately 71 feet bgs, and three soil samples were collected. One surficial soil sample was analyzed for TCL VOCs, including TICs, TCL SVOCs, PCBs, pesticides, TAL metals, and total cyanide. The deeper soil samples were analyzed for TCL VOCs, including TICs;
- Installation of a monitoring well couplet (ACME-MW-1 and ACME-MW-1D) and collection of one groundwater sample for analysis of TCL VOCs, plus TICs, from each; and
- One subslab soil vapor-point (ACME-SV-1) was installed and a subslab soil vapor sample paired with an indoor air sample was collected for VOC analysis.

#### 6.1.1 Field Screening

TOV concentrations were detected at a maximum concentration of 180 parts per million (ppm) between approximately 54 and 55 feet bgs (below the groundwater table). Three “shake tests” were performed in this boring using the OIL-IN-SOIL™ field screening test kits with SUDAN IV at the following intervals: 26 to 27 feet bgs, 54 to 55 feet bgs, and 70 to 71 feet bgs. The test from 26 to 27 feet bgs was recorded as positive (i.e. a pink-colored ring was observed), which indicates that DNAPL may be present in the soil. The test from 54 to 55 feet bgs was positive (i.e. a pink-colored ring was observed), which indicates that DNAPL may be present in the soil. The test from 70 to 71 feet bgs was negative (i.e. pink-colored rings were not observed) indicating that DNAPL was not present in the soil.

#### 6.1.2 Soil Analytical Results

The following is a summary of AOC 1 soil sample results:

- None of the VOCs were detected at concentrations above the Part 375 Unrestricted and Commercial Use SCOs in any of the soil samples from ACME-MW-1D/EB-1.
- VOC TICs were not identified in any of the soil samples from ACME-MW-1D/EB-1.
- SVOCs, PCBs, and pesticides were not detected in the surficial soil sample ACME-EB-1 (1-2) collected from 1 to 2 feet bgs.
- Metals were detected in ACME-EB-1 (1-2) at concentrations below the Unrestricted and Commercial Use SCOs.

As described in Section 6.1.1, the initial interpretation of the “shake test” performed on soil from 54 to 55 feet bgs was positive, indicating that DNAPL may be present in the soil. However, subsequent consultation from the OIL-IN-SOIL™ field screening test kit manufacturer indicated that the pink dye used in the test too closely resembled the reddish-brown silt that was representative of the soil sample. The manufacturer recommended a

transition to a blue dye test, to provide greater contrast with the reddish-brown silt. For this reason, a soil sample was not collected from 54 to 55 feet bgs at ACME-MW1-1D/EB-1.

#### 6.1.3 Groundwater Analytical Results

Four groundwater samples (ACME-MW-1-20121204, ACME-MW-1D-20121204, DEC-005-20121204, and DEC-005D-20121204) were collected from the monitoring wells within and in the immediate vicinity of AOC 1. The following CVOCs were detected at concentrations exceeding NYSDEC TOGS Class GA Standards and Guidance Values:

- 1,1-Dichloroethene (1,1-DCE) – 8.1 micrograms per liter (µg/L) in ACME-MW-1D and 6.6 µg/L in DEC-005D
- cis-1,2-Dichloroethene (cDCE) – 22 µg/L in ACME-MW-1, 190 µg/L in ACME-MW-1D, 8.2 µg/L in DEC-005, and 170 µg/L in DEC-005D
- PCE – 12 µg/L in ACME-MW-1, 8.8 µg/L in ACME-MW-1D, 8.3 µg/L in DEC-005, and 7.6 µg/L in DEC-005D
- trans-1,2-Dichloroethene (tDCE) – 7.9 µg/L in ACME-MW-1D, and 9.6 µg/L in DEC-005D
- TCE – 220 µg/L in ACME-MW-1, 2,100 µg/L in ACME-MW-1D, 210 µg/L in DEC-005, and 2600 µg/L in DEC-005D
- Vinyl Chloride – 4.1 µg/L in DEC-005D

VOC TICs were not identified in the groundwater samples from ACME-MW-1 and ACME-MW-1D. The CVOCs 1,1-DCE, cDCE, and tDCE are daughter products resulting from the biodegradation of PCE and TCE. Although 1,1-DCE is a daughter product of TCE, TCE degradation to 1,1-DCE is less favorable than degradation to cDCE and tDCE. The degradation of 1,1,1-TCA via dehydrohalogenation to 1,1-DCE is the primary degradation pathway.

#### 6.1.4 Soil Vapor and Indoor Air Analytical Results

A paired subslab soil vapor and indoor air sample (ACME-SV-1 and ACME-IA-1, respectively) were sampled in AOC 1. During sampling activities, PID screening indicated a VOC concentration of 8.2 ppm at subslab soil vapor point ACME-SV-1. PCE and TCE were reported at concentrations of 1,600 µg/m<sup>3</sup> and 1,600 µg/m<sup>3</sup>, respectively, in soil vapor sample ACME-SV-1. PCE and TCE were detected in indoor air at concentrations of 4.7 µg/m<sup>3</sup> and 3.8 µg/m<sup>3</sup>, respectively, which are above the published range of background concentrations, but below their AGVs. Based on a review of the chemical product inventory that was compiled as part of the IAQ investigation, there were no indoor air sources of PCE and TCE at AOC 1.

### **6.2 AOC 2 –Dry Well/Underground Injection Well**

The RI scope that was completed at AOC 2 consisted of the following:

- Three soil borings (ACME-SB-2A, ACME-SB-2B, and ACME-SB-2C) were advanced in the northern and western portion of AOC 2 on the sidewalks of Anthony Street and Vandervoort Avenue. One soil boring, ACME-SB-2B, was advanced to approximately 77 feet bgs and the two other borings, ACME-SB-2A and ACME-SB-2C, were completed to approximately 55 feet bgs. A fourth soil boring, ACME-SB-2D was hand cleared to 5 feet bgs. This boring was not advanced beyond 5 feet bgs because it was inaccessible by the drilling equipment that was used due to limited overhead clearance and because CVOC impacts were not apparent in any of the other AOC 2 borings. A loading dock immediately adjacent to soil boring location ACME-SB-2D was inaccessible during the RI; however, the loading dock was observed to be accessible during an August 14, 2015 site walk. An additional soil boring will be advanced within this loading dock and between soil boring locations ACME-SB-2D and ACME-MW-3D/EB-3 during the supplemental RI.
- Nine soil samples were collected. One surface sample from each boring was analyzed for TCL VOCs, including TICs, TCL SVOCs, PCBs, pesticides, TAL metals, and total cyanide. All other soil samples were analyzed for TCL VOCs plus TICs;
- Installation of a monitoring well couplet (ACME-MW-2 and ACME-MW-2D) and collection of one groundwater sample for analysis of TCL VOCs, plus TICs, from each; and
- A subslab soil vapor-point (ACME-SV-2) was installed and a subslab soil vapor sample paired with an indoor air sample was collected for VOC analysis. A duplicate indoor air sample was also collected at AOC 2.

#### 6.2.1 Field Screening

PID screening revealed VOC impacts in each of the four soil borings completed in AOC 2. The following is a summary of the maximum TOV concentrations that were detected in each boring below the groundwater table:

- ACME-SB-2A – 36.6 ppm at approximately 47 and 48 feet bgs
- ACME- SB-2B – 202 ppm at approximately 72 and 73 feet bgs
- ACME-SB-2C – 25.0 ppm at approximately 47 and 48 feet bgs
- ACME-SB-2D – 160 ppm at approximately 4 and 5 feet bgs

“Shake tests” were completed using the OIL-IN-SOIL™ field screening test kits with SUDAN IV in the following borings and depth intervals:

- ACME-SB-2A – 47 to 48 feet bgs
- ACME-SB-2B – 40 to 41 feet bgs, 72 to 73 feet bgs, and 76 to 77 feet bgs.

- ACME-SB-2D – 4 to 5 feet bgs

The tests were negative (i.e. pink-colored rings were not observed), indicating that DNAPL was not present in the tested soil samples.

#### 6.2.2 Soil Analytical Results

The following is a summary of AOC 2 soil sample results:

- VOCs were not detected at concentrations above the Part 375 Unrestricted and Commercial Use SCOs in any of the soil samples collected from AOC 2.
- One or more VOC TICs, including by-products of petroleum compounds (i.e. dodecane, tridecane, hexane, etc.), were detected at low concentrations (maximum concentration of 0.28 mg/kg) in soil samples ACME-SB-2A (40-41), ACME-SB-2A (47-48), ACME-SB-2B (10-11), ACME-SB-2B (40-41), ACME-SB-2C (41-42), and ACME-SB-2D (4-5).
- SVOCs were not detected in surficial soil samples ACME-SB-2A (3-4) collected from 3 to 4 feet bgs and ACME-SB-2D (4-5) collected from 4 to 5 feet bgs. SVOCs were detected at concentrations below the Unrestricted and Commercial Use SCOs in surficial soil samples ACME-SB-2B (1-2) collected from 1 to 2 feet bgs and ACME-SB-2C (2-3) collected from 2 to 3 feet bgs.
- PCBs were not detected in any of the surficial soil samples.
- Pesticides were not detected in surficial soil samples ACME-SB-2A (3-4), ACME-SB-2C (2-3), and ACME-SB-2D (4-5). One pesticide, p,p'-DDT, was detected at a concentration below the Unrestricted and Commercial Use SCOs in surficial soil sample ACME-SB-2B (1-2) collected from 1 to 2 feet bgs.
- Two of four surficial soil samples [ACME-SB-2B (1-2) and ACME-SB-2C (2-3)] contained concentrations of metals (copper, lead, and selenium) above the Unrestricted Use SCOs.

#### 6.2.3 Groundwater Analytical Results

Two groundwater samples, ACME-MW-2-20121207 and ACME-MW-2D-20121207, were collected from the monitoring well couplet in AOC 2. The following CVOCs were detected at concentrations exceeding NYSDEC TOGS Class GA Standards and Guidance Values:

- 1,1,2-Trichloroethane (1,1,2-TCA) – 2.3 µg/L ACME-MW-2 and 1.5 µg/L ACME-MW-2D
- 1,1-DCE – 8.1 µg/L in ACME-MW-2D
- cDCE – 140 µg/L in ACME-MW-2 and 240 µg/L in ACME-MW-2D
- PCE – 9.8 µg/L in ACME-MW-2 and 11 µg/L in ACME-MW-2D
- tDCE – 32 µg/L ACME-MW-2D
- TCE – 2,500 µg/L in ACME-MW-2 and 5,200 µg/L in ACME-MW-2D

- Vinyl chloride – 4.8 µg/L in ACME-MW-2D

VOC TICs were not identified in the AOC 2 groundwater samples. The CVOCs 1,1-DCE, cDCE, tDCE, and vinyl chloride are daughter products resulting from the biodegradation of PCE and TCE. The CVOc 1,1-DCE is a daughter product of TCE; however, TCE degradation to 1,1-DCE is less favorable than degradation to cDCE and tDCE. The degradation of 1,1,1-TCA via dehydrohalogenation to 1,1-DCE is the primary degradation pathway.

#### 6.2.4 Soil Vapor and Indoor Air Analytical Results

A paired subslab soil vapor and indoor air sample (ACME-SV-2 and ACME-IA-2, respectively) were sampled in AOC 2. During sampling activities, PID screening indicated VOC concentrations of 12.0 ppm at subslab soil vapor point ACME-SV-2. PCE and TCE were reported at concentrations of 920 µg/m<sup>3</sup> and 74 µg/m<sup>3</sup>, respectively, at ACME-SV-2. PCE and TCE were detected in indoor air at concentrations of 5.6 µg/m<sup>3</sup> and 3.1 µg/m<sup>3</sup>, below their AGVs. Based on a review of the chemical product inventory that was compiled as part of the IAQ investigation, there were no indoor air sources of PCE and TCE in AOC 2 at the time that samples were collected.

### **6.3 AOC 3 - Dip Tank and Associated Piping and Floor Trench**

The RI scope that was completed at AOC 3 consisted of the following:

- One deep soil boring (ACME-MW3D/EB-3) was completed to approximately 69 feet bgs and three soil samples, plus one duplicate, were collected. One surficial soil sample was analyzed for TCL VOCs, including TICs, TCL SVOCs, PCBs, pesticides, TAL metals, and total cyanide. The deeper soil samples were analyzed for TCL VOCs, including TICs;
- Installation of a monitoring well couplet (ACME-MW-3 and ACME-MW-3D) and collection of one groundwater sample for analysis of TCL VOCs, plus TICs, from each; and
- Installation of one subslab soil vapor point (ACME-SV-3) and a subslab soil vapor sample paired with an indoor air sample were collected for VOC analysis.

#### 6.3.1 Field Screening

TOV concentrations were detected at a maximum of 192 ppm between approximately 63 and 64 feet bgs (below the groundwater table). Four “shake tests” were completed using the OIL-IN-SOIL™ field screening test kits with SUDAN IV at the following intervals: 3 to 5 feet bgs, 20 to 21 feet bgs, 56 to 57 feet bgs, and 63 to 64 feet bgs at the ACME-MW3D/EB-3 boring location. The tests performed at 20 to 21 feet bgs, 56 to 57 feet bgs, and 63 to 64 feet bgs in ACME-MW3D/EB-3 were negative (i.e. pink-colored rings were not observed), indicating that DNAPL was not present in the tested soil samples.

The “shake test” from 3 to 5 feet bgs in ACME-MW3D/EB-3 and an additional “shake test” performed at ACME-MW-3 on soil from 4 to 5 feet bgs were recorded as positive (i.e. a pink-colored ring was observed), which indicates that DNAPL may be present in the tested soil samples. However, further consultation with the OIL-IN-SOIL™ field screening test kit manufacturer indicated that the pink dye used in these tests may have been inappropriate.

#### 6.3.2 Soil Analytical Results

The following is a summary of AOC 3 soil sample results:

- VOCs were not detected at concentrations above the Part 375 Unrestricted and Commercial Use SCOs in any of the soil samples collected from ACME-MW-3D/EB-3.
- Three or more VOC TICs, including by-products of petroleum compounds (i.e. dodecane, tridecane, tetradecane, etc.), were detected at low concentrations (maximum concentration of 0.064 mg/kg) in soil samples ACME-EB-3 (20-21) and ACME-EB-3 (36-37).
- SVOCs, PCBs, and pesticides were not detected in the surficial soil sample ACME-EB-3 (3-4) collected from 3 to 4 feet bgs.
- One metal, lead, was detected at a concentration above its Unrestricted Use SCO in surficial soil sample ACME-EB-3 (3-4) collected from 3 to 4 feet bgs. Lead was not detected at a concentration greater than its Commercial Use SCO at this location.

#### 6.3.3 Groundwater Analytical Results

Two groundwater samples, ACME-MW-3-20121203 and ACME-MW-3D-20121203, were collected from the monitoring well couplet in AOC 3. The following CVOCs were detected at concentrations exceeding NYSDEC TOGS Class GA Standards and Guidance Values:

- 1,1,2-TCA – 1.3 µg/L in ACME-MW-3D
- 1,1-DCE – 12 µg/L in ACME-MW-3D
- cDCE – 25 µg/L in ACME-MW-3 and 620 µg/L in ACME-MW-3D
- PCE – 5.3 µg/L in ACME-MW-3 and 11 µg/L in ACME-MW-3D
- tDCE – 44 µg/L in ACME-MW-3D
- TCE – 530 µg/L in ACME-MW-3 and 11,000 µg/L in ACME-MW-3D
- Vinyl Chloride – 7.6 µg/L in ACME-MW-3D

VOC TICs were not identified in the groundwater samples from ACME-MW-3 and ACME-MW-3D. The CVOCs cDCE, tDCE, and vinyl chloride are daughter products resulting from the biodegradation of PCE and TCE. The CVOC 1,1-DCE may be a degradation product of TCE, but may also be a daughter product of 1,1,1-TCA degradation.

### 6.3.4 Soil Vapor and Indoor Air Analytical Results

A paired subslab soil vapor and indoor air sample (ACME-SV-3 and ACME-IA-3, respectively) were collected in AOC 3. During sampling activities, PID screening indicated a maximum VOC concentration of 10.2 ppm at subslab soil vapor point ACME-SV-3. PCE and TCE were reported at concentrations of 3,100  $\mu\text{g}/\text{m}^3$  and 4,500  $\mu\text{g}/\text{m}^3$ , respectively, at ACME-SV-3. PCE and TCE were detected in indoor air at concentrations of 4.0  $\mu\text{g}/\text{m}^3$  and 3.3  $\mu\text{g}/\text{m}^3$ , respectively, which are below their AGVs. Based on a review of the chemical product inventory that was compiled as part of the IAQ investigation, there were no indoor air sources of PCE and TCE identified in AOC 3 at the time of sample collection.

## **6.4 AOC 4 - Apparent Dry Well**

- One deep soil boring (ACME-MW4D/EB-4) was completed to approximately 90 feet bgs and two soil samples were collected. One surface sample was analyzed for TCL VOCs, including TICs, TCL SVOCs, PCBs, pesticides, TAL metals, and total cyanide. The other sample was analyzed for TCL VOCs plus TICs;
- Installation of a monitoring well couplet (ACME-MW-4 and ACME-MW-4D) and collection of one groundwater sample for analysis of TCL VOCs, plus TICs, from each; and
- A subslab soil vapor-point (ACME-SV-4) was installed and a subslab soil vapor sample paired with an indoor air sample were collected for VOC analysis. A duplicate indoor air sample was also collected at AOC 4.

### 6.4.1 Field Screening

Field screening did not indicate evidence of CVOCs or petroleum-impacted soil at AOC 4.

### 6.4.2 Soil Analytical Results

The following is a summary of AOC 4 soil sample results:

- VOCs were not detected at concentrations above the Part 375 Unrestricted and Commercial Use SCOs in the two soil samples.
- One VOC TIC, octamethyl cyclotetrasiloxane, a by-product of petroleum compounds, was detected at a low concentration (maximum concentration of 0.0065 mg/kg) in soil sample ACME-EB-4 (1-2).
- PCBs and pesticides were not detected in the surficial soil sample ACME-EB-1 (1-2) collected from 1 to 2 feet bgs.
- Multiple SVOCs, including benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and chrysene were reported at concentrations above the Unrestricted Use SCOs and one SVOC, benzo(a)pyrene was reported at a concentration above its Commercial Use SCO in surficial soil sample ACME-EB-4 (1-2).



- Multiple metals, including barium, copper, lead, and zinc, were also reported at concentrations above their Unrestricted Use SCOs in the surficial soil sample ACME-EB-1 (1-2). These metal concentrations were less than their respective Commercial Use SCOs.

#### 6.4.3 Groundwater Analytical Results

Two groundwater samples, ACME-MW-4-20121205 and ACME-MW-4D-20121205, were collected from the monitoring well couplet in AOC 4. Multiple CVOCs were detected at concentrations below NYSDEC TOGS Standards and Guidance Values in the shallow monitoring well ACME-MW-4. The following CVOCs were detected at concentrations exceeding their NYSDEC TOGS Class GA Standards and Guidance Values in the deep monitoring well ACME-MW-4D:

- cDCE – 43 µg/L
- TCE – 630 µg/L

VOC TICs were not identified in the groundwater samples from ACME-MW-4 and ACME-MW-4D. The CVOC cDCE is a daughter product resulting from the biodegradation of PCE and TCE.

#### 6.4.4 Soil Vapor and Indoor Air Analytical Results

A paired subslab soil vapor and indoor air sample (ACME-SV-4 and ACME-IA-4, respectively) were collected in AOC 4. During sampling activities, PID screening indicated a maximum VOC concentration of 34.2 ppm at subslab soil vapor point ACME-SV-4. PCE and TCE were reported at concentrations of 2,600 µg/m<sup>3</sup> and 28 µg/m<sup>3</sup>, respectively, at ACME-SV-4. Only TCE was detected in indoor air at a concentration of 0.58 µg/m<sup>3</sup>, which is below its AGV. Based on a review of the chemical product inventory that was compiled as part of the IAQ investigation, there were no indoor air sources of TCE at AOC 4 identified at the time of the sampling.

### **6.5 NYSDEC Site Perimeter Monitoring wells**

That RI scope that was performed off-site, along the perimeter of the Site, consisted of the following:

- Two soil borings (DEC-026D and DEC-039D) were completed to approximately 85 feet bgs and 66 feet bgs, respectively. The soil borings were not characterized from grade to 40 feet bgs at DEC-026D and from grade to 50 feet bgs at DEC-039D because they were installed approximately 5 to 10 feet away from their existing coupled shallow monitoring wells (DEC-026 and DEC-039), which were installed by the URS Corporation (URS April 2008 and URS October 2008, respectively). One soil sample was collected at the groundwater interface from DEC-026D and was analyzed for TCL VOCs, including TICs. No soil sample was collected from DEC-039D because soil samples were collected from this area at DEC-039

during a previous investigation (URS October 2008). The deep borings were converted into deep monitoring wells, creating well couplets.

- Seven groundwater samples were collected from three monitoring well couplets (DEC-005/DEC-005D, DEC-026/DEC-026D and DEC-039/DEC-039D) and from one shallow NYSDEC monitoring well (DEC-022D). The groundwater samples were analyzed for TCL VOCs, including TICs.

#### 6.5.1 Field Screening

Field screening did not indicate evidence of CVOC or petroleum-impacted soil at DEC-039D from 50 to 66 feet bgs. A maximum TOV concentration of 105 ppm was detected in soil boring DEC-026D at approximately 78 and 79 feet bgs (below the groundwater table). Odors were noted at DEC-026D between approximately 52 and 60 feet bgs. Three “shake tests” were completed using the OIL-IN-SOIL™ field-screening test kits with SUDAN IV at DEC-026D at the following depth intervals: 52 to 53 feet bgs, 58 to 59 feet bgs, and 78 to 79 feet bgs. The tests were negative (i.e. pink-colored rings were not observed), indicating that DNAPL was not present in the tested soil samples.

#### 6.5.2 Soil Analytical Results

The following is a summary of soil sample results:

- No soil samples were collected from DEC-039D.
- VOCs were not detected at concentrations above the Part 375 Unrestricted and Commercial Use SCOs in the soil sample DEC-026D (43-44).
- VOC TICs were not identified in soil sample DEC-026D (43-44).

#### 6.5.3 Groundwater Analytical Results

Seven groundwater samples (DEC-005-20121204, DEC-005D-20121204, DEC-022D-20121204, DEC-026-20121204, DEC-026D-20121204, DEC-039-20121204, and DEC-039D-20121204) were collected from three monitoring well couplets and from one shallow monitoring well on the sidewalks of Anthony Street, Lombardy Street, and Vandervoort Avenue. The following CVOCs were detected at concentrations exceeding NYSDEC TOGS Standards and Guidance Values:

- Upgradient Monitoring Wells (DEC-005, DEC-005D, DEC-022D, DEC-039, and DEC-039D):
  - 1,1,1-TCA – 8.2 µg/L in DEC-039
  - 1,1,2-TCA – 23 µg/L in DEC-022D
  - 1,1-DCE – 6.6 µg/L in DEC-005D
  - cDCE – 8.2 µg/L in DEC-005 to 170.2 µg/L in DEC-005D
  - PCE – 7.6 µg/L in DEC-005D to 600 µg/L in DEC-022D

- TCE – 74 µg/L in DEC-022D to 2,600 µg/L in DEC-005D
- Vinyl Chloride – 4.1 µg/L in DEC-022D
- Downgradient Monitoring Wells (DEC-026 and DEC-026D):
  - 1,1,2-TCA – 4.9 µg/L in DEC-026D to 11 µg/L in DEC-026
  - 1,1-DCE – 6.8 µg/L in DEC-026D
  - cDCE – 440 µg/L in DEC-026 to 1,100 µg/L in DEC-026D
  - PCE – 33 µg/L in DEC-026D to 63 µg/L in DEC-026
  - tDCE – 6.3 µg/L in DEC-026 to 80 µg/L in DEC-026D
  - TCE – 7,300 µg/L in DEC-026 to 13,000 µg/L in DEC-026D
  - Vinyl Chloride – 3.0 µg/L in DEC-026 to 12 µg/L in DEC-026D

VOC TICs were not identified in groundwater in any of the seven monitoring wells. The CVOCs cDCE, tDCE, and vinyl chloride are daughter products resulting from the biodegradation of PCE and TCE. The CVOC 1,1-DCE may be a degradation product of TCE, but may also be a daughter product of 1,1,1-TCA degradation.

## 7.0 NATURE AND EXTENT OF CONTAMINATION

This section discusses the nature and extent of chlorinated VOC-impacted soil, groundwater and soil vapor at the Site. A discussion of these findings as they relate to each AOC identified in the RIWP and the perimeter monitoring wells is provided in Section 6.0.

### 7.1 Soil Quality

Nine soil borings were completed, from which nineteen soil samples were collected, during the RI. Soil analytical results are compared to the Part 375-6.8(a) Unrestricted and Commercial Use SCOs. A summary of the soil samples collected is provided in Table 1. For reference, sample summary analytical results are presented in the following tables:

- Table 6: VOCs (soil)
- Table 7: SVOCs (surficial soil)
- Table 8: Metals, PCBs, and Pesticides (surficial soil)

Soil sample locations and VOC results are presented in Figure 11. The following subsections provide a detailed description of analytical soil sample results.

#### 7.1.1 Historic Fill

The historic fill layer was identified through soil classification in the field. Generally, the fill layer is composed of brick, concrete, wood, coal, and gravel in a sand and silt matrix. The fill layer covers the Site from surface grade (beneath the building foundation elements) to depths ranging from approximately 1 to 3 feet bgs. Subsurface cross sections depicting the fill layer are provided as Figures 7 and 8.

The following is a summary of the analytical results for soil samples collected from historic fill:

- **VOCs:** VOCs were not detected at concentrations that exceed their Unrestricted Use SCOs.
- **SVOCs:** Individual SVOCs, specifically polynuclear aromatic hydrocarbons (PAHs), exceeded the Unrestricted Use SCOs at one location (ACME-EB-4). In addition, one SVOC, benzo(a)pyrene, exceeded its Commercial Use SCO at ACME-EB-4. The following is a summary of SVOCs that exceeded their Unrestricted Use SCOs (presented in parentheses) at ACME-EB-4:
  - Benzo(a)Anthracene – 4.13 mg/kg (1 mg/kg)
  - Benzo(a)Pyrene – 4.31 mg/kg (1 mg/kg; Commercial Use SCO – 1 mg/kg)
  - Benzo(b)Fluoranthene – 3.17 mg/kg (1 mg/kg)
  - Chrysene – 4.68 mg/kg (1 mg/kg)
- **Metals:** Metals, including barium, copper, lead, selenium, and zinc, were detected in historic fill at concentrations above their Unrestricted Use SCOs.

Copper, lead, and zinc were also present in the background samples collected by the NYSDEC at McGolrick Park. The following is a summary of the range of individual metals in historic fill that exceed their Unrestricted Use SCO (presented in parentheses):

- Barium – 380 mg/kg (350 mg/kg)
  - Copper – 79.7 mg/kg to 116 mg/kg (50 mg/kg)
  - Lead – 257 mg/kg to 566 mg/kg (63 mg/kg)
  - Selenium – 4.06 mg/kg (3.9 mg/kg)
  - Zinc – 271 mg/kg (109 mg/kg)
- **PCBs:** PCB were not detected in historic fill at concentrations greater than their Unrestricted Use SCO.
  - **Pesticides:** Pesticides were not detected in historic fill at concentrations greater than their Unrestricted Use SCO.

Based on the concentrations detected during this RI, a review of the background soil sample results collected by the NYSDEC at McGolrick Park, and experience evaluating historic fill in New York City, the metal and SVOC concentrations detected at the Site are constituents of historic fill.

#### 7.1.2 Chlorinated Volatile Organic Compounds in Soil

Instrumental evidence (i.e., elevated PID readings) detected in soil borings that were advanced in AOC 1, AOC 2, AOC 3 and positive OIL-IN-SOIL™ field screening test results on the Anthony Street sidewalk suggest that a historic release may have occurred at the Site. Despite these field observations, chlorinated VOCs, including PCE, TCE, and their daughter products, were not detected in soil samples at concentrations greater than their Unrestricted Use SCO. AOCs and depths at which field screening was indicative of a historic release and the results of field screening are summarized in the following table.

AOC	Boring ID	Depth Interval (feet bgs)	OIL-IN-SOIL™ Field Screening Test	PID Reading	PCE and TCE Analytical Results Greater than Unrestricted Use SCO (mg/kg)
AOC 1	ACME-MW-1D/EB-1	26 - 27	Positive	108 ppm	NE
		54 - 55	Positive	180 ppm	NA
		70 – 71	Negative	26.9 ppm	NA

AOC	Boring ID	Depth Interval (feet bgs)	OIL-IN-SOIL™ Field Screening Test	PID Reading	PCE and TCE Analytical Results Greater than Unrestricted Use SCOs (mg/kg)
AOC 2	ACME-SB-2A	47 - 48	Negative	36.6 ppm	NE
	ACME-MW-2D/SB-2B	40 - 41	Negative	55.2 ppm	NE
		72 - 73	Negative	202 ppm	NA
		76 - 77	Negative	27.5 ppm	NA
	ACME-SB-2D	4 - 5	Negative	160 ppm	NE
AOC 3	ACME-MW-3D/EB-3	3 - 5	Positive	28.5 ppm	NE
		20 - 21	Negative	12.9 ppm	NE
		56 - 57	Negative	52.0 ppm	NA
		63 - 64	Negative	192 ppm	NA
	ACME-MW-3	4 - 5	Positive	84.4 ppm	NA
Down-gradient	DEC-026D	52 - 53	Negative	46.3 ppm	NA
		58 - 59	Negative	70.1 ppm	NA
		78 - 79	Negative	105 ppm	NA

NE – CVOCs did not exceed Unrestricted Use SCOs

NA – Not analyzed. The soil was within the saturated zone; therefore, no soil sample was collect from this interval.

Based on a review of soil sample analytical results, CVOCs were detected in soil in each AOC at concentrations two to three orders of magnitude less than their Unrestricted Use SCOs. Despite field screening results from AOC 1 and AOC 3 that suggest the presence of DNAPL in

soil, analytical results are contrary to these observations. A source of CVOCs in soil was not identified.

## 7.2 Groundwater Quality

Groundwater samples from seven monitoring well couplets and from one shallow monitoring well (15 groundwater samples total) were collected during the RI. Groundwater samples were collected according to the methods set forth in Section 4.4.4 and results were compared to the NYSDEC TOGS 1.1.1 AWQS for Class GA groundwater. Shallow and deep overburden groundwater is impacted with CVOCs throughout the Site. Chlorinated ethenes, including PCE, TCE, their degradation products (cDCE, tDCE, and vinyl chloride), chlorinated ethanes, including 1,1,1-TCA, 1,1,2-TCA, 1,2-dichloroethane (1,2-DCA), and chloroethane, were detected above their respective TOGS 1.1.1 Class GA AWQS.

Groundwater data is presented on the following tables and figures:

- Groundwater elevation data - Table 2
- Groundwater sample summary - Table 3
- Groundwater sample results summary - Table 9
- Shallow overburden groundwater contour map – Figure 4
- Deep overburden groundwater contour map – Figure 5
- Groundwater sample locations and results - Figure 12
- PCE and TCE isoconcentration maps - Figures 14 to 17

### 7.2.1 Shallow Overburden Groundwater

The general flow direction of the shallow overburden groundwater is to the north and northwest toward the corner of Anthony Street and Vandervoort Avenue and is consistent with surficial topography. The direction of the shallow overburden groundwater flow (as opposed to the deep overburden, which conforms to regional flow toward the Newtown Creek) may be locally drawn toward the off-site system associated with the oil spill to the north of the Site.

#### Chlorinated Ethenes

PCE was detected in seven of the eight shallow monitoring wells at concentrations exceeding its Class GA standard. The highest concentration of PCE in shallow groundwater was detected in an upgradient monitoring well (DEC-022D) at a concentration of 600 µg/L. PCE was detected in the two other upgradient monitoring wells (DEC-005 and DEC-039) at concentrations of 8.3 µg/L and 43 µg/L, respectively and in one downgradient monitoring well (DEC-026) at a concentration of 63 µg/L. On-site PCE concentrations in groundwater range from BDL (<0.41 µg/L) in ACME-MW-4 (AOC 4) to 12 µg/L in ACME-MW-1 (AOC 1). PCE concentrations in groundwater at the Site are lower than upgradient concentrations, suggesting the Site is

impacted by an upgradient off-site PCE source to the south and southeast of the Site (Former Klink Cosmo Dry Cleaner).

TCE was detected in seven of the eight shallow monitoring wells at concentrations exceeding its Class GA standard. The highest TCE concentrations in shallow overburden groundwater were detected in downgradient monitoring wells DEC-026 (7,300 µg/L) and ACME-MW-2 (2,500 µg/L). TCE was detected at lower concentrations in the three up/cross-gradient perimeter monitoring wells (DEC-005, DEC-022D, and DEC-039) at concentrations of 210 µg/L, 74 µg/L, and 93 µg/L, respectively. Site TCE concentrations range from 1.6 µg/L in ACME-MW-4 (AOC 4) to 530 µg/L in ACME-MW-3 (AOC 3). Based on a review of the baseline groundwater monitoring results presented by URS (URS April 2012), dissolved TCE concentrations have historically been greatest at DEC-005, with TCE concentrations as high as 66,000 µg/L in December 2007. The highest dissolved TCE concentration measured in DEC-026 prior to this RI was 2,700 µg/L measured in July 2008, which is less than half the concentration measured during this RI.

In general, TCE concentrations measured during this RI were higher in the northern and northwestern part of the Site near AOC 3 and in a downgradient monitoring well (DEC-026). These results are not consistent with historical URS groundwater sample results. TCE concentrations at the Site are one to two orders of magnitude higher than PCE concentrations, which indicate that TCE is not the result PCE degradation but is likely from a separate source. A source of dissolved TCE has not been identified.

One or more degradation products of PCE and TCE (i.e. cDCE, tDCE, and vinyl chloride) were generally detected above Class GA standards in the shallow monitoring wells where PCE and TCE were detected. The following degradation products of PCE and TCE were detected in the shallow groundwater samples:

- cDCE was detected above its Class GA standard in seven of the eight shallow monitoring wells. cDCE concentrations range between BDL (<0.43 µg/L) in ACME-MW-4 (AOC 4) and 440 µg/L in DEC-026 (downgradient).
- tDCE was detected above its Class GA standard in one downgradient monitoring well (DEC-026) at a concentration of 6.3 µg/L.
- 1,1-DCE was not detected above its Class GA standard in any of the monitoring wells.
- Vinyl chloride was detected above the applicable groundwater criteria in downgradient monitoring well DEC-026 at a concentration of 3.0 µg/L.

The presence of DCE isomers and vinyl chloride in shallow overburden groundwater indicates natural attenuation of PCE and TCE via reductive dechlorination. The PCE to TCE concentration ratio in DEC-022D was found to be 600:35 µg/L, or ≈17:1. This deviates from other on and off-Site PCE to TCE concentration ratios for shallow and deep wells, which were more than 1:100.



### Chlorinated Ethanes

Chlorinated ethanes, including 1,1,1-TCA and 1,1,2-TCA, were detected in four of the shallow monitoring wells at concentrations exceeding their respective Class GA standards. The highest 1,1,1-TCA concentration was detected in shallow groundwater at an upgradient monitoring well (DEC-039) at a concentration of 8.2 µg/L. The highest 1,1,2-TCA concentration was detected in shallow overburden groundwater at an upgradient monitoring well (DEC-022D) at a concentration of 23 µg/L. Based on a review of the RI groundwater data and data obtained from the URS Site Characterization reports, 1,1,1-TCA and 1,1,2-TCA appear to originate from an off-site, upgradient source.

#### 7.2.2 Deep Overburden Groundwater

The general flow direction of the deep overburden groundwater is to the northeast toward the Newtown Creek and is different from that of the shallow overburden groundwater flow. With the exception of ACME-MW-4D, all deep monitoring wells were set on the top of the deep clay layer. The top of clay layer slopes toward the north and northwest. This deep clay layer was not encountered in the eastern part of the Site.

### Chlorinated Ethenes

PCE was detected in six of the seven deep monitoring wells at concentrations exceeding its Class GA standard. The highest concentration of PCE in deep groundwater was detected in a downgradient monitoring well (DEC-026D) at a concentration of 33 µg/L. On-site PCE concentrations range between 1.8 µg/L in ACME-MW-4D (AOC 4) and 11 µg/L in ACME-MW-2D (AOC 2) and ACME-MW-3D (AOC 3). PCE was also detected in two upgradient monitoring wells (DEC-005D and DEC-039D) at concentrations of 7.6 µg/L and 11 µg/L, respectively.

TCE was detected in each of the seven deep monitoring wells at concentrations exceeding its Class GA standard. The highest TCE concentration in deep groundwater was detected in a side/downgradient monitoring well (DEC-026D) at a concentration of 13,000 µg/L. TCE was detected at a lower concentration in two upgradient monitoring wells DEC-005D (2,600 µg/L) and DEC-039D (1,500 µg/L) and in the downgradient Site well ACME-MW-4D (630 µg/L). On-site TCE concentrations range between 630 µg/L in ACME-MW-4D (AOC 4) and 11,000 µg/L in ACME-MW-3D (AOC 3). Based on a review of the baseline groundwater monitoring results presented by URS (URS April 2012), the highest historical dissolved TCE concentration measured at the Site was at DEC-005D in July 2008 (70,000 µg/L).

In general, TCE concentrations measured during this RI were higher in the northern and northwestern part of the Site near AOC 3 and in a side/downgradient monitoring well (DEC-026D). TCE concentrations at the Site are two to three orders of magnitude higher than PCE concentrations, which indicate that TCE is not the result of PCE degradation but is likely from a separate source. A source of dissolved TCE has not been identified.

Degradation products of PCE and TCE (i.e. cDCE, tDCE, and vinyl chloride) were generally detected above their respective Class GA standards in the monitoring wells where PCE and TCE were detected. The following degradation products of PCE and TCE were detected in the deep groundwater samples:

- cDCE was detected above its Class GA standard in all of the deep monitoring wells. Concentrations of cDCE range from 43 µg/L in ACME-MW-4D (AOC 4) to 1,100 µg/L in DEC-026D (downgradient).
- tDCE was detected above its Class GA standard in six of the seven deep monitoring wells. Concentrations of tDCE range from 2.7 µg/L in ACME-MW-4D (AOC 4) to 80 µg/L in DEC-026D (downgradient).
- 1,1-DCE was detected above its Class GA standard in five of the seven deep monitoring wells. Concentrations of 1,1-DCE range from BRL (5.2 µg/L) in DEC-039D (upgradient) to 12 µg/L in ACME-MW-3D (AOC 3).
- Vinyl chloride was detected above its Class GA standard in four of the seven deep monitoring wells. Concentrations of vinyl chloride range from 1.0 µg/L in ACME-MW-4D (AOC 4) to 12 µg/L in DEC-026D (downgradient).

The presence of DCE isomers and vinyl chloride in deep overburden groundwater indicates natural attenuation of PCE and TCE via reductive dechlorination.

#### Chlorinated Ethanes

The chlorinated ethane 1,1,2-TCA was detected in three of the deep monitoring wells at concentrations exceeding its Class GA standard. The highest 1,1,2-TCA concentration (4.9 µg/L) was detected at downgradient monitoring well DEC-026D.

#### 7.2.3 CVOC Solubility in Groundwater

DNAPL was not detected in any of the wells during well gauging. The concentrations of PCE, cDCE, tDCE, 1,1-DCE, and vinyl chloride are below 1% of their respective solubility in water in monitoring wells that were sampled during this RI. TCE concentrations are above its 1% solubility concentration in deep monitoring wells ACME-MW-3D in AOC 3 and DEC-026D, downgradient of the Site. The TCE concentration of 11,000 µg/L in ACME-MW-3D is 1% of its water solubility of 1,100 milligrams per liter (mg/L). The TCE concentration of 13,000 µg/L in DEC-026D is 1.18% of its water solubility.

#### 7.2.4 Source Areas and Horizontal and Vertical Extent of Groundwater Impacts

Based on the results of the RI, there appear to be multiple sources of dissolved phase CVOCs impacting groundwater at the Site:

### PCE

- The Site does not appear to be a source of PCE in groundwater because PCE was not identified in Site soil above its Unrestricted Use SCO.
- PCE concentrations in the shallow overburden groundwater at the Site are lower than upgradient concentrations, suggesting the Site is impacted by an upgradient off-site PCE source to the southeast of the Site. The Klink Cosmo Cleaners, located upgradient of the Site at 364 Richardson Street, was identified as a source of PCE in groundwater (URS October 2008). The dissolved-phase PCE plume originating from the Klink Cosmo Cleaners is migrating to the north and PCE was detected at concentrations of 6,800 µg/L in monitoring well DEC-040 located southeast of the Site (cross gradient) during the October 2011 groundwater sampling event (URS April 2012). The dissolved-phase PCE plume originating from the Klink Cosmo Cleaners is likely impacting groundwater at the Site.

### TCE

- In general, TCE concentrations in deep and shallow overburden groundwater at the Site are one to three orders of magnitude higher than PCE concentrations, which indicate that TCE is not the result PCE degradation but is likely from a separate source.
- There is no historical record of TCE use at the Site. Other than as a breakdown product of the PCE contamination emanating from the Klink Cosmo Cleaner, a source of localized dissolved TCE has not been identified.

TCE concentrations are generally higher in the deep overburden groundwater compared to shallow groundwater. TCE impacted groundwater is not expected to migrate below the top of the clay layer because of its low permeability; however, the lateral extent of the clay layer in the eastern part of the Site was not determined during the RI. The horizontal extent of TCE-impacted groundwater has not been fully delineated and a source has not yet been identified; therefore, additional investigation is necessary to determine the source and extent of TCE impacts to groundwater.

## **7.3 Soil Vapor and Indoor Air Quality**

Four coupled subslab soil vapor and indoor air samples were collected during the RI, as per the methods set forth in Section 4.5. The subslab soil vapor and indoor air analytical results were compared to the decision matrices. The indoor air analytical results were also compared to the Air Guideline Values (AGVs) provided in the NYSDOH Guidance. Soil vapor and indoor air sample locations and results are presented on Figure 13 and summarized in Table 10. Subslab soil vapor and indoor air decision matrix recommendations are provided in Table 11. PCE and TCE isoconcentration maps in soil vapor are provided as Figures 18 and 19, respectively. The

highest PCE and TCE concentrations were detected in AOC 3. A summary of the sample results is provided below:

#### Carbon Tetrachloride

- Carbon tetrachloride was not detected in any of the subslab vapor and indoor air samples.

#### 1,1,1-TCA

- 1,1,1-TCA was detected in each of the subslab vapor samples at concentrations ranging from 81  $\mu\text{g}/\text{m}^3$  in AOC 4 to 360  $\mu\text{g}/\text{m}^3$  in AOC 1.
- 1,1,1-TCA was not detected in the indoor air samples.
- A comparison of the NYSDOH Decision Matrix 2 with subslab vapor and corresponding indoor air results yields recommendations of no further action to monitoring the condition.

#### PCE

- PCE was detected in each of the subslab vapor samples at concentrations exceeding its NYSDOH AGV. PCE concentrations in the subslab vapor samples range from 920  $\mu\text{g}/\text{m}^3$  in AOC 2 to 3,100  $\mu\text{g}/\text{m}^3$  in AOC 3.
- Indoor air PCE concentrations ranged from 2.4  $\mu\text{g}/\text{m}^3$  in AOC 4 to 5.6  $\mu\text{g}/\text{m}^3$  in AOC 2. None of the concentrations exceeded the PCE AGV of 100  $\mu\text{g}/\text{m}^3$ . A source of PCE in indoor air was not identified during the site inspection/inventory that was performed as part of the IAQ investigation; the source of PCE in indoor air is likely soil vapor intrusion.
- A comparison of the NYSDOH Decision Matrix 2 with subslab vapor results and their corresponding indoor air results yields a recommendation to monitor/mitigate the condition.

#### TCE

- TCE was detected in each of the subslab vapor samples at concentrations exceeding its NYSDOH AGV. TCE concentrations in the subslab vapor samples range from 28  $\mu\text{g}/\text{m}^3$  in AOC 4 to 4,500  $\mu\text{g}/\text{m}^3$  in AOC 3.
- Indoor air TCE concentrations ranged from 0.58  $\mu\text{g}/\text{m}^3$  in AOC 4 to 3.8  $\mu\text{g}/\text{m}^3$  in AOC 1. None of the concentrations exceeded the PCE AGV of 5  $\mu\text{g}/\text{m}^3$ . A source of TCE in indoor air was not identified during the site inspection/inventory that was performed as part of the IAQ investigation; the source of TCE in indoor air is likely soil vapor intrusion.

- A comparison of the NYSDOH Decision Matrix 1 with subslab vapor results and their corresponding indoor air results yields a recommendation to monitor/mitigate the condition.

The following table summarizes the subslab soil vapor and indoor air concentration ranges for these compounds and the corresponding NYSDOH recommended actions:

AOC	Compound	Subslab Soil Vapor Concentration Range ( $\mu\text{g}/\text{m}^3$ )	Indoor Air Concentration Range ( $\mu\text{g}/\text{m}^3$ )	NYSDOH Soil Vapor/ Indoor Air Matrix Recommendations
AOC 1	1,1,1-TCA	360	Not detected	Monitoring (Matrix 2)
	TCE	1,600	3.8	Mitigation (Matrix 1)
	PCE	1,600	4.7	Mitigation (Matrix 2)
AOC 2	1,1,1-TCA	110	Not detected	Monitoring (Matrix 2)
	TCE	74	3.1	Mitigation (Matrix 1)
	PCE	920	5.6	Monitoring/Mitigation (Matrix 2)
AOC 3	1,1,1-TCA	220	Not detected	Monitoring (Matrix 2)
	TCE	4,500	3.3	Mitigation (Matrix 1)
	PCE	3,100	4.0	Mitigation (Matrix 2)
AOC 4	1,1,1-TCA	81	Not detected	No further action (Matrix 2)
	TCE	28	0.58	Monitoring (Matrix 1)
	PCE	2,600	2.4	Mitigation (Matrix 2)

The NYSDOH recommends that the average air level in a residential community not exceed  $100 \mu\text{g}/\text{m}^3$  for PCE and  $5 \mu\text{g}/\text{m}^3$  for TCE. Based on a comparison of the measured concentrations of PCE and TCE in indoor air to these AGVs, neither CVOC exceeds the NYSDOH recommended AGV.

## **8.0 QUALITATIVE HUMAN HEALTH EXPOSURE ASSESSMENT**

A qualitative human health exposure assessment was prepared using the data gathered during the RI. The exposure assessment conforms to the DER-10 paragraph 3.14(c)17 and subparagraphs and the DER-10 Appendix 3B New York State Department of Health Qualitative Human Health Exposure Assessment. The assessment includes an evaluation of potential sources and migration pathways of Site contamination, potential receptors, exposure media, and receptor intake routes and exposure pathways.

### **8.1 Site Setting**

The Site was historically used for iron works, metal shearing, and metal-finishing operations (Acme Steel facility). The former Acme Steel facility was reportedly a generator of F001 waste (spent halogenated solvents used in degreasing). A variety of solvents and chemicals were used in the manufacturing and finishing processes, including phosphate washes, paints, zinc precipitator, cutting oil, hydraulic oil, cold degreaser (petroleum distillate), adhesives, primer, and unspecified degreasers. The Site is a NYSDEC Class 2 Inactive Hazardous Waste Disposal Site (IHWDS), Site No. 224131.

The buildings in which former operations were performed are still in place. The buildings at 46 Anthony Street (Lot 11) are used as a paper-distribution warehouse to the west, by a decorative granite and marble warehouse and showroom in the center, and as office space to the east along Porter Avenue. The building at 95 Lombardy Street (Lot 8) is also used as a granite and marble warehouse and showroom. To develop this exposure assessment, mixed (commercial/manufacturing) use consistent with the current use of the Site was assumed.

### **8.2 Summary of Environmental Conditions**

The analytical data obtained during the RI for soil, soil vapor and groundwater (the exposure media) were evaluated in Sections 6.0 and 7.0. Historic fill contains concentrations of SVOCs and/or metals that exceed their Unrestricted Use SCOs in AOC 2, AOC 3, and AOC 4. SVOC and metal concentrations are consistent with those typically found in historic fill in New York City. Groundwater and soil vapor throughout the Site are impacted with dissolved-phase CVOCs (refer to Sections 7.2 and 7.3); however, a source of CVOCs was not detected in soil.

### **8.3 Conceptual Site Model**

A conceptual site model has been developed based on the findings of the RI. The purpose of the conceptual site model is to develop a simplified framework for understanding the distribution of impacted materials, potential migration pathways, and potentially complete exposure pathways, as discussed below.

### 8.3.1 Potential Sources of Contamination

Potential sources of CVOC impacts at the Site have been identified in Section 3.3 and are based on a Records Search Report, prepared by Langan and dated May 27, 2011. The following potential sources of CVOCs were identified:

- AOC 1 - Former Metal Fabrication Area in the southwestern part of the Site
- AOC 2 - Dry Well/Underground Injection Well in the northwest corner of the Site
- AOC 3 - Dip Tank and Associated Piping and Floor Trench in the northwestern part of the Site
- AOC 4 - Apparent Dry Well in the eastern part of the Site

Based on the results of the RI, AOC 3 appears to be a potential source of chlorinated solvents in groundwater and soil vapor. This potential source of CVOC impacts is consistent with the former land use; however, a source was not identified during this RI. Off-site sources of TCE (i.e., degradation of PCE from known upgradient sources) have been identified; however, based on the ratio of PCE to TCE at the Site, a separate source of TCE is likely. Based on historical use of properties to the north, south, and west, additional unidentified sources are likely.

### 8.3.2 Exposure Media

The CVOC-impacted media include soil, soil vapor, and groundwater. Although it was presumed that these media were likely impacted by historic use of the Site as an iron works, metal shearing, and metal-finishing operations, the soil results of this RI, including CVOC results that were two to three orders of magnitude less than their respective Unrestricted Use SCOs, and the absence of records indicating the historical use of TCE at the Site suggest that any on-site sources associated with the AOCs that were investigated have had minimal impacts. However, it should be noted that sediment samples collected from the floor drain in the northeast section of the property as part of the Phase 2 ESA completed by Impact Environmental were found to contain low levels of both PCE and TCE.

CVOCs are not present in soil at appreciable concentrations and the Site is entirely capped by an impermeable surface; therefore, exposure to CVOCs through contact with soil is unlikely. Groundwater at the Site is not used as a potable source of water and is at least 37.8 feet bgs; therefore, exposure to CVOCs through contact with groundwater is unlikely. Because CVOCs are present in soil vapor, there is potential for soil vapor intrusion through the building slabs. A review of soil, soil vapor, and groundwater data is provided in Sections 6.0 (Discussion of AOC and NYSDEC Site Perimeters Monitoring Wells) and 7.0 (Nature and Extent of Contamination).

## **8.4 Human Health Exposure Assessment**

### 8.4.1 Receptor Populations

The Site is capped with concrete and is currently used for commercial and warehousing purposes. The warehouse areas have large bay doors that are generally open during business hours, creating a well-ventilated space. Human receptors under current conditions include tenants, workers, and visitors to the showrooms at the Site. The Site is located in an area zoned for manufacturing and there are no residential areas in the adjoining properties. There are ten to twenty adult employees at the Site during normal working hours and there is limited access to the Site by the public (e.g., customers with visits lasting less than one hour).

### 8.4.2 Potential Exposure Pathways – On-Site

Based on a review of the RI data, soil has not been significantly impacted by historical releases of CVOCs. Historic fill contains concentrations of SVOCs and metals that exceed their Unrestricted. The SVOCs dibenzo(a,h)anthracene in AOC 2 and AOC 4 and benzo(a)pyrene in AOC 4 also exceed their respective Commercial Use SCOs in historic fill. The surface cover is composed of concrete (building slabs) throughout the Site, thereby eliminating any exposure pathway to historic fill. If the building slabs are penetrated, a dermal absorption, inhalation, and ingestion exposure pathway will be complete.

CVOC-impacted groundwater is present throughout the Site. Because groundwater in New York City is not used as a potable water source, and there are no Site wells for non-potable uses, there is no completion of the exposure pathway from groundwater under current Site conditions.

Soil vapor samples were collected from each of the four AOCs. Soil vapor results indicated the presence of several CVOCs, primarily TCE and PCE, at concentrations above NYSDOH AGVs. The maximum PCE and TCE concentrations (3,100  $\mu\text{g}/\text{m}^3$  and 4,500  $\mu\text{g}/\text{m}^3$ , respectively) were observed at subslab location ACME-SV-3 in AOC 3, located in the northwestern part of the Site. Points of exposure include potential cracks in building slabs that present a potential migration pathway and through volatilization of vapors into the air where there are Site workers. Routes of exposure may include inhalation of vapors entering the building. None of the indoor air samples collected during the RI exceeded the respective AGV for any CVOC; however, the NYSDOH may recommend measures be taken to reduce the likelihood of potential exposures, given the sub-slab sample TCE and PCE concentrations.

### 8.4.3 Potential Exposure Pathways – Off-Site

Off-site migration of Site soil contaminants is not expected to result in a complete exposure pathway for current conditions because no intrusive activities are planned at the Site. Based on the possible source of CVOCs at AOC 3 in groundwater, transport of source material depends on groundwater flow, physical and chemical properties of the contaminants, and subsurface



features. The Site is within the Meeker Avenue Plume Trackdown site. Based on the results of several investigations by the URS Corporation and others, CVOCs were found in soil, groundwater, and soil vapor throughout the Meeker Avenue Plume Trackdown site. Horizontally, groundwater flow will transport dissolved-phase CVOCs off-site with plume geometry enlarged by diffusion and dispersion. Groundwater contaminants are migrating off-site; however, the off-site migration of impacted groundwater from the Site is not expected to result in a complete exposure pathway for the current conditions because the Site and surrounding areas obtain their drinking-water supply from surface-water reservoirs located upstate and there are no known non-potable uses of groundwater in the area.

Off-site soil vapor samples were not collected, but, based on the results of groundwater samples collected from perimeter wells and soil vapor sample results collected by URS during previous investigations, there is a potential for off-site migration of TCE and PCE-impacted soil vapor. Points of exposure include potential cracks in off-site building slabs that present a potential migration pathway and through volatilization of vapors into the air where there are building occupants. Routes of exposure may include inhalation of vapors entering the off-site buildings.

#### 8.4.4 Summary

Complete exposure pathways within the Site may exist between the contaminated media and human receptors under current conditions. The pathways include direct contact via inhalation of soil vapor contaminants. The following table summarizes the exposure assessment for the Site.

Environmental Media and Exposure Route	Human Exposure Assessment
Direct contact with surface soil and inhalation (and incidental ingestion)	<ul style="list-style-type: none"><li>The Site is capped with concrete; therefore, direct contact is not possible under current conditions. If the slab is penetrated, a dermal, inhalation, or ingestion exposure pathway is complete.</li></ul>
Direct contact with subsurface soil (and incidental ingestion)	<ul style="list-style-type: none"><li>Intrusive activities (i.e. construction activities) can result in direct contact with subsurface soils. Air monitoring, engineering controls and worker training should be necessary for any intrusive activities</li><li>Intrusive activities are not planned for the Site; however, mitigation through implementation of a health and safety plan would be necessary to protect Site workers if intrusive activities occur.</li></ul>

Environmental Media and Exposure Route	Human Exposure Assessment
Ingestion of groundwater	<ul style="list-style-type: none"> <li>Groundwater is not used for drinking water; there is no completion of the exposure pathway under current Site conditions.</li> <li>There are no known domestic water-supply wells in the area.</li> </ul>
Direct contact with groundwater	<ul style="list-style-type: none"> <li>Groundwater is between approximately 38 and 53 feet bgs at the Site; therefore, direct contact with groundwater is not expected.</li> <li>Intrusive activities (e.g., groundwater sampling for Site investigation) can result in direct contact with groundwater. Standard health and safety plans are needed to mitigate exposure if intrusive activities occur.</li> </ul>
Indoor air inhalation (exposures related to soil vapor intrusion)	<ul style="list-style-type: none"> <li>Implementation of NYSDOH guidance directs mitigation and monitoring.</li> <li>Careful inspection of on-site building foundation slabs with measures to seal any cracks or other air pathways through the slab is recommended.</li> <li>Additional on-site monitoring is recommended to confirm indoor air concentrations remain below AGVs.</li> <li>The potential for soil vapor intrusion at nearby off-site structures/receptors exists. Additional off-site monitoring may be necessary if impacts to indoor air at off-site structures are detected.</li> <li>Additional measures may be warranted if impacts to indoor air are detected.</li> </ul>

## 8.5 Evaluation of Human Health Exposure

Complete exposure pathways have the following five elements: (1) a contaminant source, (2) a contaminant release and transport mechanism, (3) a point of exposure; (4) a route of exposure, and (5) a receptor population.

An analysis of each element is discussed above for the Site. Based on the conceptual site model and the review of environmental data, complete on-site exposure pathways appear to be present on Site. The complete exposure pathways indicate a modest risk of exposure to humans from Site contaminants via exposure to soil, soil vapor, and groundwater. Recommended mitigation measures to address this modest risk include:

- Careful inspection of building foundation slabs with measures to seal any cracks or other air pathways through the slab; and
- Implementation of health and safety plans designed to mitigate exposure during any invasive work.

- Continued monitoring of site contaminants and exposure pathways to prevent possible exposure of receptor populations.

## **8.6 Ecological Risks**

The Site is located in a fully developed urban area. The surface cover on the Site provides minimal habitat for wildlife. The Sargent William Dougherty Playground is located approximately 50 feet north of the Site; however, the playground is mostly capped with concrete and provides minimal habitat for wildlife. The Newtown Creek is located approximately a half mile to the east and north of the Site. Because of the lack of suitable habitat, the ecological risks posed by the Site are negligible.

## **8.7 Fish and Wildlife Exposure Assessment**

NYSDEC DER-10 requires an on-site and off-site Fish and Wildlife Resources Impact Analysis (FWRIA) if certain criteria are met. Per the requirements stipulated in Section 3.10 and Appendix 3C of DER-10, a review of nearby fish and wildlife resources was conducted using aerial photos, Site observations, and USGS topographic maps. The Site is located in a long-urbanized, industrial area. Newtown Creek is located about a half mile to the east and north of the Site, but possesses neither suitable habitat nor ecological significance. Based on these findings, there was no need to prepare an FWRIA for the Site. A completed form of DER-10 Appendix 3C is enclosed in this addendum as Appendix O.

## **9.0 CONCLUSIONS AND RECOMMENDATIONS**

The RI was implemented between September 18 and December 13, 2012 to:

- Determine whether AOCs identified in the Records Search Report are sources of PCE and TCE;
- Evaluate whether these AOCs have impacted soil, groundwater, and/or soil vapor;
- Interpret the stratigraphy of the Site using observations obtained during the RI and previous investigations performed by URS;
- Determine the direction of groundwater flow; and
- Determine geotechnical properties of Site soil and aquifer properties of saturated soil to evaluate remedial alternatives.

The findings summarized herein are based on both qualitative and quantitative data, consisting of field observations, instrumental readings, and laboratory analytical results of soil, groundwater, and soil vapor and indoor air samples collected during the RI.

### **9.1 Summary of Findings**

Significant RI findings are summarized as follows:

- Two stratigraphic units were evaluated during this RI: historic fill and the Upper Glacial Aquifer (i.e. Upper Pleistocene deposits). The historic fill extends to depths of up to approximately 3 feet bgs and is comprised of a brown, fine to coarse grained sand with some silt, some gravel, and trace anthropogenic materials (i.e., coal, brick, concrete, wood, and metal). Underlying the historic fill is the Upper Glacial Aquifer, which extends to depths of up to 90 feet bgs. The following textural units were encountered within the upper glacial aquifer: a sand unit with various amounts of fines and gravel, clayey silt and silty clay layer (not present in the southwest corner of the Site), continuous sand and gravel unit that occurs just below the clay/silty clay unit, and a fine to coarse sand that underlies the sand and gravel unit. This unit is underlain by a clay layer, which was encountered in the western portion of the Site at depths ranging from 63 feet bgs to 80.5 feet bgs (el. -18.90 feet to -35.90 feet). This unit is not consistent with the description of the Upper Glacial Aquifer and may be the clay member of the Raritan Formation; however the depths at which this clay was encountered is not consistent with depths presented in URS reports. The top of this clay layer slopes toward the north and northwest.
- The sand/gravel unit that was identified in the Upper Glacial Aquifer is significant because it is continuous and presents a potential migration pathway for CVOCs that originate from off-site sources.
- Groundwater is present at depths ranging from approximately 38.6 to 52.5 feet bgs (el. 0.10 feet to el. 2.27 feet). Shallow overburden groundwater migrates in a

north/northwesterly direction most likely toward the off-site system located to the north of the Brooklyn Queens Express Way. Deep overburden groundwater flows in a northeasterly direction toward the Newtown Creek.

- Historic fill is impacted with metals and SVOCs at concentrations that exceed Unrestricted Use SCOs. SVOCs were also present in AOC 2 and AOC 4 at concentrations that exceed their Commercial Use SCOs.
- CVOCs, including PCE, TCE, and their degradation products, were detected in soil in each AOC at concentrations two to three orders of magnitude less than their Unrestricted Use SCOs. Despite field screening results from AOC 1 and AOC 3 that suggest the presence of DNAPL in soil, analytical results are contrary to these observations. A source of CVOCs in soil was not identified.
- Shallow and deep overburden groundwater is impacted by CVOCs throughout the Site. Chlorinated ethenes, including PCE, TCE, and their degradation products (cDCE, tDCE, and vinyl chloride) and chlorinated ethanes, including 1,1,1-TCA and 1,1,2-TCA, were detected above their respective Class GA standards.
- PCE concentrations in the shallow overburden groundwater at the Site are lower than upgradient concentrations, suggesting the Site is impacted by an upgradient, off-site PCE source.
- TCE concentrations at the Site are one to two orders of magnitude higher than PCE concentrations, which indicate that TCE is not the result of PCE degradation but is likely from a separate source. Sediment samples collected from the floor drain in the northeast section of the property as part of the Phase 2 ESA completed by Impact Environmental were found to contain low levels of both PCE and TCE.
- TCE concentrations in shallow and deep groundwater measured during this RI were highest in the northern and northwestern part of the Site, near AOC 3, and in a downgradient monitoring well (DEC-026).
- There is no historical record of TCE use at the Site. A source of dissolved TCE has not been identified at the Site.
- TCE impacted groundwater is not expected to migrate below the top of the deep clay layer because of its low permeability; however, the lateral extent of the clay layer in the eastern part of the Site was not determined during the RI. The horizontal extent of TCE-impacted groundwater has not been fully delineated.
- Concentrations of TCE equal to or above 1% of its water solubility were detected in the deep monitoring wells at AOC 3 (ACME-MW-3D) and downgradient of the Site (DEC-026D). Field-screening of selected soil samples with OIL-IN-SOIL™ field-screening

tests suggest the presence of DNAPL; however, based on well gauging and analytical results, DNAPL is not present at the Site.

- The presence of PCE and TCE degradation products in shallow and deep overburden groundwater indicates natural attenuation of PCE and TCE via reductive dechlorination.
- PCE and TCE were detected in subslab soil vapor at concentrations above their AGVs. Indoor air sample results that were coupled with soil vapor sample locations indicate PCE and TCE at concentrations less than their AGVs. Based on a comparison of the soil vapor and indoor air sample results to the NYSDOH decision matrices, NYSDOH recommends mitigation, regardless of the indoor air concentration.

## 9.2 Recommendations

Based on the findings of the RI, the following recommendations are to be considered:

- Additional investigation is necessary to distinguish off-site sources and to determine whether any TCE impacts originate from the Site, and if so, their extent and magnitude.
- Advancement of a delineation boring, or borings, near the location of ACME-EB-2D within AOC 2 to further delineate the vertical extent of soil impacts in this area.
- Additional investigation should be completed within AOC 3 to sample from within and around the floor drain and former conveyor in this area. A shallow and deep boring/monitoring well location should be installed between DEC-026D and ACME-MW-3.
- An additional delineation boring near AOC 4 and at the location of the reported "underground injection well" should be advanced.
- Additional groundwater monitoring should be coordinated with NYSDEC monitoring of wells surrounding the Site.
- Because the Site buildings are used as a commercial and warehousing space with no residential use, active mitigation (i.e., subslab depressurization system and/or vapor barrier) is not recommended for the Site buildings. To mitigate soil vapor infiltration and potential exposure at the Site, openings in the buildings' floor slabs should be sealed. Additional monitoring should be performed to confirm that no actionable PCE and TCE concentrations exist within Site indoor air.
- The VOC 1,4-dioxane, which is a solvent stabilizer frequently used for degreasing, should be added to the VOC target compound list for future investigations at the Site. This compound was detected as a VOC TIC in the soil at the adjacent property at 72 Anthony Street (NYSDEC Site No. 224132). The VOC 1,4-dioxane is listed as a contaminant in the Part 375 SCOs.

## 10.0 REFERENCES

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# TABLES



Table 1  
Soil Sample Summary  
Remedial Investigation  
Former ACME Steel/Metal Works  
95 Lombardy Street/46 Anthony Street  
Brooklyn, New York  
NYSDEC Site No. 224131

Area of Concern (AOC)	Boring/Monitoring Well Location	Sample ID	Sample Date	Sample Matrix	Start Depth (feet bgs)	End Depth (feet bgs)	Parent Sample (for duplicate samples only)	Analysis
AOC 1	ACME-MW-1D/EB-1	ACME-EB-1 (1-2)	9/19/2012	Soil	1	2	-	TCL VOC plus TIC via EPA Method 8260B TCL SVOC via EPA method 8270C PCB via EPA method 8082A Pesticides via EPA method 8081B TAL metals by EPA method 6010B/7000 series Total cyanide via EPA method 9013A/9010C
		ACME-EB-1 (26-27)	9/26/2012	Soil	26	27	-	TCL VOC plus TIC via EPA Method 8260B
		ACME-EB-1 (37-38)	9/26/2012	Soil	37	38	-	TCL VOC plus TIC via EPA Method 8260B
AOC 2	ACME-SB-2A	ACME-SB-2A (3-4)	9/24/2012	Soil	3	4	-	TCL VOC plus TIC via EPA Method 8260B TCL SVOC via EPA method 8270C PCB via EPA method 8082A Pesticides via EPA method 8081B TAL metals by EPA method 6010B/7000 series Total cyanide via EPA method 9013A/9010C
		ACME-SB-2A (40-41)	11/13/2012	Soil	40	41	-	TCL VOC plus TIC via EPA Method 8260B
		ACME-SB-2A (47-48)	11/13/2012	Soil	47	48	-	TCL VOC plus TIC via EPA Method 8260B
	ACME-MW-2D/SB-2B	ACME-SB-2B (1-2)	9/24/2012	Soil	1	2	-	TCL VOC plus TIC via EPA Method 8260B TCL SVOC via EPA method 8270C PCB via EPA method 8082A Pesticides via EPA method 8081B TAL metals by EPA method 6010B/7000 series Total cyanide via EPA method 9013A/9010C
		ACME-SB-2B (10-11)	11/19/2012	Soil	10	11	-	TCL VOC plus TIC via EPA Method 8260B
		ACME-SB-2B (40-41)	11/21/2012	Soil	40	41	-	TCL VOC plus TIC via EPA Method 8260B
	ACME-MW-2/SB-2C	ACME-SB-2C (2-3)	9/24/2012	Soil	2	3	-	TCL VOC plus TIC via EPA Method 8260B TCL SVOC via EPA method 8270C PCB via EPA method 8082A Pesticides via EPA method 8081B TAL metals by EPA method 6010B/7000 series Total cyanide via EPA method 9013A/9010C
		ACME-SB-2C (41-42)	11/26/2012	Soil	41	42	-	TCL VOC plus TIC via EPA Method 8260B

**Notes:**  
VOC = Volatile organic compounds  
SVOC = Semi volatile organic compounds  
TAL = Target analyte list  
TCL = Target compound list  
AOC = Area of Concern

TIC = Tentatively identified compounds  
EPA = Environmental Protection Agency  
PCB = Polychlorinated biphenyls  
feet bgs = Feet below grade surface

Table 1  
Soil Sample Summary  
Remedial Investigation  
Former ACME Steel/Metal Works  
95 Lombardy Street/46 Anthony Street  
Brooklyn, New York  
NYSDEC Site No. 224131

Area of Concern (AOC)	Boring/Monitoring Well Location	Sample ID	Sample Date	Sample Matrix	Start Depth (feet bgs)	End Depth (feet bgs)	Parent Sample (for duplicate samples only)	Analysis
AOC 2	ACME-SB-2D	ACME-SB-2D (4-5)	10/1/2012	Soil	4	5	-	TCL VOC plus TIC via EPA Method 8260B TCL SVOC via EPA method 8270C PCB via EPA method 8082A Pesticides via EPA method 8081B TAL metals by EPA method 6010B/7000 series Total cyanide via EPA method 9013A/9010C
AOC 3	ACME-MW-3D/EB-3	ACME-EB-3 (3-4)	9/20/2012	Soil	3	4	-	TCL VOC plus TIC via EPA Method 8260B TCL SVOC via EPA method 8270C PCB via EPA method 8082A Pesticides via EPA method 8081B TAL metals by EPA method 6010B/7000 series Total cyanide via EPA method 9013A/9010C
		ACME-EB-3 (20-21)	11/14/2012	Soil	20	21	-	TCL VOC plus TIC via EPA Method 8260B
		ACME-EB-3 (36-37)	11/14/2012	Soil	36	37	-	TCL VOC plus TIC via EPA Method 8260B
		ACME-DUP-3	11/14/2012	Soil	36	37	ACME-EB-3 (36-37)	TCL VOC plus TIC via EPA Method 8260B
AOC 4	ACME-MW-4D/EB-4	ACME-EB-4 (1-2)	9/21/2012	Soil	1	2	-	TCL VOC plus TIC via EPA Method 8260B TCL SVOC via EPA method 8270C PCB via EPA method 8082A Pesticides via EPA method 8081B TAL metals by EPA method 6010B/7000 series Total cyanide via EPA method 9013A/9010C
		ACME-EB-4 (49-50)	10/23/2012	Soil	49	50	-	TCL VOC plus TIC via EPA Method 8260B
NYSDEC Site Perimeter Well	DEC-026D	DEC-026D (43-44)	11/12/2012	Soil	43	44	-	TCL VOC plus TIC via EPA Method 8260B
-	-	ACME-FB-1	10/2/2012	Field Blank	-	-	-	TCL VOC plus TIC via EPA Method 8260B
-	-	ACME-FB-2	11/9/2012	Field Blank	-	-	-	TCL VOC plus TIC via EPA Method 8260B
-	-	ACME-FB-3	11/19/2012	Field Blank	-	-	-	TCL VOC plus TIC via EPA Method 8260B

Notes:  
VOC = Volatile organic compounds  
SVOC = Semivolatile organic compounds  
TAL = Target analyte list  
TCL = Target compound list  
AOC = Area of Concern

TIC = Tentatively identified compounds  
EPA = Environmental Protection Agency  
PCB = Polychlorinated biphenyls  
feet bgs = Feet below grade surface

**Table 2**  
**Groundwater Elevations**  
**Remedial Investigation**  
**Former ACME Steel/Metal Works**  
**95 Lombardy Street/46 Anthony Street**  
**Brooklyn, New York**  
**NYSDEC Site No. 224131**

Monitoring Well ID	Latitude <sup>1</sup>	Longitude <sup>1</sup>	Ground Surface Elevation <sup>2</sup>	Top of Casing Elevation <sup>2</sup>	Date	Measured Well Depth (feet bgs)	Depth to Water (feet bgs)	Groundwater Elevation <sup>2</sup>
<b>On-Site Wells</b>								
ACME-MW-1	40.722944	-73.937011	44.16	43.64	12/3/2012	51.40	42.70	0.94
ACME-MW-1D	40.722962	-73.937018	44.12	43.67	12/3/2012	75.00	41.40	2.27
ACME-MW-2	40.723274	-73.937156	41.06	42.29	12/3/2012	54.20	41.32	0.97
ACME-MW-2D	40.723253	-73.937259	42.76	40.61	12/3/2012	80.00	38.60	2.01
ACME-MW-3	40.723165	-73.936947	40.33	39.82	12/3/2012	49.60	37.82	2.00
ACME-MW-3D	40.723155	-73.936986	40.42	40.12	12/3/2012	74.65	38.20	1.92
ACME-MW-4	40.723354	-73.935978	54.78	54.23	12/3/2012	60.20	52.48	1.75
ACME-MW-4D	40.723362	-73.935996	54.79	53.89	12/3/2012	91.75	52.12	1.77
<b>NYSDEC Site Perimeter Wells</b>								
DEC-005	40.723003	-73.937139	42.08	41.76	12/3/2012	48.50	39.78	1.98
DEC-005D	40.722979	-73.937129	42.09	41.51	12/3/2012	72.00	41.41	0.10
DEC-022D	40.722967	-73.935960	51.75	51.36	12/3/2012	61.20	49.55	1.81
DEC-026	40.723409	-73.936641	48.73	48.33	12/3/2012	55.00	46.80	1.53
DEC-026D	40.723400	-73.936682	48.24	47.86	12/3/2012	86.20	46.00	1.86
DEC-039	40.722753	-73.936758	45.04	44.82	12/3/2012	51.93	42.80	2.02
DEC-039D	40.722743	-73.936791	44.07	44.29	12/3/2012	66.25	42.30	1.99

**Notes:**

1. The horizontal datum is referenced to the North American Datum of 1983 (NAD83), New York State Plane Coordinate System, Long Island Zone.
2. The vertical datum is referenced to the North American Vertical Datum of 1988 (NAVD88).
3. bgs = below grade surface

Table 3  
Groundwater Sample Summary  
Remedial Investigation  
Former ACME Steel/Metal Works  
95 Lombardy Street/46 Anthony Street  
Brooklyn, New York  
NYSDEC Site No. 224131

Area of Concern (AOC)	Monitoring Well Location	Sample ID	Sample Matrix	Sample Date	Parent Sample (for duplicate samples only)	Analysis
AOC 1	ACME-MW-1	ACME-MW-1-20121204	Groundwater	12/4/2012	-	TCL VOC plus TIC via EPA Method 8260B
	ACME-MW-1D	ACME-MW-1D-20121204	Groundwater	12/4/2012	-	TCL VOC plus TIC via EPA Method 8260B
AOC 2	ACME-MW-2	ACME-MW-2-20121207	Groundwater	12/7/2012	-	TCL VOC plus TIC via EPA Method 8260B
	ACME-MW-2D	ACME-MW-2D-20121207	Groundwater	12/7/2012	-	TCL VOC plus TIC via EPA Method 8260B
AOC 3	ACME-MW-3	ACME-MW-3-20121203	Groundwater	12/3/2012	-	TCL VOC plus TIC via EPA Method 8260B
	ACME-MW-3D	ACME-MW-3D-20121203	Groundwater	12/3/2012	-	TCL VOC plus TIC via EPA Method 8260B
AOC 4	ACME-MW-4	ACME-MW-4-20121205	Groundwater	12/5/2012	-	TCL VOC plus TIC via EPA Method 8260B
	ACME-MW-4D	ACME-MW-4D-20121205	Groundwater	12/5/2012	-	TCL VOC plus TIC via EPA Method 8260B
NYSDEC Site Perimeter Wells	DEC-005	DEC-005-20121204	Groundwater	12/4/2012	-	TCL VOC plus TIC via EPA Method 8260B
	DEC-005D	DEC-005D-20121204	Groundwater	12/4/2012	-	TCL VOC plus TIC via EPA Method 8260B
	DEC-022D	DEC-022D-20121204	Groundwater	12/4/2012	-	TCL VOC plus TIC via EPA Method 8260B
	DEC-026	DEC-026-20121204	Groundwater	12/4/2012	-	TCL VOC plus TIC via EPA Method 8260B
	DEC-026D	DEC-026D-20121204	Groundwater	12/4/2012	-	TCL VOC plus TIC via EPA Method 8260B
		ACME-DUP-1-20121204	Groundwater	12/4/2012	DEC-026D-20121204	TCL VOC plus TIC via EPA Method 8260B
	DEC-039	DEC-039-20121204	Groundwater	12/4/2012	-	TCL VOC plus TIC via EPA Method 8260B
	DEC-039D	DEC-039D-20121204	Groundwater	12/4/2012	-	TCL VOC plus TIC via EPA Method 8260B
-	-	ACME-TB-20121204	Trip Blank	12/5/2012	-	TCL VOC plus TIC via EPA Method 8260B
-	-	ACME-TB-20121205	Trip Blank	12/5/2012	-	TCL VOC plus TIC via EPA Method 8260B
-	-	ACME-TB-20121206	Trip Blank	12/7/2012	-	TCL VOC plus TIC via EPA Method 8260B
-	-	ACME-TB-20121207	Trip Blank	12/7/2012	-	TCL VOC plus TIC via EPA Method 8260B
-	-	ACME-FB-20121205	Field Blank	12/5/2012	-	TCL VOC plus TIC via EPA Method 8260B
-	-	ACME-FB-20121206	Field Blank	12/7/2012	-	TCL VOC plus TIC via EPA Method 8260B

Notes:

TCL = Target compound list

VOC = Volatile organic compounds

TIC = Tentatively identified compounds

EPA = Environmental Protection Agency

**Table 4**  
**Soil Vapor and Indoor Air Sample Summary**  
**Remedial Investigation**  
**Former ACME Steel/Metal Works**  
**95 Lombardy Street/46 Anthony Street**  
**Brooklyn, New York**  
**NYSDEC Site No. 224131**

Area of Concern (AOC)	Boring/Monitoring Well Location	Sample ID	Sample Matrix	Sample Date	Parent Sample (for duplicate samples only)	Analysis
<b>AOC 1</b>	ACME-IA-1	IA-1-20121213	Indoor Air	12/13/2012	-	VOC via EPA method TO-15
	ACME-SV-1	SV-1-20121213	Soil Vapor	12/13/2012	-	VOC via EPA method TO-15
<b>AOC 2</b>	ACME-IA-2	IA-2-20121213	Indoor Air	12/13/2012	-	VOC via EPA method TO-15
		DUP-03-20121213	Indoor Air	12/13/2012	IA-2-20121213	VOC via EPA method TO-15
	ACME-SV-2	SV-2-20121213	Soil Vapor	12/13/2012	-	VOC via EPA method TO-15
<b>AOC 3</b>	ACME-IA-3	IA-3-20121213	Indoor Air	12/13/2012	-	VOC via EPA method TO-15
	ACME-SV-3	SV-3-20121213	Soil Vapor	12/13/2012	-	VOC via EPA method TO-15
<b>AOC 4</b>	ACME-IA-4	IA-4-20121212	Indoor Air	12/12/2012	-	VOC via EPA method TO-15
		DUP-01-20121212	Indoor Air	12/12/2012	IA-4-20121212	VOC via EPA method TO-15
	ACME-SV-4	SV-4-20121212	Soil Vapor	12/12/2012	-	VOC via EPA method TO-15

**Notes:**

TCL = Target compound list

VOC = Volatile organic compounds

EPA = Environmental Protection Agency

**Table 5**  
**Vertical Hydraulic Gradient Calculations**  
**Remedial Investigation**  
**Former ACME Steel/Metal Works**  
**95 Lombardy Street/46 Anthony Street**  
**Brooklyn, New York**  
**NYSDEC Site No. 224131**

Well Clusters	Monitoring Well ID	Date	Ground Surface Elevation <sup>1</sup>	Top of Casing Elevation <sup>1</sup>	Groundwater Elevation <sup>1</sup>	Screen Setting <sup>2</sup> (feet amsl)		Midpoint Screen Elevation <sup>1</sup>	Vertical Separation (feet)	Vertical Hydraulic Gradient (foot/foot)
						Top	Bottom			
On-Site Wells										
Well Cluster	ACME-MW-1	12/3/2012	44.16	43.64	0.94	7.66	-7.34	0.16	23.04	-0.058
ACME-MW-1	ACME-MW-1D	12/3/2012	44.12	43.67	2.27	-17.88	-27.88	-22.88		
Well Cluster	ACME-MW-2	12/3/2012	41.06	42.29	0.97	1.06	-13.94	-6.44	23.8	-0.044
ACME-MW-2	ACME-MW-2D	12/3/2012	42.76	40.61	2.01	-25.24	-35.24	-30.24		
Well Cluster	ACME-MW-3	12/3/2012	40.33	39.82	2.00	5.33	-9.97	-2.32	25.26	0.003
ACME-MW-3	ACME-MW-3D	12/3/2012	40.42	40.12	1.92	-22.58	-32.58	-27.58		
Well Cluster	ACME-MW-4	12/3/2012	54.78	54.23	1.75	7.78	-5.22	1.28	29.49	-0.001
ACME-MW-4	ACME-MW-4D	12/3/2012	54.79	53.89	1.77	-23.21	-33.21	-28.21		
NYSDEC Site Perimeter Wells										
Well Cluster	DEC-005	12/3/2012	42.08	41.76	1.98	9.12	-5.88	1.62	23.47	0.080
DEC-005	DEC-005D	12/3/2012	42.09	41.51	0.10	-16.85	-26.85	-21.85		
Well Cluster	DEC-026	12/3/2012	48.73	48.33	1.53	8.33	-6.67	0.83	20.22	-0.016
DEC-026	DEC-026D	12/3/2012	48.24	47.86	1.86	-14.39	-24.39	-19.39		
Well Cluster	DEC-039	12/3/2012	45.04	44.82	2.02	6.82	-8.18	-0.68	14.25	0.002
DEC-039	DEC-039D	12/3/2012	44.07	44.29	1.99	-9.93	-19.93	-14.93		

**Notes:**

1. The horizontal datum is referenced to the North American Datum of 1983 (NAD83), New York State Plane Coordinate System, Long Island Zone.
2. The vertical datum is referenced to the North American Vertical Datum of 1988 (NAVD88).
3. Screen settings for existing monitoring wells DEC-005, DEC-005D, DEC-026, and DEC-039 were obtained from the URS Corporation Site Characterization Reports Phase II (April 2008) and Phase III (October 2008).

Table 6  
Soil Sample Analytical Results Summary - VOCs  
Remedial Investigation  
Former ACME Steel/Metal Works  
95 Lombardy Street/46 Anthony Street  
Brooklyn, New York  
NYSDEC Site No. 224131

Location	NYSDEC Part 375	NYSDEC Part 375	NYSDEC Part 375	ACME-MW-1D/EB-1			ACME-SB-2A (3-4)		ACME-SB-2A		ACME-SB-2A (47-48)		ACME-SB-2B (1-2)		ACME-MW-2D/SB-2B		ACME-SB-2B (40-41)	
Sample ID	Protection of	Unrestricted Use	Commercial Use	ACME-EB-1 (1-2)	ACME-EB-1 (26-27)	ACME-EB-1 (37-38)	ACME-SB-2A (3-4)	ACME-SB-2A (40-41)	ACME-SB-2A (47-48)	ACME-SB-2B (1-2)	ACME-SB-2B (10-11)	ACME-SB-2B (40-41)	ACME-SB-2B (1-2)	ACME-SB-2B (10-11)	ACME-SB-2B (40-41)	ACME-SB-2B (1-2)	ACME-SB-2B (10-11)	ACME-SB-2B (40-41)
Lab Sample ID	Groundwater SCO	SCO	SCO	12I0721-01	12J0014-04	12J0014-05	12I0819-04	12K0465-02	12K0465-03	12I0819-03	12K0644-04	12K0740-01	09/24/2012	11/13/2012	11/19/2012	09/24/2012	11/19/2012	11/21/2012
Sample Date				09/19/2012	09/26/2012	09/26/2012	09/24/2012	11/13/2012	11/13/2012	09/24/2012	11/19/2012	11/21/2012	3 to 4	40 to 41	47 to 48	1 to 2	10 to 11	40 to 41
Sampling Depth (feet)				1 to 2	26 to 27	37 to 38	3 to 4	40 to 41	47 to 48	1 to 2	10 to 11	40 to 41						
VOC (mg/kg)																		
1,1,1-Trichloroethane (1,1,1-TCA)	0.68	0.68	500	0.00012 U	0.00012 U	0.00012 U	0.00014 U	0.00014 U	0.00013 U	0.00012 U	0.00013 U	0.0024 R						
1,1,2-Trichloroethane (1,1,2-TCA)		-	-	0.0007 U	0.00072 U	0.00071 U	0.00082 U	0.00083 U	0.00078 U	0.0007 U	0.00076 U	0.0024 R						
1,2,4-Trichlorobenzene		-	-	0.00062 U	0.00064 U	0.00063 U	0.00073 U	0.00074 U	0.00069 U	0.00062 U	0.00068 U	0.0024 R						
1,2,4-Trimethylbenzene	3.6	3.6	190	0.0005 U	0.00052 U	0.00052 U	0.00059 U	0.0006 U	0.00056 U	0.0005 U	0.016	0.0044 J						
1,2-Dichloroethane (1,2-DCA)	0.02	0.02	30	0.00047 U	0.00048 U	0.00048 U	0.00055 U	0.00055 U	0.00052 U	0.00047 U	0.00051 U	0.0024 R						
1,3,5-Trimethylbenzene (Mesitylene)	8.4	8.4	190	0.00041 U	0.00043 U	0.00042 U	0.00049 U	0.00049 U	0.00046 U	0.00041 U	0.0038 J	0.0024 R						
Acetone	0.05	0.05	500	0.0062 J	0.0063 U	0.0062 U	0.0072 U	0.0073 U	0.0068 U	0.0061 U	0.011	0.014 J						
Benzene	0.06	0.06	44	0.00046 U	0.00047 U	0.00047 U	0.00054 U	0.00054 U	0.00051 U	0.00046 U	0.0005 U	0.0024 R						
Carbon disulfide		-	-	0.00034 U	0.00035 U	0.00034 U	0.0004 U	0.0004 U	0.00037 U	0.00034 U	0.00037 U	0.0024 R						
Chloroethane (Ethyl Chloride)		-	-	0.00051 U	0.00053 U	0.00053 U	0.00061 U	0.00061 U	0.00057 U	0.00051 U	0.00056 U	0.0024 R						
Chloroform	0.37	0.37	350	0.00047 U	0.00048 U	0.00048 U	0.00055 U	0.00055 J	0.00052 U	0.00047 U	0.00091 J	0.0024 R						
cis-1,2-Dichloroethylene (cDCE)	0.25	0.25	500	0.00027 U	0.00028 U	0.00027 U	0.00032 U	0.00032 U	0.0003 U	0.00027 U	0.00029 U	0.0024 R						
Ethylbenzene	1	1	390	0.00027 U	0.00028 U	0.00028 U	0.00032 U	0.00032 U	0.0003 U	0.00027 U	0.0013 J	0.0024 R						
m&p Xylenes		-	-	0.00086 U	0.00089 U	0.00088 U	0.001 U	0.001 U	0.00096 U	0.00086 U	0.0066 J	0.0041 J						
Methyl ethyl ketone (2-butanone)	0.12	0.12	500	0.00081 U	0.00084 U	0.00083 U	0.00096 U	0.00097 U	0.00091 U	0.00081 U	0.00089 U	0.0024 R						
Methyl isobutyl ketone (4-methyl-2-pentanone)		-	-	0.0023 J	0.00059 U	0.00059 U	0.00068 U	0.00068 U	0.00064 U	0.00058 U	0.00063 U	0.0032 J						
Methylene chloride	0.05	0.05	500	0.0017 J	0.00086 U	0.00085 U	0.00098 U	0.00099 U	0.00093 U	0.00083 U	0.0013 J	0.0024 R						
Naphthalene	12	12	500	0.001 U	0.001 U	0.001 U	0.0012 U	0.0012 U	0.0011 U	0.001 U	0.0023 J	0.0024 R						
n-Propylbenzene	3.9	3.9	500	0.00039 U	0.0004 U	0.00039 U	0.00046 U	0.00046 U	0.00043 U	0.00039 U	0.0015 J	0.0024 R						
o-Xylene (1,2-dimethylbenzene)		0.26	-	0.00034 U	0.00035 U	0.00035 U	0.0004 U	0.0004 U	0.00038 U	0.00034 U	0.0033 J	0.0024 R						
Tert-butyl methyl ether	0.93	0.93	500	0.00034 U	0.00035 U	0.00035 U	0.0004 U	0.0004 U	0.00038 U	0.00034 U	0.00037 U	0.0024 R						
Tetrachloroethylene (PCE)	1.3	1.3	150	0.0005 U	0.00051 U	0.0019 J	0.00058 U	0.0029 J	0.00055 U	0.054	0.012	0.0055 J						
Toluene	0.7	0.7	500	0.00036 U	0.00037 U	0.00036 U	0.00042 U	0.00042 U	0.0004 U	0.00036 U	0.0028 J	0.0044 J						
trans-1,2-Dichloroethene (tDCE)	0.19	0.19	500	0.00048 U	0.0005 U	0.00049 U	0.00057 U	0.00057 U	0.00054 U	0.00048 U	0.00053 U	0.0024 R						
Trichloroethylene (TCE)	0.47	0.47	200	0.00046 U	0.00096 J	0.0053	0.00054 U	0.04	0.03	0.0008 J	0.0005 U	0.027 J						
Vinyl chloride	0.02	0.02	13	0.00025 U	0.00026 U	0.00026 U	0.0003 U	0.0003 U	0.00028 U	0.00025 U	0.00028 U	0.0024 R						
Xylenes, total	1.6	0.26	500	0.00055 U	0.00057 U	0.00056 U	0.00065 U	0.00065 U	0.00061 U	0.00055 U	0.0099 J	0.0056 J						
TIC VOC (mg/kg)																		
(1-Ethylpropyl) cyclohexane	-	-	-	NI	NI	NI	NI	NI	NI	NI	0.018 NJ	NI						
(1-Methylpropyl)-cyclohexane	-	-	-	NI	NI	NI	NI	NI	NI	NI	NI	NI						
1,1,3-Trimethyl cyclohexane	-	-	-	NI	NI	NI	NI	0.024 NJ	NI	NI	0.0086 NJ	NI						
1,1-Dimethylcyclohexane	-	-	-	NI	NI	NI	NI	0.097 NJ	NI	NI	NI	NI						
17-Pentatriacontene	-	-	-	NI	NI	NI	NI	NI	NI	NI	NI	0.13 NJ						
1-Ethyl-2-methylcyclohexane	-	-	-	NI	NI	NI	NI	NI	NI	NI	0.018 NJ	NI						
1-Hexyl-3-methyl-cyclopentane	-	-	-	NI	NI	NI	NI	0.08 NJ	NI	NI	NI	NI						
2,3,6-Trimethyl decane	-	-	-	NI	NI	NI	NI	NI	NI	NI	NI	NI						
2,4-Dimethyl-2-pentene	-	-	-	NI	NI	NI	NI	NI	NI	NI	NI	NI						
2,6-Dimethyl undecane	-	-	-	NI	NI	NI	NI	NI	NI	NI	NI	NI						
2-Methyl decane	-	-	-	NI	NI	NI	NI	NI	NI	NI	NI	NI						
2-Methyl undecane	-	-	-	NI	NI	NI	NI	NI	NI	NI	NI	0.039 NJ						
2-Methyl-dodecane	-	-	-	NI	NI	NI	NI	NI	NI	NI	NI	NI						
3,8-Dimethyl decane	-	-	-	NI	NI	NI	NI	0.039 NJ	NI	NI	NI	NI						
3-Methyl decane	-	-	-	NI	NI	NI	NI	0.037 NJ	NI	NI	NI	0.05 NJ						
3-Methyl dodecane	-	-	-	NI	NI	NI	NI	NI	NI	NI	NI	NI						
3-Methyl undecane	-	-	-	NI	NI	NI	NI	NI	NI	NI	NI	0.065 NJ						
4-Methyl dodecane	-	-	-	NI	NI	NI	NI	NI	NI	NI	NI	NI						
cis-1,4,-Dimethylcyclohexane	-	-	-	NI	NI	NI	NI	NI	NI	NI	NI	NI						
cis-Decahydronaphthalene	-	-	-	NI	NI	NI	NI	NI	0.04 NJ	NI	NI	NI						
Cyclododecene	-	-	-	NI	NI	NI	NI	NI	NI	NI	NI	NI						
Cyclohexane, pentyl-	-	-	-	NI	NI	NI	NI	NI	NI	NI	NI	0.14 NJ						
Decahydro-2-methyl naphthalene	-	-	-	NI	NI	NI	NI	0.15 NJ	0.098 NJ	NI	0.12 NJ	0.094 NJ						
n-Dodecane	-	-	-	NI	NI	NI	NI	0.17 NJ	0.24 NJ	NI	0.058 NJ	0.28 NJ						
n-Hexane	-	-	-	NI	NI	NI	NI	NI	NI	NI	NI	NI						
n-Tetradecane	-	-	-	NI	NI	NI	NI	NI	NI	NI	NI	NI						
n-Tridecane	-	-	-	NI	NI	NI	NI	NI	0.14 NJ	NI	0.022 NJ	NI						
n-Undecane	-	-	-	NI	NI	NI	NI	0.21 NJ	0.098 NJ	NI	0.027 NJ	NI						
Octamethylcyclotetrasiloxane	-	-	-	NI	NI	NI	NI	NI	NI	NI	NI	NI						
Pulegone	-	-	-	NI	NI	NI	NI	NI	NI	NI	NI	0.059 NJ						
Spiro [4.5] decane	-	-	-	NI	NI	NI	NI	NI	NI	NI	0.019 NJ	NI						

Notes:

- Grab soil sample analytical results are compared to the New York State Department of Environmental Conservation (NYSDEC) title 6 of the official compilation of New York Codes, Rules, and Regulations (NYCRR) Part 375 Protection of Groundwater, Unrestricted Use, and Commercial Use Soil Cleanup Objectives (SCO).
- Detections are in bold.
- There were no VOC sample results that exceeded SCOs.
- VOC = Volatile Organic Compounds
- TIC = Tentatively Identified Compounds
- mg/kg = milligrams per kilogram
- NI = Not identified

Qualifiers:

- ^ = Not available  
J = The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample.  
UJ = The analyte was not detected at a level greater than or equal to the reporting limit (RL); however, the reported RL is approximate and may be inaccurate or imprecise.  
R = The sample results are unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.  
NJ = The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.

Table 6  
Soil Sample Analytical Results Summary - VOCs  
Remedial Investigation  
Former ACME Steel/Metal Works  
95 Lombardy Street/46 Anthony Street  
Brooklyn, New York  
NYSDEC Site No. 224131

Location	NYSDEC Part 375	NYSDEC Part 375	NYSDEC Part 375	ACME-MW-2/SB-2C		ACME-SB-2D	ACME-MW-3D/EB-3		ACME-DUP-3	ACME-MW-4D/EB-4		DEC-026D
Sample ID	Protection of	Unrestricted Use	Commercial Use	ACME-SB-2C (2-3)	ACME-SB-2C (41-42)	ACME-SB-2D (4-5)	ACME-EB-3 (3-4)	ACME-EB-3 (20-21)	ACME-EB-3 (36-37)	ACME-EB-4 (1-2)	ACME-EB-4 (49-50)	EB-DEC-026D(43-44)
Lab Sample ID	Groundwater SCO	SCO	SCO	12I0819-02	12K0740-02	12J0187-02	12I0721-02	12K0465-06	12K0465-04	12K0465-05	12I0819-01	12K0465-01
Sample Date				09/24/2012	11/26/2012	10/01/2012	09/20/2012	11/14/2012	11/14/2012	11/12/2012	09/21/2012	11/12/2012
Sampling Depth (feet)				2 to 3	41 to 42	4 to 5	3 to 4	20 to 21	36 to 37	36 to 37	1 to 2	49 to 50
VOC (mg/kg)												
1,1,1-Trichloroethane (1,1,1-TCA)	0.68	0.68	500	0.00013 U	0.0025 U	0.00012 U	0.00019 U	0.00013 U	0.00014 U	0.00011 U	0.00013 UJ	0.000091 UJ
1,1,2-Trichloroethane (1,1,2-TCA)		-	-	0.00076 U	0.0025 U	0.00071 U	0.0011 U	0.00074 U	0.00083 U	0.00066 U	0.00079 UJ	0.00054 UJ
1,2,4-Trichlorobenzene		-	-	0.00068 U	0.0025 U	0.00063 U	0.001 U	0.00066 U	0.00073 U	0.00059 U	0.0007 UJ	0.00048 UJ
1,2,4-Trimethylbenzene	3.6	3.6	190	0.00055 U	0.0025 U	0.00051 U	0.00083 U	0.00054 U	0.0006 U	0.00048 U	0.0014 J	0.00039 UJ
1,2-Dichloroethane (1,2-DCA)	0.02	0.02	30	0.00051 U	0.0025 U	0.00047 U	0.00077 U	0.0005 U	0.00055 U	0.00044 U	0.00053 UJ	0.00036 UJ
1,3,5-Trimethylbenzene (Mesitylene)	8.4	8.4	190	0.00045 U	0.0025 U	0.00042 U	0.00068 U	0.00044 U	0.00049 U	0.00039 U	0.00047 UJ	0.00032 UJ
Acetone	0.05	0.05	500	0.0067 U	0.0031 J	0.0069	0.01 UJ	0.0065 U	0.0072 U	0.0058 U	0.0069 U	0.011 J
Benzene	0.06	0.06	44	0.0005 U	0.0025 U	0.00046 U	0.00075 U	0.00049 U	0.00054 U	0.00043 U	0.00052 UJ	0.00035 UJ
Carbon disulfide		-	-	0.00036 U	0.0025 U	0.00034 U	0.00055 U	0.00036 U	0.0004 U	0.00032 U	0.00038 UJ	0.00026 UJ
Chloroethane (Ethyl Chloride)		-	-	0.00056 U	0.0025 U	0.00052 U	0.00085 U	0.00055 U	0.00061 U	0.00049 U	0.00058 UJ	0.0004 UJ
Chloroform	0.37	0.37	350	0.00051 U	0.0025 U	0.00047 U	0.00077 U	0.0005 U	0.00055 U	0.00044 U	0.00053 UJ	0.00036 UJ
cis-1,2-Dichloroethylene (cDCE)	0.25	0.25	500	0.00029 U	0.0025 U	0.00027 U	0.00044 U	0.00029 U	0.00032 U	0.00025 U	0.00031 UJ	0.00021 UJ
Ethylbenzene	1	1	390	0.00029 U	0.0025 U	0.00027 U	0.00044 U	0.00029 U	0.00032 U	0.00025 U	0.00031 UJ	0.00021 UJ
m&p Xylenes		-	-	0.00094 U	0.0025 U	0.00088 U	0.0014 U	0.00092 U	0.001 U	0.00081 U	0.0012 J	0.00067 UJ
Methyl ethyl ketone (2-butanone)	0.12	0.12	500	0.00089 U	0.0025 U	0.00083 U	0.0013 U	0.00087 U	0.00096 U	0.00077 U	0.00092 UJ	0.00063 UJ
Methyl isobutyl ketone (4-methyl-2-pentanone)		-	-	0.00063 U	0.0025 U	0.00059 U	0.00095 U	0.00061 U	0.00068 U	0.00054 U	0.0017 J	0.00045 UJ
Methylene chloride	0.05	0.05	500	0.00091 U	0.0051 J	0.02	0.0016 J	0.00089 U	0.00099 U	0.00079 U	0.00095 U	0.0035 J
Naphthalene	12	12	500	0.0011 U	0.0025 U	0.001 U	0.0016 U	0.0011 U	0.0012 U	0.00095 U	0.0011 UJ	0.00078 UJ
n-Propylbenzene	3.9	3.9	500	0.00042 U	0.0025 U	0.00039 U	0.00064 U	0.00041 U	0.00046 U	0.00037 U	0.00044 UJ	0.0003 UJ
o-Xylene (1,2-dimethylbenzene)		0.26	-	0.00037 U	0.0025 U	0.00035 U	0.00056 U	0.00036 U	0.0004 U	0.00032 U	0.00039 UJ	0.00026 UJ
Tert-butyl methyl ether	0.93	0.93	500	0.00037 U	0.0025 U	0.00035 U	0.00056 U	0.00036 U	0.0004 U	0.00032 U	0.00039 UJ	0.00026 UJ
Tetrachloroethylene (PCE)	1.3	1.3	150	0.023	0.0081	0.0022 J	0.013	0.00053 U	0.0016 J	0.0014 J	0.06 J	0.00038 UJ
Toluene	0.7	0.7	500	0.00039 U	0.0025 U	0.00036 U	0.00059 U	0.00038 U	0.00042 U	0.00034 U	0.00041 UJ	0.00028 UJ
trans-1,2-Dichloroethene (tDCE)	0.19	0.19	500	0.00052 U	0.0025 U	0.00049 U	0.00079 U	0.00051 U	0.00057 U	0.00046 U	0.00055 UJ	0.00037 UJ
Trichloroethylene (TCE)	0.47	0.47	200	0.001 J	0.12	0.00046 U	0.01	0.0028 J	0.012	0.0077	0.00052 UJ	0.00035 UJ
Vinyl chloride	0.02	0.02	13	0.00028 U	0.0025 U	0.00026 U	0.00042 U	0.00027 U	0.0003 U	0.00024 U	0.00029 UJ	0.0002 UJ
Xylenes, total	1.6	0.26	500	0.0006 U	0.0025 U	0.00056 U	0.00091 U	0.00059 U	0.00065 U	0.00052 U	0.0012 J	0.00043 UJ
TIC VOC (mg/kg)												
(1-Ethylpropyl) cyclohexane	-	-	-	NI	NI	NI	NI	NI	NI	NI	NI	NI
(1-Methylpropyl)-cyclohexane	-	-	-	NI	NI	NI	NI	0.0099 NJ	NI	NI	NI	NI
1,1,3-Trimethyl cyclohexane	-	-	-	NI	NI	NI	NI	NI	NI	NI	NI	NI
1,1-Dimethylcyclohexane	-	-	-	NI	NI	NI	NI	NI	NI	NI	NI	NI
17-Pentatriacontene	-	-	-	NI	NI	NI	NI	NI	NI	NI	NI	NI
1-Ethyl-2-methylcyclohexane	-	-	-	NI	NI	NI	NI	NI	NI	NI	NI	NI
1-Hexyl-3-methyl-cyclopentane	-	-	-	NI	NI	NI	NI	NI	NI	NI	NI	NI
2,3,6-Trimethyl decane	-	-	-	NI	0.016 NJ	NI	NI	NI	NI	NI	NI	NI
2,4-Dimethyl-2-pentene	-	-	-	NI	NI	NI	NI	0.01 NJ	NI	NI	NI	NI
2,6-Dimethyl undecane	-	-	-	NI	0.015 NJ	NI	NI	0.0081 NJ	NI	NI	NI	NI
2-Methyl decane	-	-	-	NI	0.029 NJ	NI	NI	NI	NI	NI	NI	NI
2-Methyl undecane	-	-	-	NI	NI	NI	NI	NI	NI	NI	NI	NI
2-Methyl-dodecane	-	-	-	NI	0.013 NJ	NI	NI	NI	NI	NI	NI	NI
3,8-Dimethyl decane	-	-	-	NI	NI	NI	NI	NI	NI	NI	NI	NI
3-Methyl decane	-	-	-	NI	NI	NI	NI	NI	NI	NI	NI	NI
3-Methyl dodecane	-	-	-	NI	NI	NI	NI	0.01 NJ	NI	NI	NI	NI
3-Methyl undecane	-	-	-	NI	0.01 NJ	NI	NI	NI	NI	NI	NI	NI
4-Methyl dodecane	-	-	-	NI	0.022 NJ	NI	NI	NI	NI	NI	NI	NI
cis-1,4,-Dimethylcyclohexane	-	-	-	NI	NI	NI	NI	0.0075 NJ	NI	NI	NI	NI
cis-Decahydronaphthalene	-	-	-	NI	NI	NI	NI	NI	NI	NI	NI	NI
Cyclododecene	-	-	-	NI	NI	NI	NI	0.014 NJ	NI	NI	NI	NI
Cyclohexane, pentyl-	-	-	-	NI	NI	NI	NI	NI	NI	NI	NI	NI
Decahydro-2-methyl naphthalene	-	-	-	NI	NI	NI	NI	0.0072 NJ	NI	NI	NI	NI
n-Dodecane	-	-	-	NI	0.099 NJ	NI	NI	0.064 NJ	0.018 NJ	0.0058 NJ	NI	NI
n-Hexane	-	-	-	NI	NI	0.013 NJ	NI	NI	NI	NI	NI	NI
n-Tetradecane	-	-	-	NI	NI	NI	NI	NI	0.042 NJ	NI	NI	NI
n-Tridecane	-	-	-	NI	0.1 NJ	NI	NI	0.031 NJ	0.033 NJ	0.013 NJ	NI	NI
n-Undecane	-	-	-	NI	0.016 NJ	NI	NI	NI	NI	NI	NI	NI
Octamethylcyclotetrasiloxane	-	-	-	NI	NI	NI	NI	NI	NI	NI	0.0065 NJ	NI
Pulegone	-	-	-	NI	NI	NI	NI	NI	NI	NI	NI	NI
Spiro [4.5] decane	-	-	-	NI	NI	NI	NI	NI	NI	NI	NI	NI

Notes:

- Grab soil sample analytical results are compared to the New York State Department of Environmental Conservation (NYSDEC) title 6 of the official compilation of New York Codes, Rules, and Regulations (NYCRR) Part 375 Protection of Groundwater, Unrestricted Use, and Commercial Use Soil Cleanup Objectives (SCO).
- Detections are in bold.
- There were no VOC sample results that exceeded SCOs.
- VOC = Volatile Organic Compounds
- TIC = Tentatively Identified Compounds
- mg/kg = milligrams per kilogram
- NI = Not identified

Qualifiers:

- ^\* = Not available  
J = The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample.  
UJ = The analyte was not detected at a level greater than or equal to the reporting limit (RL); however, the reported RL is approximate and may be inaccurate or imprecise.  
R = The sample results are unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.  
NJ = The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.



Table 7  
Soil Sample Analytical Results Summary - SVOCs  
Remedial Investigation  
Former ACME Steel/Metal Works  
95 Lombardy Street/72 Anthony Street  
Brooklyn, New York  
NYSDEC Site No. 224131

Location	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Protection of Groundwater SCO	NYSDEC Part 375 Commercial Use SCO	ACME-MW-1D/EB-1	ACME-SB-2A	ACME-MW-2D/SB-2B	ACME-MW-2/SB-2C	ACME-SB-2D	ACME-MW-3D/EB-3	ACME-MW-4D/EB-4
Sample ID				ACME-EB-1 (1-2)	ACME-SB-2A (3-4)	ACME-SB-2B (1-2)	ACME-SB-2C (2-3)	ACME-SB-2D (4-5)	ACME-EB-3 (3-4)	ACME-EB-4 (1-2)
Lab Sample ID				1210721-01	1210819-04	1210819-03	1210819-02	12J0187-02	1210721-02	1210819-01
Sample Date				09/19/2012	09/24/2012	09/24/2012	09/24/2012	10/01/2012	09/20/2012	09/21/2012
Sampling Depth (feet)				1 to 2	3 to 4	1 to 2	2 to 3	4 to 5	3 to 4	1 to 2
SVOC (mg/kg)										
1,2-Dichlorobenzene	1.1	1.1	500	0.113 U	0.116 U	0.121 U	1.17 UJ	0.114 U	0.115 U	2.43 U
1,4-Dichlorobenzene	1.8	1.8	130	0.106 U	0.11 U	0.114 U	1.1 UJ	0.108 U	0.108 U	2.29 U
2-Methylphenol (o-cresol)	0.33	0.33	500	0.0655 U	0.0676 U	0.0701 U	0.68 U	0.0665 U	0.0668 U	1.41 U
4-Nitrophenol	-	-	-	0.0648 U	0.0669 U	0.0693 U	0.673 U	0.0658 R	0.0661 U	1.4 U
Acenaphthylene	100	107	500	0.0828 UJ	0.0854 U	0.126 J	0.859 UJ	0.084 U	0.0844 UJ	1.78 U
Benzo(a)Anthracene	1	1	5.6	0.0645 U	0.0666 U	0.329	0.67 UJ	0.0655 U	0.0658 U	4.13
Benzo(a)Pyrene	1	22	1	0.0683 U	0.0705 U	0.368	0.709 UJ	0.0693 U	0.0696 U	4.81
Benzo(b)Fluoranthene	1	1.7	5.6	0.145 U	0.149 U	0.299	1.5 UJ	0.147 U	0.147 U	3.17
Benzo(g,h,i)Perylene	100	1,000	500	0.0573 U	0.0591 U	0.145 J	0.594 UJ	0.0581 U	0.0584 U	1.64 UJ
Benzo(k)Fluoranthene	0.8	1.7	56	0.172 U	0.178 U	0.35	1.79 UJ	0.175 U	0.176 U	3.71 U
Chrysene	1	1	56	0.0793 UJ	0.0819 U	0.351	0.824 UJ	0.0805 U	0.0809 UJ	4.68
Dibenz(a,h)Anthracene	0.33	1,000	0.56	0.0693 U	0.0715 U	0.0918 J	0.72 UJ	0.0704 U	0.0707 U	1.49 U
Di-n-octylphthalate	-	-	-	0.172 U	0.178 U	0.184 U	5.88 J	0.175 U	0.176 U	3.71 U
Fluoranthene	100	1,000	500	0.101 U	0.104 U	0.48	1.05 UJ	0.103 U	0.103 U	8.57
Hexachlorobenzene	0.33	3.2	6	0.102 U	0.105 U	0.109 U	1.06 UJ	0.103 U	0.104 U	2.19 U
Hexachlorocyclopentadiene	-	-	-	0.128 U	0.132 U	0.137 U	1.33 UJ	0.13 R	0.131 U	2.76 U
Indeno(1,2,3-c,d)Pyrene	0.5	8.2	5.6	0.0786 U	0.0812 U	0.166 J	0.816 U	0.0798 U	0.0802 U	1.69 U
Pentachlorophenol	0.8	0.8	6.7	0.13 U	0.134 U	0.139 U	1.35 UJ	0.132 U	0.133 U	2.8 U
Phenanthrene	100	1,000	500	0.09 U	0.0929 U	0.269	0.935 UJ	0.0914 U	0.0918 U	7.12
Phenol	0.33	0.33	500	0.0745 U	0.0769 U	0.0797 U	0.773 U	0.0756 U	0.076 U	1.6 U
Pyrene	100	1,000	500	0.0704 U	0.0726 UJ	0.584 J	0.73 UJ	0.0714 U	0.0718 U	10.2 UJ

Notes:

- Soil sample analytical results are compared to the New York State Department of Environmental Conservation (NYSDEC) title 6 of the official compilation of New York Codes, Rules, and Regulations (NYCRR) Part 375 Protection of Groundwater, Unrestricted Use, and Commercial Use Soil Cleanup Objectives (SCO).
- Detections are in bold.
- Results exceeding NYSDEC Part 375 Unrestricted Use SCO are highlighted.
- Results exceeding NYSDEC Part 375 Protection of Groundwater SCO are italicized.
- Results exceeding NYSDEC Part 375 Commercial Use SCO are in red.
- SVOC = Semi Volatile Organic Compounds
- mg/kg = milligrams per kilogram

Qualifiers:

"-" = Not available

J = The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected at a level greater than or equal to the level of RL or the sample concentration for results impacted by blank contamination.

UJ = The analyte was not detected at a level greater than or equal to the reporting limit (RL); however, the reported RL is approximate and may be inaccurate or imprecise.

R = The sample results are unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.

Table 8  
Soil Sample Analytical Results Summary - Metals, Pesticides and PCBs  
Remedial Investigation  
Former ACME Steel/Metal Works  
95 Lombardy Street/72 Anthony Street  
Brooklyn, New York  
NYSDEC Site No. 224131

Location Sample ID Lab Sample ID Sample Date Sampling Depth (feet)	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Protection of Groundwater SCO	NYSDEC Part 375 Commercial Use SCO	ACME-MW-1D/EB-1 ACME-EB-1 (1-2) 12I0721-01 09/19/2012 1 to 2	ACME-SB-2A ACME-SB-2A (3-4) 12I0819-04 09/24/2012 3 to 4	ACME-MW-2D/SB-2B ACME-SB-2B (1-2) 12I0819-03 09/24/2012 1 to 2	ACME-MW-2/SB-2C ACME-SB-2C (2-3) 12I0819-02 09/24/2012 2 to 3	ACME-SB-2D ACME-SB-2D (4-5) 12J0187-02 10/01/2012 4 to 5	ACME-MW-3D/EB-3 ACME-EB-3 (3-4) 12I0721-02 09/20/2012 3 to 4	ACME-MW-4D/EB-4 ACME-EB-4 (1-2) 12I0819-01 09/21/2012 1 to 2
Metals (mg/kg)										
Aluminum	-	-	-	7230	5740	4440	4990	4220	5170	5610
Arsenic	13	16	16	2.02	1.56	7.18	3	1.39	1.9	8.6
Barium	350	820	400	48.6	30.1	104	123	32.4	76.8	380
Beryllium	7.2	47	590	0.103 U	0.107 U	0.111 U	0.107 U	0.105 U	0.106 U	0.208
Calcium	-	-	-	395	541	1300	42700	873	2800	22800
Chromium, total	30	-	1500	13.7	15.2	17.9	14.4	10.4	16.8	15.2
Cobalt	-	-	-	6.91	5.86	4.95	4.11	5.08	5.68	5.28
Copper	50	1,720	270	49.6	10.1	79.7	27.2	10.7	26.8	116
Cyanide	27	40	27	1.72 U	0.534 U	3.32	0.537 U	0.525 U	1.76 U	0.557 U
Iron	-	-	-	16500	18500	22400 J	13200	13100	16300	18600
Lead	63	450	1000	7.83	4.56 J	307 J	556 J	4.46	257	383 J
Magnesium	-	-	-	1660	1540	1200	4500	1540	2100	8250
Manganese	-	-	-	393	375	249	212	311	346	260
Nickel	30	130	310	17.5	15.8 J	17.9 J	20.5 J	13.4	17.9	18.1 J
Potassium	-	-	-	782	578	1020	1170	739	999	735
Selenium	3.9	4	1500	2.97	3.18 J	4.06 J	2.32 J	2.78	2.79	3.84 J
Sodium	-	-	-	120	10.7 U	380 J	571 J	116 J	199	237 J
Vanadium	-	-	-	24.2	26.9	33.4	15.5	18.4	23.2	22.9
Zinc	109	2,480	10000	33	18.7	55.6	67	17.7	72.3	271
Pesticides (mg/kg)										
P,P'-DDT	0.0033	136	47	0.00171 U	0.000352 U	0.00205	0.000354 U	0.00173 U	0.00174 U	0.000367 U
PCBs (mg/kg)										
TOTAL PCBs	0.1	3.2	1	0.00704 U	0.00726 U	0.00752 U	0.0073 U	0.00714 U	0.00718 U	0.00757 U

**Notes:**

1. Soil sample analytical results are compared to the New York State Department of Environmental Conservation (NYSDEC) title 6 of the official compilation of New York Codes, Rules, and Regulations (NYCRR) Part 375 Unrestricted Use, Protection of Groundwater, and Commercial Use Soil Cleanup Objectives (SCO).

2. Detections are in bold.

3. Results exceeding NYSDEC Part 375 Unrestricted Use SCO are highlighted.

4. Results exceeding Protection of Groundwater SCO are italicized.

4. PCB = Polychlorinated biphenyls

5. mg/kg = milligrams per kilogram

**Qualifiers:**

"-" = Not available

J = The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected at a level greater than or equal to the level of RL or the sample concentration for results impacted by blank contamination.

Table 9  
Groundwater Sample Analytical Results Summary - VOCs  
Remedial Investigation  
Former ACME Steel/Metal Works  
95 Lombardy Street/46 Anthony Street  
Brooklyn, New York  
NYSDEC Site No. 224131

Location Sample ID Lab Sample ID Sample Date	NYSDEC TOGS 1.1.1 AWQS GA	ACME-MW-1	ACME-MW-1D/EB-1	ACME-MW-2/SB-2C	ACME-MW-2D/SB-2B	ACME-MW-3	ACME-MW-3D/EB-3	ACME-MW-4	ACME-MW-4D/EB-4
		ACME-MW-1-20121204 12L0194-09 12/04/2012	ACME-MW-1D-20121204 12L0194-10 12/04/2012	ACME-MW-2-20121207 12L0401-04 12/07/2012	ACME-MW-2D-20121207 12L0401-03 12/07/2012	ACME-MW-3-20121203 12L0194-01 12/03/2012	ACME-MW-3D-20121203 12L0194-02 12/03/2012	ACME-MW-4-20121205 12L0227-01 12/05/2012	ACME-MW-4D-20121205 12L0227-02 12/05/2012
		VOC (µg/l)							
1,1,1-Trichloroethane (1,1,1-TCA)	5	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U
1,1,2,2-Tetrachloroethane	5	0.59 U	0.59 U	0.59 U	0.59 U	0.59 U	0.59 U	0.59 U	0.59 U
1,1,2-Trichloroethane (1,1,2-TCA)	1	1.3 U	1.3 U	2.3 J	1.5 J	1.3 U	1.3 J	1.3 U	1.3 U
1,1-Dichloroethane (1,1-DCA)	5	0.42 U	0.42 U	0.42 U	1.1 J	0.42 U	1.2 J	0.42 U	0.42 U
1,1-Dichloroethene (1,1-DCE)	5	0.52 U	8.1	1.2 J	8.1	0.88 J	12	0.52 U	2.4 J
1,2,4-Trichlorobenzene	5	0.91 U	0.91 U	0.91 U	0.91 U	0.91 U	0.91 U	0.91 U	0.91 U
1,2-Dibromo-3-chloropropane	0.04	0.98 U	0.98 U	0.98 U	0.98 U	0.98 U	0.98 U	0.98 U	0.98 U
1,2-Dichloroethane (1,2-DCA)	0.6	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U
1,2-Dichloropropane	1	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U
Acetone	50	6.1 U	6.1 U	6.1 UJ	6.1 UJ	6.1 U	6.1 U	6.1 U	6.1 U
Benzene	1	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Carbon Tetrachloride	5	0.56 U	0.56 U	0.56 U	0.56 U	0.56 U	0.56 U	0.56 U	0.56 U
Chloroethane	5	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U
Chloroform	7	0.42 U	0.42 U	1.2 J	1.6 J	0.42 U	0.82 J	0.42 U	0.42 U
cis-1,2-dichloroethylene (cDCE)	5	22	190	140	240 J	25	620	0.43 U	43
Isopropylbenzene (Cumene)	5	0.63 U	0.63 U	0.63 U	0.63 U	0.63 U	0.63 U	0.63 U	0.63 U
Methylene chloride	5	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 UJ	2.4 UJ
Naphthalene	10	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
sec-Butylbenzene	5	0.59 U	0.59 U	0.59 U	0.59 U	0.59 U	0.59 U	0.59 U	0.59 U
t-Butylbenzene	5	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U
Tert-butyl methyl ether	-	0.53 U	0.53 U	0.53 U	0.53 U	0.53 U	0.53 U	0.53 U	0.53 U
Tetrachloroethylene (PCE)	5	12	8.8	9.8	11	5.3	11	0.41 U	1.8 J
Toluene	5	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	1.3 J	0.17 U	0.17 U
Trans-1,2-dichloroethene (tDCE)	5	1.5 J	7.9	5	32	0.52 U	44	0.52 U	2.7 J
Trichloroethylene (TCE)	5	220	2100	2500	5200	530	11000	1.6 J	630
Trichlorofluoromethane	5	1.8 J	0.54 U	0.54 U	0.54 U	0.54 U	0.54 U	0.54 U	0.99 J
Vinyl chloride	2	0.68 U	1.3 J	0.68 U	4.8 J	0.68 U	7.6 J	0.68 U	1 J
TIC VOC (µg/l)									
Total TIC	-	NI	NI	NI	NI	NI	NI	NI	NI

Notes:

- Groundwater samples analytical results are compared to the New York State Department of Environmental Conservation (NYSDEC) Technical and Operational Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards (AWQS) and guidance values for drinking water (class GA) .
- Results exceeding NYSDEC TOGS are highlighted.
- Detections are shown in bold.
- VOC = Volatile Organic Compounds
- TIC = Tentatively identified compounds
- NI = Not identified
- µg/l = micrograms per liter

Qualifiers:

- .\* = Not available
- J = The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample.
- U = The analyte was analyzed for, but was not detected at a level greater than or equal to the level of RL or the sample concentration for results impacted by blank contamination.
- UJ = The analyte was not detected at a level greater than or equal to the reporting limit (RL); however, the reported RL is approximate and may be inaccurate or imprecise.

Table 9  
Groundwater Sample Analytical Results Summary - VOCs  
Remedial Investigation  
Former ACME Steel/Metal Works  
95 Lombardy Street/46 Anthony Street  
Brooklyn, New York  
NYSDEC Site No. 224131

Location Sample ID Lab Sample ID Sample Date	NYSDEC TOGS 1.1.1 AWQS GA	DEC-005	DEC-005D	DEC-022D	DEC-026	DEC-026D		DEC-039	DEC-039D
		DEC-005-20121204	DEC-005D-20121204	DEC-022D-20121204	DEC-026-20121204	DEC-026D-20121204	ACME-DUP-1-20121204	DEC-039-20121204	DEC-039D-20121204
		12L0194-06 12/04/2012	12L0194-07 12/04/2012	12L0194-08 12/04/2012	12L0194-03 12/04/2012	12L0194-04 12/04/2012	12L0194-05 12/04/2012	12L0194-11 12/04/2012	12L0194-12 12/04/2012
VOC (µg/l)									
1,1,1-Trichloroethane (1,1,1-TCA)	5	0.23 U	0.23 U	0.92 J	0.23 U	0.23 U	0.23 U	8.2	2.3 U
1,1,2,2-Tetrachloroethane	5	0.59 U	0.59 U	0.59 U	0.59 U	0.59 U	0.59 U	0.59 U	5.9 U
1,1,2-Trichloroethane (1,1,2-TCA)	1	1.3 U	1.3 U	23	11	4.9 J	4.8 J	1.3 U	13 U
1,1-Dichloroethane (1,1-DCA)	5	0.42 U	0.42 U	3.8 J	0.42 U	3.1 J	3.3 J	4 J	4.2 U
1,1-Dichloroethene (1,1-DCE)	5	0.52 U	6.6	0.52 U	1.8 J	6.8	7.2	1.9 J	5.2 U
1,2,4-Trichlorobenzene	5	0.91 U	0.91 U	0.91 U	0.91 U	0.91 U	0.91 U	0.91 U	9.1 U
1,2-Dibromo-3-chloropropane	0.04	0.98 U	0.98 U	0.98 U	0.98 U	0.98 U	0.98 U	0.98 U	9.8 U
1,2-Dichloroethane (1,2-DCA)	0.6	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	3.6 U
1,2-Dichloropropane	1	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	2.3 U
Acetone	50	6.1 U	6.1 U	6.1 U	6.1 U	6.1 U	6.1 U	6.1 U	61 U
Benzene	1	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	3 U
Carbon Tetrachloride	5	0.56 U	0.56 U	0.56 U	0.56 U	0.56 U	0.56 U	0.56 U	5.6 U
Chloroethane	5	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	28 U
Chloroform	7	0.42 U	0.42 U	1.6 J	0.91 J	1.4 J	1.5 J	1.1 J	4.2 U
cis-1,2-dichloroethylene (cDCE)	5	8.2	170	35	440	1100 J	770 J	16	90
Isopropylbenzene (Cumene)	5	0.63 U	0.63 U	0.63 U	0.63 U	0.63 U	0.63 U	0.63 U	6.3 U
Methylene chloride	5	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	24 U
Naphthalene	10	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	12 U
sec-Butylbenzene	5	0.59 U	0.59 U	0.59 U	0.59 U	0.59 U	0.59 U	0.59 U	5.9 U
t-Butylbenzene	5	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	14 U
Tert-butyl methyl ether	-	0.53 U	0.53 U	0.8 J	1.5 J	0.53 U	0.53 U	0.53 U	5.3 U
Tetrachloroethylene (PCE)	5	8.3	7.6	600	63	33	32	43	11 J
Toluene	5	0.17 U	0.17 U	0.17 U	0.17 U	1.2 J	1.3 J	0.17 U	1.7 U
Trans-1,2-dichloroethene (tDCE)	5	0.52 U	9.6	0.52 U	6.3	80	87	0.52 U	12 J
Trichloroethylene (TCE)	5	210	2600	74	7300	13000	13000	93	1500
Trichlorofluoromethane	5	0.91 J	0.54 U	0.54 U	0.54 U	0.54 U	0.54 U	6.3	5.4 U
Vinyl chloride	2	0.68 U	4.1 J	0.68 U	3 J	12 J	12 J	0.68 U	6.8 U
TIC VOC (µg/l)									
Total TIC	-	NI	NI	NI	NI	NI	NI	NI	NI

Notes:

1. Groundwater samples analytical results are compared to the New York State Department of Environmental Conservation (NYSDEC) Technical and Operational Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards (AWQS) and guidance values for drinking water (class GA) .
2. Results exceeding NYSDEC TOGS are highlighted.
3. Detections are shown in bold.
4. VOC = Volatile Organic Compounds
5. TIC = Tentatively identified compounds
6. NI = Not identified
7. µg/l = micrograms per liter

Qualifiers:

- \*\* = Not available
- J = The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample.
- U = The analyte was analyzed for, but was not detected at a level greater than or equal to the level of RL or the sample concentration for results impacted by blank contamination.
- UU = The analyte was not detected at a level greater than or equal to the reporting limit (RL); however, the reported RL is approximate and may be inaccurate or imprecise.

Table 10  
Indoor Air, Subslab Vapor and Ambient Air Sample Analytical Results Summary - VOCs  
Remedial Investigation  
Former ACME Steel/ Metal Works  
95 Lombardy Street/46 Anthony Street  
Brooklyn, New York  
NYSDEC Site No. 224131

Location	NYSDOH AGV	ACME-SV-1/IA-1		ACME-SV-2/IA-2			ACME-SV-3 IA-3		ACME-SV-4 IA-4		
Sample ID		SV-1-20121213	IA-1-20121213	SV-2-20121213	IA-2-20121213	DUP-03-20121213	SV-3-20121213	IA-3-20121213	SV-4-20121212	IA-4-20121212	DUP-01-20121212
Lab Sample ID		12L0515-01	12L0515-07	12L0515-02	12L0515-08	12L0515-09	12L0515-03	12L0515-06	12L0481-06	12L0481-02	12L0481-05
Sample Date		12/13/2012	12/13/2012	12/13/2012	12/13/2012	12/13/2012	12/13/2012	12/13/2012	12/13/2012	12/12/2012	12/12/2012
VOC (µg/m³)											
1,1,1-Trichloroethane (1,1,1-TCA)	-	360	0.37 U	110	0.37 U	0.37 U	220	0.37 U	81	0.37 U	0.37 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	-	12 U	0.52 U	14 U	0.52 U	0.52 U	14 U	0.52 U	15 U	0.52 U	1
1,1,2-Trichloroethane (1,1,2-TCA)	-	8.8 U	0.37 U	10 U	0.37 U	0.37 U	10 U	0.37 U	11 U	0.37 U	0.37 U
1,1-Dichloroethane (1,1-DCA)	-	6.6 U	0.27 U	7.5 U	0.27 U	0.27 U	7.5 U	0.27 U	7.9 U	0.27 U	0.27 U
1,1-Dichloroethene (1,1-DCE)	-	6.4 U	0.27 U	7.4 U	0.27 U	0.27 U	18	0.27 U	7.8 U	0.27 U	0.27 U
1,2,4-Trimethylbenzene	-	40 U	1.9	46 U	1.8	1.7 U	45 U	2	48 U	3.8 J	10 J
1,2-Dichloroethane (1,2-DCA)	-	6.6 U	0.27 U	7.5 U	0.27 U	0.27 U	7.5 U	0.27 U	7.9 U	0.27 U	0.27 U
1,2-Dichloropropane	-	7.5 U	0.31 U	8.6 U	0.53	0.31 U	8.5 U	0.31 U	9.1 U	0.31 U	0.31 U
1,3,5-Trimethylbenzene (Mesitylene)	-	16 U	0.67 U	18 U	0.67 U	0.67 U	18 U	0.67 U	19 U	1.6 J	3.6 J
1,3-Butadiene	-	7 U	0.29 U	8.1 U	0.29 U	0.29 U	8 U	0.29 U	8.5 U	0.29 UJ	6.1 J
4-Ethyltoluene	-	40 U	1.8	46 U	1.7	1.7 U	45 U	1.9	48 U	4.4 J	10 J
Acetone	-	3.8 U	46	4.4 U	47	45	6.1	44	8.9	35 J	61 J
Benzene	-	5.2 U	2.1	5.9 U	1.9	1.8	5.9 U	2	6.3 U	3.4 J	6.5 J
Carbon Disulfide	-	21	2.8	19	3.5	3.1	6.9	2.6	12	4.3	4.6
Chloroethane	-	4.3 U	0.18 U	4.9 U	0.18 U	0.18 U	4.9 U	0.18 U	5.2 U	0.18 U	0.18 U
Chloroform	-	13	0.33 U	9.1 U	0.33 U	0.33 U	21	0.33 U	9.6 U	0.33 U	0.33 U
Chloromethane	-	3.3 U	1	3.8 U	0.97	0.91	3.8 U	0.92	4.1 U	1.1	1.2
Cis-1,2-Dichloroethylene (cDCE)	-	6.4 U	0.27 U	7.4 U	0.27 U	0.27 U	37	0.27 U	7.8 U	0.27 U	0.27 U
Cyclohexane	-	5.6 U	0.58	6.4 U	0.54	0.49	6.3 U	0.58	6.8 U	1.9 J	4 J
Dichlorodifluoromethane	-	8 U	2.3	9.2 U	2.2	2.1	9.1 U	2.2	9.7 U	2.6	2.5
Ethyl Acetate	-	5.8 U	6.5	6.7 U	6.5	6	6.6 U	7.4	7.1 U	4.1	5.2
Ethylbenzene	-	7 U	3.4	8.1 U	3.4	2.9	8 U	3.8	10	11	14
Isopropanol	-	4 U	8.9 J	4.6 U	8.3 J	6.4 J	4.5 U	11 J	4.8 U	6.5 J	8.6 J
m & p Xylenes	-	7 U	13	8.1 U	12	10	8 U	14	26	26 J	38 J
Methyl Ethyl Ketone (2-Butanone)	-	4.8 U	1.9	5.5 U	1.9	1.9	5.4 U	2.1	5.8 U	3.5	3.8
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	-	6.6 U	0.92	7.6 U	0.81 J	0.28 UJ	7.6 U	0.86	8 U	0.28 U	0.28 U
Methylene Chloride	60	5.6 U	2.1	6.5 U	4.5 J	2.2 J	6.4 U	1.8	10	3	2.7
N-Heptane	-	6.6 U	6.7	7.6 U	6.6	6.2	7.6 U	7.3	8 U	11 J	22 J
N-Hexane	-	5.7 U	2.2	6.5 U	3.3 J	2.2 J	6.5 U	2	6.9 U	5.7 J	13 J
o-Xylene (1,2-Dimethylbenzene)	-	7 U	3.9	8.1 U	3.7	3.2	8 U	4.3	13	11 J	17 J
Styrene	-	6.9 U	2.1	7.9 U	2.1	1.6	7.9 U	1.5	8.4 U	6.1	8.2
Tetrachloroethylene(PCE)	100	1600	4.7	920	5.6	6.1	3100	4	2600	2.4 J	3.7 J
Toluene	-	9.2	31	20	31	29	6.9 U	34	30	47 J	77 J
Trans-1,2-Dichloroethene (tDCE)	-	6.4 U	0.27 U	7.4 U	0.27 U	0.27 U	7.3 U	0.27 U	7.8 U	0.27 U	0.27 U
Trichloroethylene (TCE)	5	1600	3.8	74	3.1	2.9	4500	3.3	28	0.58 J	0.18 UJ
Trichlorofluoromethane	-	9.1 U	1.4	10 U	1.4	1.3	10 U	1.4	11 U	1.8	1.7
Vinyl Chloride	-	8.3 U	0.35 U	9.5 U	0.35 U	0.35 U	9.4 U	0.35 U	10 U	0.35 U	0.35 U

Notes:

- Indoor Air sample results were compared to the New York State Department of Health (NYSDOH) Air Guideline Values (AGV).
- Detection are in bold.
- Concentrations above NYSDOH AGV criteria are highlighted.
- µg/m³ = micrograms per cubic meter.

Qualifiers:

\*\*- Not available

U = Analyte included in the analysis, but not detected.

J = The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample.

UJ = The analyte was not detected at a level greater than or equal to the reporting limit (RL); however, the reported RL is approximate and may be inaccurate or imprecise.

Table 11  
Soil Vapor and Indoor Air Decision Matrices Recommendations  
Remedial Investigation  
Former ACME Steel/Metal Works  
95 Lombardy Street/46 Anthony Street  
Brooklyn, New York  
NYSDEC Site No. 224131

Client ID Lab Sample ID Date Sample Completed Soil Vapor/Indoor Air	SV-1-20121213 12L0515-01 12/13/2012 Soil Vapor	IA-1-20121213 12L0515-07 12/13/2012 Indoor Air	NYSDOH Decision Matrix Result	SV-2-20121213 12L0515-02 12/13/2012 Soil Vapor	IA-2-20121213 12L0515-08 12/13/2012 Indoor Air	NYSDOH Decision Matrix Result
VOC (µg/m <sup>3</sup> )						
1,1,1-Trichloroethane <sup>2</sup>	360	ND	Monitoring	110	ND	Monitoring
Carbon Tetrachloride <sup>1</sup>	ND	ND	No further action	ND	ND	No further action
Tetrachloroethene <sup>2</sup>	1600	4.7	Mitigation	920	5.6	Mitigation
Trichloroethene <sup>1</sup>	1600	3.8	Mitigation	74	3.1	Monitoring/Mitigation

Client ID Lab Sample ID Date Sampled Soil Vapor/Indoor Air	SV-3-20121213 12L0515-03 12/13/2012 Soil Vapor	IA-3-20121213 12L0515-06 12/13/2012 Indoor Air	NYSDOH Decision Matrix Result	SV-4-20121212 12L0481-06 12/12/2012 Soil Vapor	IA-4-20121212 12L0481-02 12/12/2012 Indoor Air	NYSDOH Decision Matrix Result
VOC (µg/m <sup>3</sup> )						
1,1,1-Trichloroethane <sup>2</sup>	220	ND	Monitoring	81	ND	No further action
Carbon Tetrachloride <sup>1</sup>	ND	ND	No further action	ND	ND	No further action
Tetrachloroethene <sup>2</sup>	3100	4	Mitigation	2600	2.4 J	Monitoring
Trichloroethene <sup>1</sup>	4500	3.3	Mitigation	28	0.58 J	Mitigation

**Notes and Qualifiers:**  
Air sample results were compared to New York State Department of Health (NYSDOH) Guidance for Evaluating Soil Vapor Intrusion Decision Matrices.  
µg/m<sup>3</sup>, mcg/m3: Microgram per cubic meter  
<sup>1</sup>: Compound is compared with the NYSDOH Soil Vapor/Indoor Air Matrix 1  
<sup>2</sup>: Compound is compared with the NYSDOH Soil Vapor/Indoor Air Matrix 2  
ND = Not Detected

SUB-SLAB VAPOR CONCENTRATION of COMPOUND (mcg/m <sup>3</sup> )	INDOOR AIR CONCENTRATION of COMPOUND (mcg/m <sup>3</sup> )			
	< 0.25	0.25 to < 1	1 to < 5.0	5.0 and above
< 5	1. No further action	2. Take reasonable and practical actions to identify source(s) and reduce exposures	3. Take reasonable and practical actions to identify source(s) and reduce exposures	4. Take reasonable and practical actions to identify source(s) and reduce exposures
5 to < 50	5. No further action	6. MONITOR	7. MONITOR	8. MITIGATE
50 to < 250	9. MONITOR	10. MONITOR / MITIGATE	11. MITIGATE	12. MITIGATE
250 and above	13. MITIGATE	14. MITIGATE	15. MITIGATE	16. MITIGATE

SUB-SLAB VAPOR CONCENTRATION of COMPOUND (mcg/m <sup>3</sup> )	INDOOR AIR CONCENTRATION of COMPOUND (mcg/m <sup>3</sup> )			
	< 3	3 to < 30	30 to < 100	100 and above
< 100	1. No further action	2. Take reasonable and practical actions to identify source(s) and reduce exposures	3. Take reasonable and practical actions to identify source(s) and reduce exposures	4. Take reasonable and practical actions to identify source(s) and reduce exposures
100 to < 1,000	5. MONITOR	6. MONITOR / MITIGATE	7. MITIGATE	8. MITIGATE
1,000 and above	9. MITIGATE	10. MITIGATE	11. MITIGATE	12. MITIGATE

Table 12  
QA/QC Analytical Results Summary  
Remedial Investigation  
Former ACME Steel/Metal Works  
95 Lombardy Street/46 Anthony Street  
Brooklyn, New York  
NYSDEC Site No. 224131

Sample ID Lab Sample ID QA/QC Sample Date	ACME-FB-1 12J0187-03 Soil Field Blank 10/02/2012	ACME-FB-2 12K0271-04 Soil Field Blank 11/09/2012	ACME-FB-3 12K0644-03 Soil Field Blank 11/19/2012	ACME-FB-20121205 12L0227-10 Groundwater Field Blank 12/05/2012	ACME-FB-20121206 12L0294-10 Groundwater Field Blank 12/07/2012	ACME-TB-20121205 12L0194-13 Groundwater Trip Blank 12/05/2012	ACME-TB-20121205 12L0227-09 Groundwater Trip Blank 12/05/2012	ACME-TB-20121206 12L0294-09 Groundwater Trip Blank 12/07/2012	ACME-TB-20121207 12L0401-06 Groundwater Trip Blank 12/07/2012	ACME-TB-20130116 13A0476-02 Groundwater Trip Blank 01/16/2013
VOC (µg/l)										
Tetrachloroethylene (PCE)	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	1.1 J	0.41 U
Trichloroethylene (TCE)	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	3.1 J	2 J
SVOC (µg/l)										
Naphthalene	4.41 R	NA	NA	3.86 U	NA	NA	NA	NA	NA	NA
Metals (µg/l)										
Calcium	39	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	20	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	50	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	20	NA	NA	NA	NA	NA	NA	NA	NA	NA
PCB (µg/l)										
Total PCB	0.0541 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides (µg/l)										
Pesticides	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

- Notes:**
1. Only detected compounds are shown.
  2. PCB = Polychlorinated biphenyls
  3. VOC = Volatile Organic Compounds
  4. SVOC = Semi Volatile Organic Compounds
  5. µg/l = micrograms per liter
  6. ND = Not Detected
  7. NA = Not Analyzed

**Qualifiers:**

J = The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected at a level greater than or equal to the level of RL or the sample concentration for results impacted by blank contamination.

R = The sample results are unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.

# FIGURES







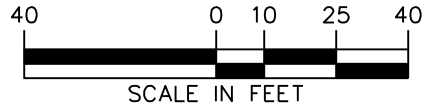


LEGEND:

- SITE BOUNDARY
- BUILDING OUTLINE

NOTES:

1. BASE MAP OBTAINED FROM THE NYCITYMAP WEBSITE (<http://gis.nyc.gov/doitt/nycitymap/>).
2. THE REMEDIAL INVESTIGATION (RI) WAS CONDUCTED BY LANGAN BETWEEN SEPTEMBER AND DECEMBER 2012.



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**FORMER ACME  
STEEL/METAL WORKS**

**NYSDEC SITE No. 224131  
95 LOMBARDY STREET/  
46 ANTHONY STREET**

**BROOKLYN**

**NEW YORK**

Figure Title

**AERIAL SITE PLAN**

Project No.  
170157201

Date  
12/27/2012

Scale  
1" = 40'

Drawn By  
EB

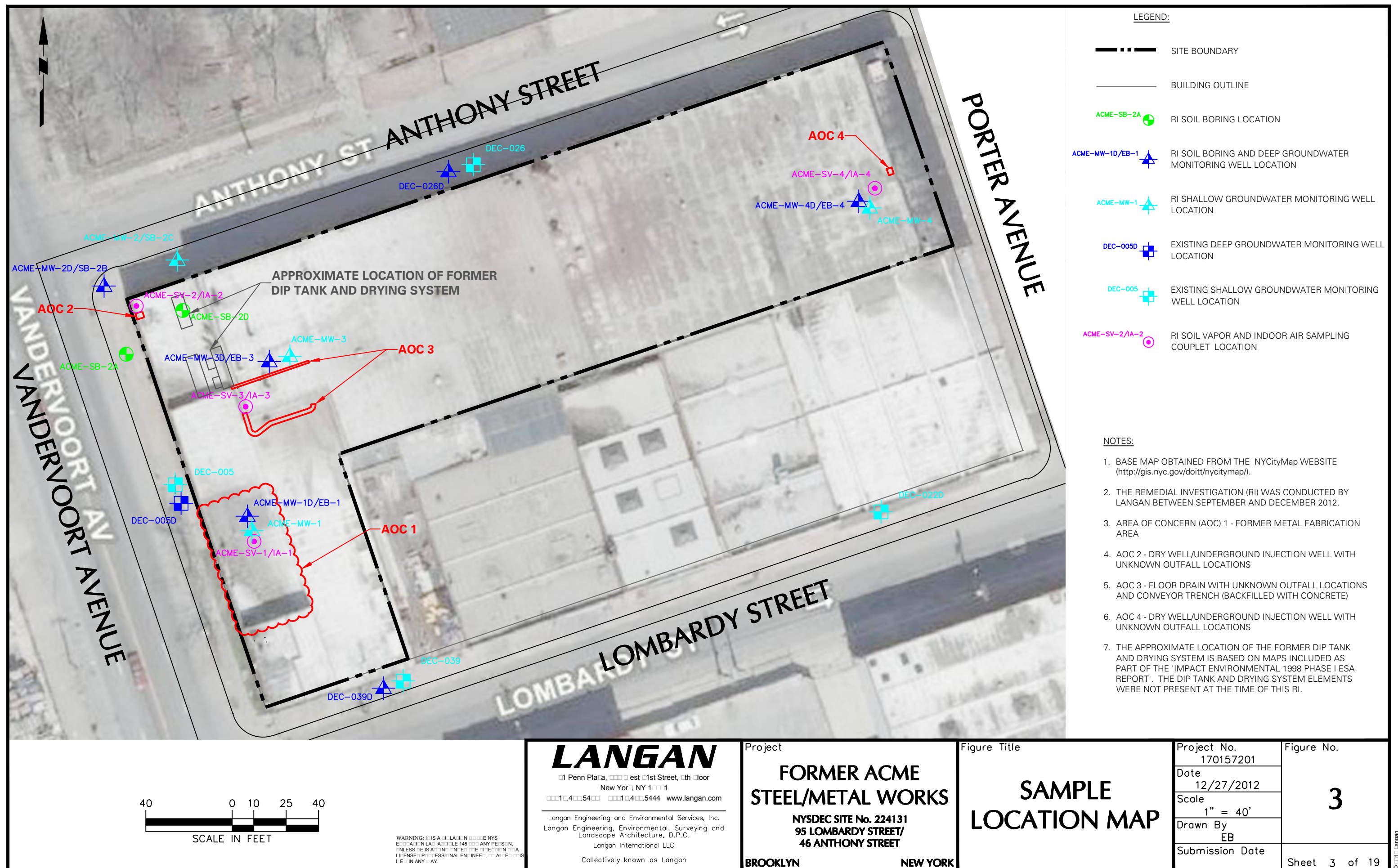
Submission Date

Figure No.

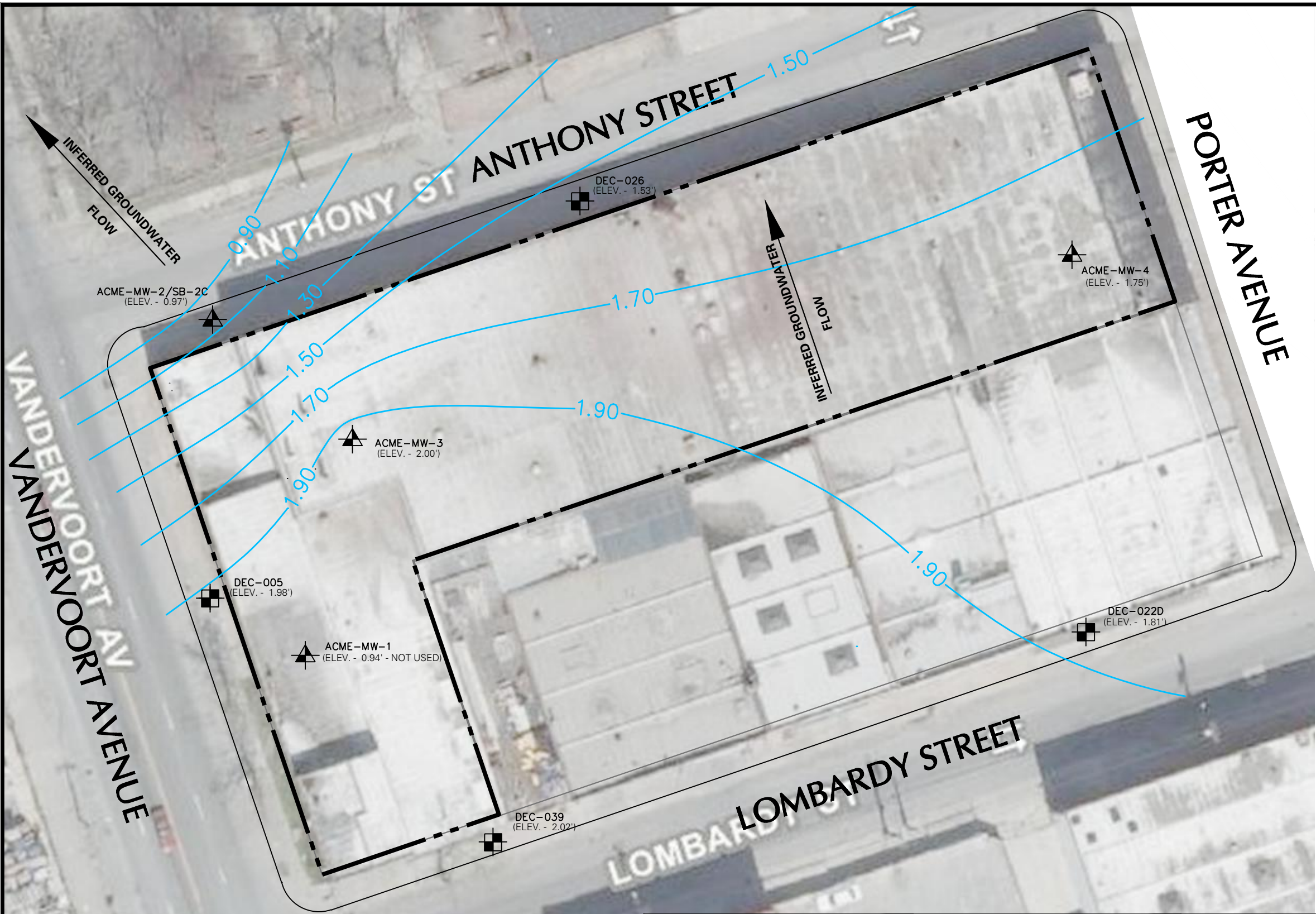
**2**

Sheet 2 of 19







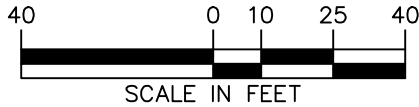


LEGEND:

- SITE BOUNDARY
- BUILDING OUTLINE
- RI SHALLOW GROUNDWATER MONITORING WELL LOCATION
- EXISTING SHALLOW GROUNDWATER MONITORING WELL LOCATION
- 1.90 INFERRED GROUNDWATER ELEVATION CONTOUR (FEET)

NOTES:

1. BASE MAP OBTAINED FROM THE NYCITYMAP WEBSITE (<http://gis.nyc.gov/doitt/nycitymap/>).
2. THE REMEDIAL INVESTIGATION (RI) WAS CONDUCTED BY LANGAN BETWEEN SEPTEMBER AND DECEMBER 2012.
3. GROUNDWATER CONTOURS ARE INFERRED BASED ON THE SHALLOW MONITORING WELLS, WHICH STRADDLE THE WATER TABLE.
4. GROUNDWATER CONTOUR INTERVAL IS 0.20 FEET.
5. GROUNDWATER ELEVATIONS AT MONITORING WELL ACME-MW-1 WAS NOT INCLUDED IN THE GROUNDWATER CONTOUR MAP.
6. ELEVATION (ELEV.) ARE RELATIVE TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).



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**NYSDEC SITE No. 224131  
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46 ANTHONY STREET**

**BROOKLYN**

**NEW YORK**

Figure Title

**SHALLOW  
OVERBURDEN  
GROUNDWATER  
COUNTOUR MAP**

Project No.  
170157201

Date  
01/09/2013

Scale  
1" = 40'

Drawn By  
EB

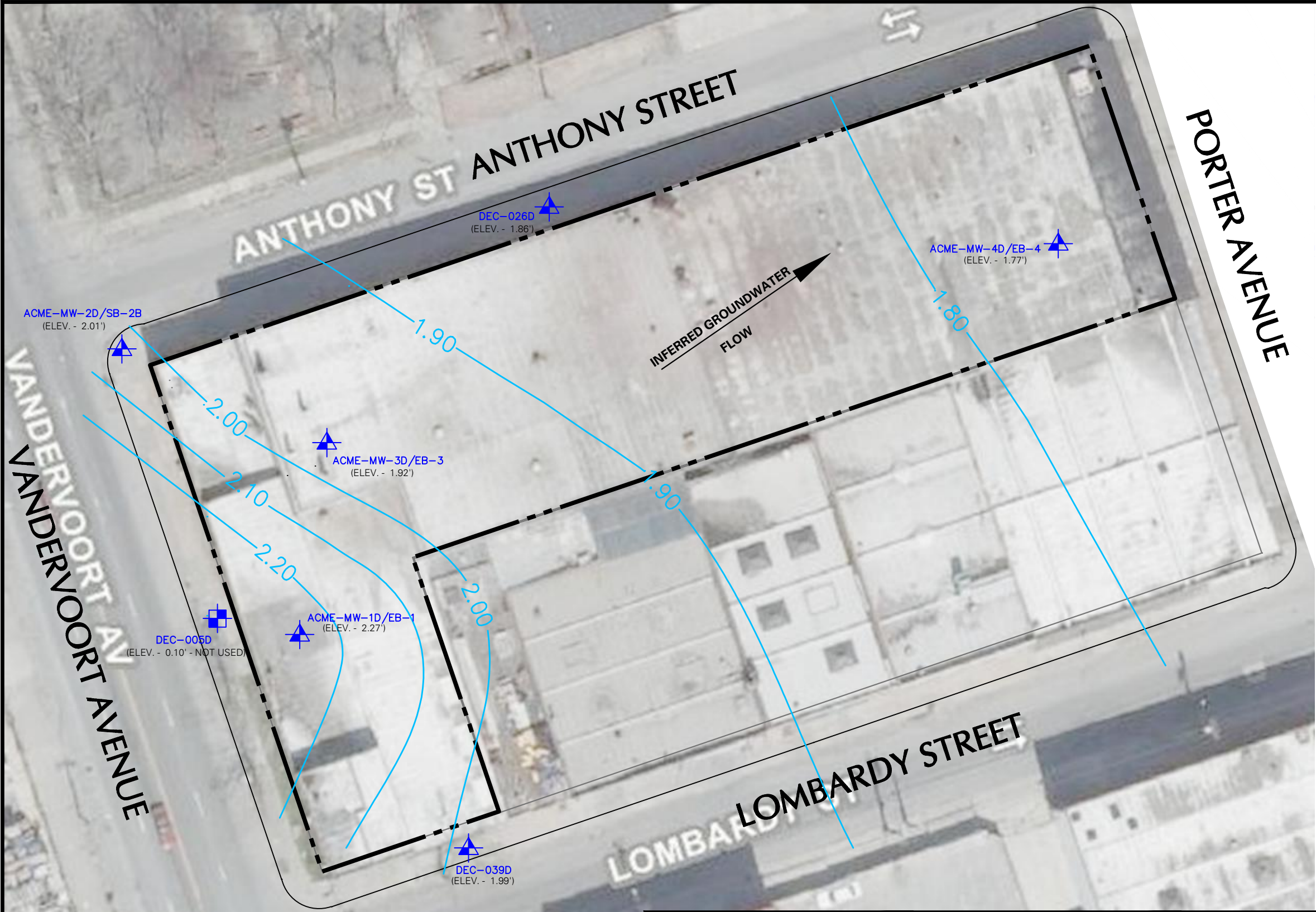
Submission Date

Figure No.

**4**

Sheet 4 of 19





LEGEND:

--- SITE BOUNDARY

— BUILDING OUTLINE

ACME-MW-1D/EB-1 RI SOIL BORING AND DEEP GROUNDWATER MONITORING WELL LOCATION

DEC-005D EXISTING DEEP GROUNDWATER MONITORING WELL LOCATION

1.90 INFERRED GROUNDWATER ELEVATION CONTOUR (FEET)

NOTES:

1. BASE MAP OBTAINED FROM THE NYCITYMAP WEBSITE (<http://gis.nyc.gov/doitt/nycitymap/>).
2. THE REMEDIAL INVESTIGATION (RI) WAS CONDUCTED BY LANGAN BETWEEN SEPTEMBER AND DECEMBER 2012.
3. GROUNDWATER CONTOURS ARE INFERRED BASED ON THE SHALLOW MONITORING WELLS, WHICH STRADDLE THE WATER TABLE.
4. GROUNDWATER CONTOUR INTERVAL IS 0.20 FEET.
5. GROUNDWATER ELEVATIONS AT MONITORING WELL ACME-MW-1 WAS NOT INCLUDED IN THE GROUNDWATER CONTOUR MAP.
6. ELEVATION (ELEV.) ARE RELATIVE TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).

SCALE IN FEET

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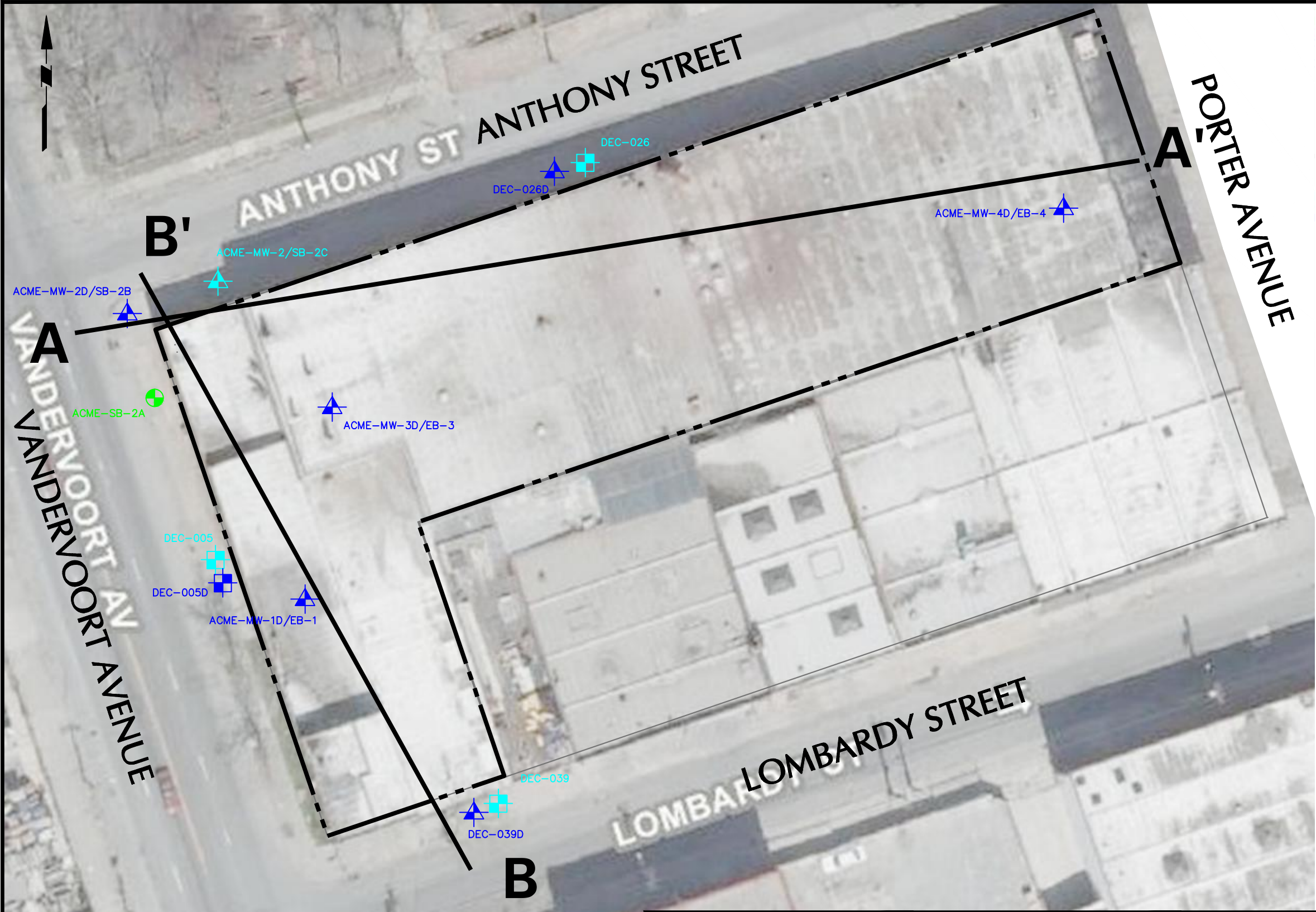
**BROOKLYN NEW YORK**

Figure Title

**DEEP OVERBURDEN GROUNDWATER COUNTOUR MAP**

Project No. 170157201	Figure No.  <b>5</b>
Date 01/09/2013	
Scale 1" = 40'	
Drawn By EB	
Submission Date	Sheet 5 of 19





LEGEND:

- SITE BOUNDARY
- BUILDING OUTLINE
- ACME-SB-2A RI SOIL BORING LOCATION
- ACME-MW-1D/EB-1 RI SOIL BORING AND DEEP GROUNDWATER MONITORING WELL LOCATION
- ACME-MW-1 RI SHALLOW GROUNDWATER MONITORING WELL LOCATION
- DEC-005 EXISTING SHALLOW GROUNDWATER MONITORING WELL LOCATION
- A-A' PROFILE TRANSECT

NOTES:

- BASE MAP OBTAINED FROM THE NYCITYMAP WEBSITE (<http://gis.nyc.gov/doitt/nycitymap/>).
- THE REMEDIAL INVESTIGATION (RI) WAS CONDUCTED BY LANGAN BETWEEN SEPTEMBER AND DECEMBER 2012.
- THE PLAN VIEW FOR PROFILE C-C' IS INCLUDED IN FIGURE 9.



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STEEL/METAL WORKS**

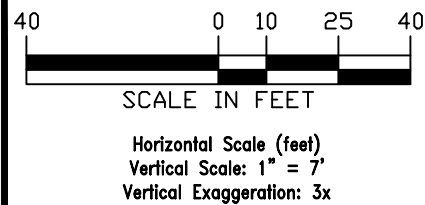
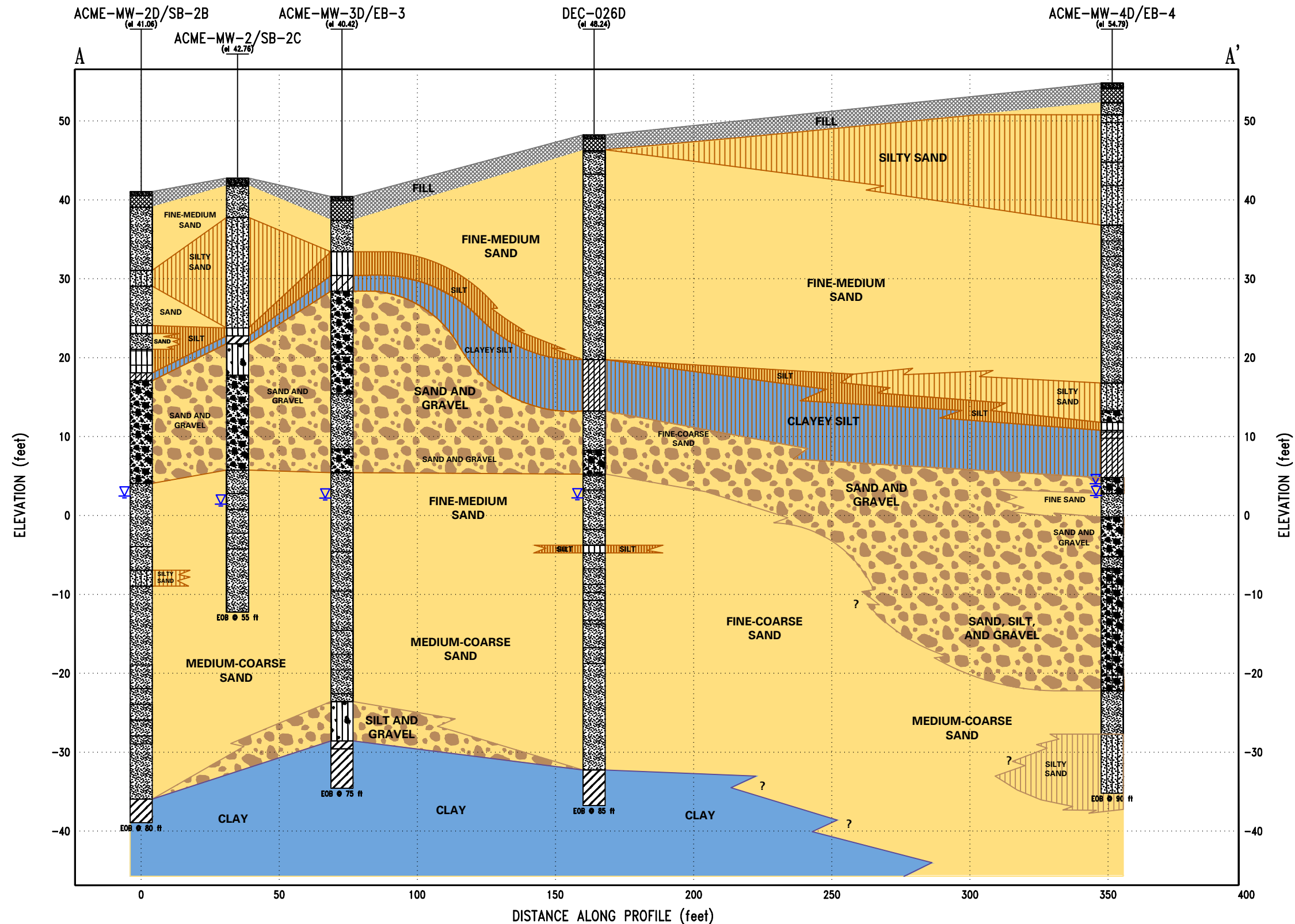
**NYSDEC SITE No. 224131  
95 LOMBARDY STREET/  
46 ANTHONY STREET**

**BROOKLYN NEW YORK**

Figure Title

**CROSS SECTION  
PLAN VIEW**

Project No. 170157201	Figure No.  <b>6</b>
Date 01/14/2012	
Scale 1" = 40'	
Drawn By EB	
Submission Date	Sheet 6 of 19



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Landscape Architecture, D.P.C.  
Langan International LLC

Collectively known as Langan

Project

**FORMER ACME  
STEEL/METAL WORKS**

NYSDEC SITE No. 224131  
95 LOMBARDY STREET/  
46 ANTHONY STREET

**BROOKLYN**

**NEW YORK**

Figure Title

**CROSS-SECTION  
A-A'**

Project No.

170157201

Date

01/11/2012

Scale

AS SHOWN

Drawn By

EB

Submission Date

Figure No.

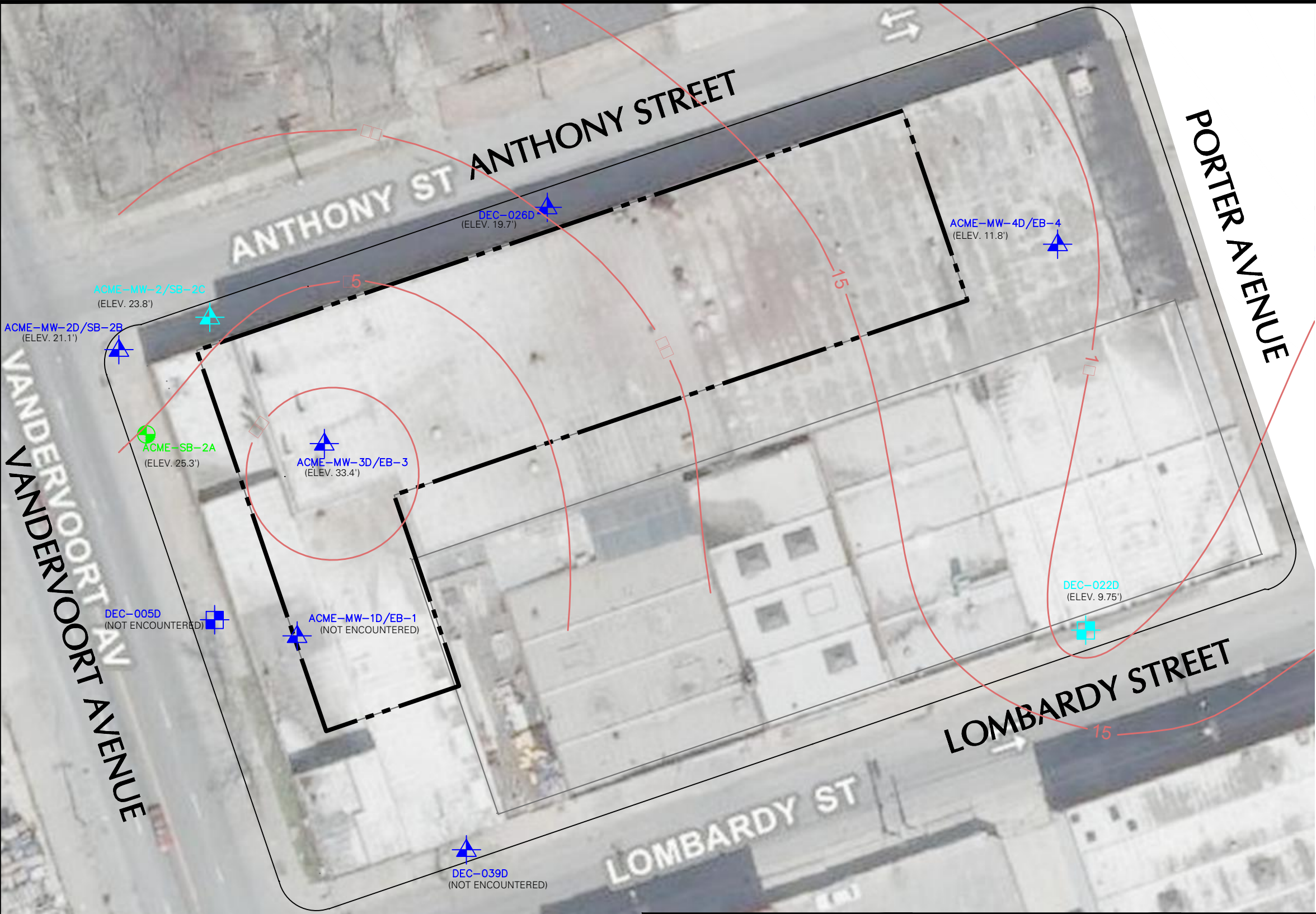
**7**

Sheet 7 of 19









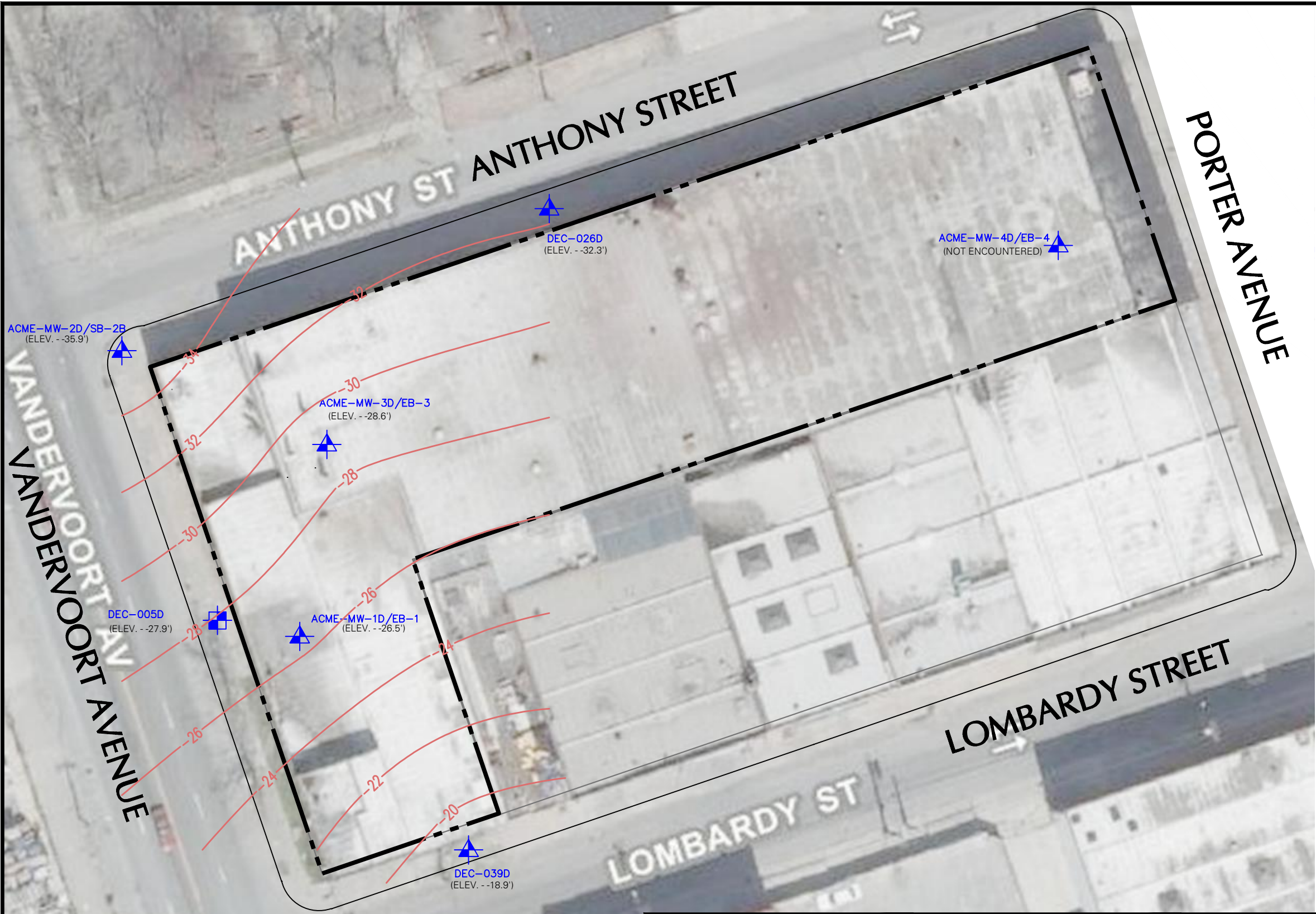
**LEGEND:**

- SITE BOUNDARY
- BUILDING OUTLINE
- ACME-SB-2A RI SOIL BORING LOCATION
- ACME-MW-1D/EB-1 RI SOIL BORING AND DEEP GROUNDWATER MONITORING WELL LOCATION
- ACME-MW-2/SB-2C RI SHALLOW GROUNDWATER MONITORING WELL LOCATION
- DEC-005D EXISTING DEEP GROUNDWATER MONITORING WELL LOCATION
- DEC-022D EXISTING SHALLOW GROUNDWATER MONITORING WELL LOCATION
- 25 INFERRED TOP OF CLAY LAYER SURFACE ELEVATION (FEET)

- NOTES:**
1. BASE MAP OBTAINED FROM THE NYCITYMAP WEBSITE (<http://gis.nyc.gov/doitt/nycitymap/>).
  2. THE REMEDIAL INVESTIGATION (RI) WAS CONDUCTED BY LANGAN BETWEEN SEPTEMBER AND DECEMBER 2012.
  3. CONTOUR INTERVAL IS 2.0 FEET.
  4. CLAY WAS NOT ENCOUNTERED IN DEEP MONITORING WELL ACME-MW-4D/EB-4.
  5. ELEVATIONS (ELEV.) ARE RELATIVE TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).

  SCALE IN FEET	<p><b>LANGAN</b></p> <p>1 Penn Plaza, 15th Floor New York, NY 10019 212.454.5444 212.454.5444 www.langan.com</p> <p>Langan Engineering and Environmental Services, Inc. Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C. Langan International LLC</p> <p>Collectively known as Langan</p>	<p>Project</p> <p><b>FORMER ACME STEEL/METAL WORKS</b></p> <p>NYSDEC SITE No. 224131 95 LOMBARDY STREET/ 46 ANTHONY STREET</p> <p><b>BROOKLYN NEW YORK</b></p>	Figure Title		Project No.	Figure No.
			<p><b>TOP OF SHALLOW CLAY LAYER CONTOUR MAP</b></p>		170157201	<p><b>9</b></p>
					Date	
					01/10/2013	
					Scale	
		1" = 40'	Drawn By			
		EB	Submission Date			
					Sheet 9 of 19	



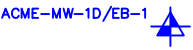


LEGEND:

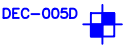


SITE BOUNDARY

BUILDING OUTLINE



RI SOIL BORING AND DEEP GROUNDWATER MONITORING WELL LOCATION



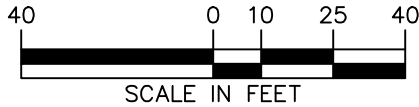
EXISTING DEEP GROUNDWATER MONITORING WELL LOCATION



INFERRED TOP OF CLAY LAYER SURFACE ELEVATION (FEET)

NOTES:

1. BASE MAP OBTAINED FROM THE NYCITYMAP WEBSITE (<http://gis.nyc.gov/doitt/nycitymap/>).
2. THE REMEDIAL INVESTIGATION (RI) WAS CONDUCTED BY LANGAN BETWEEN SEPTEMBER AND DECEMBER 2012.
3. CONTOUR INTERVAL IS 2.0 FEET.
4. CLAY WAS NOT ENCOUNTERED IN DEEP MONITORING WELL ACME-MW-4D/EB-4.
5. ELEVATIONS (ELEV.) ARE RELATIVE TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).



SCALE IN FEET

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**FORMER ACME  
STEEL/METAL WORKS**

**NYSDEC SITE No. 224131  
95 LOMBARDY STREET/  
46 ANTHONY STREET**

**BROOKLYN**

**NEW YORK**

Figure Title

**TOP OF DEEP CLAY  
LAYER CONTOUR  
MAP**

Project No.  
170157201

Date  
01/10/2013

Scale  
1" = 40'

Drawn By  
EB

Submission Date

Figure No.

**10**

Sheet 10 of 19

ACME-MW-2D/SB-2B			
VOC (mg/kg)	ACME-SB-2B (1-2)	ACME-SB-2B (10-11)	ACME-SB-2B (40-41)
Lab Sample ID	12I0819-03	12K0644-04	12K0740-01
Sample Date	09/24/2012	11/19/2012	11/21/2012
Sampling Depth (feet)	1 to 2	10 to 11	40 to 41
VOC (mg/kg)			
1,1,1-TCA	0.00012 U	0.00013 U	0.0024 R
1,1,2-TCA	0.0007 U	0.00076 U	0.0024 R
1,2-DCA	0.00047 U	0.00051 U	0.0024 R
Chloroethane	0.00051 U	0.00056 U	0.0024 R
cDEC	0.00027 U	0.00029 U	0.0024 R
PCE	<b>0.054</b>	<b>0.012</b>	<b>0.0055</b> J
tDCE	0.00048 U	0.00053 U	0.0024 R
TCE	<b>0.0008</b> J	0.0005 U	<b>0.027</b> J
Vinyl Chloride	0.00025 U	0.00028 U	0.0024 R

ACME-MW-2/SB-2C		
VOC (mg/kg)	ACME-SB-2C (2-3)	ACME-SB-2C (41-42)
Lab Sample ID	12I0819-02	12K0740-02
Sample Date	09/24/2012	11/26/2012
Sampling Depth (feet)	2 to 3	41 to 42
VOC (mg/kg)		
1,1,1-TCA	0.00013 U	0.0025 U
1,1,2-TCA	0.00076 U	0.0025 U
1,2-DCA	0.00051 U	0.0025 U
Chloroethane	0.00056 U	0.0025 U
cDEC	0.00029 U	0.0025 U
PCE	<b>0.023</b>	<b>0.0081</b>
tDCE	0.00052 U	0.0025 U
TCE	<b>0.001</b> J	<b>0.12</b>
Vinyl Chloride	0.00028 U	0.0025 U

DEC-026D	
VOC (mg/kg)	DEC-026D(43-44)
Lab Sample ID	12K0465-01
Sample Date	11/12/2012
Sampling Depth (feet)	43 to 44
VOC (mg/kg)	
1,1,1-TCA	0.00014 UJ
1,1,2-TCA	0.00081 UJ
1,2-DCA	0.00054 UJ
Chloroethane	0.00059 UJ
cDEC	0.00031 UJ
PCE	<b>0.0015</b> J
tDCE	0.00056 UJ
TCE	<b>0.011</b> J
Vinyl Chloride	0.00029 UJ

ACME-SB-2D	
VOC (mg/kg)	ACME-SB-2D (4-5)
Lab Sample ID	12J0187-02
Sample Date	10/01/2012
Sampling Depth (feet)	4 to 5
VOC (mg/kg)	
1,1,1-TCA	0.00012 U
1,1,2-TCA	0.00071 U
1,2-DCA	0.00047 U
Chloroethane	0.00052 U
cDEC	0.00027 U
PCE	<b>0.0022</b> J
tDCE	0.00049 U
TCE	0.00046 U
Vinyl Chloride	0.00026 U

ACME-MW-4D/EB-4		
VOC (mg/kg)	ACME-EB-4 (1-2)	ACME-EB-4 (49-50)
Lab Sample ID	12I0819-01	12J0945-02
Sample Date	09/21/2012	10/23/2012
Sampling Depth (feet)	1 to 2	49 to 50
VOC (mg/kg)		
1,1,1-TCA	0.00013 UJ	0.000091 UJ
1,1,2-TCA	0.00079 UJ	0.00054 UJ
1,2-DCA	0.00053 UJ	0.00036 UJ
Chloroethane	0.00058 UJ	0.0004 UJ
cDEC	0.00031 UJ	0.00021 UJ
PCE	<b>0.06</b> J	0.00038 UJ
tDCE	0.00055 UJ	0.00037 UJ
TCE	0.00052 UJ	0.00035 UJ
Vinyl Chloride	0.00029 UJ	0.0002 UJ

ACME-MW-3D/EB-3			
VOC (mg/kg)	ACME-EB-3 (3-4)	ACME-EB-3 (20-21)	ACME-EB-3 (36-37)
Lab Sample ID	12I0721-02	12K0465-06	12K0465-04
Sample Date	09/20/2012	11/14/2012	11/14/2012
Sampling Depth (feet)	3 to 4	20 to 21	36 to 37
VOC (mg/kg)			
1,1,1-TCA	0.00019 U	0.00013 U	0.00014 U
1,1,2-TCA	0.0011 U	0.00074 U	0.00083 U
1,2-DCA	0.00077 U	0.0005 U	0.00055 U
Chloroethane	0.00085 U	0.00055 U	0.00061 U
cDEC	0.00044 U	0.00029 U	0.00032 U
PCE	<b>0.013</b>	0.00053 U	<b>0.0016</b> J
tDCE	0.00079 U	0.00051 U	0.00057 U
TCE	<b>0.01</b>	<b>0.0028</b> J	<b>0.012</b>
Vinyl Chloride	0.00042 U	0.00027 U	0.0003 U

ACME-SB-2A			
VOC (mg/kg)	ACME-SB-2A (3-4)	ACME-SB-2A (40-41)	ACME-SB-2A (47-48)
Lab Sample ID	12I0819-04	12K0465-02	12K0465-03
Sample Date	09/24/2012	11/13/2012	11/13/2012
Sampling Depth (feet)	3 to 4	40 to 41	47 to 48
VOC (mg/kg)			
1,1,1-TCA	0.00014 U	0.00014 U	0.00013 U
1,1,2-TCA	0.00082 U	0.00083 U	0.00078 U
1,2-DCA	0.00055 U	0.00055 U	0.00052 U
Chloroethane	0.00061 U	0.00061 U	0.00057 U
cDEC	0.00032 U	0.00032 U	0.0003 U
PCE	0.00058 U	<b>0.0029</b> J	0.00055 U
tDCE	0.00057 U	0.00057 U	0.00054 U
TCE	0.00054 U	<b>0.04</b>	<b>0.03</b>
Vinyl Chloride	0.0003 U	0.0003 U	0.00028 U

ACME-MW-1D/EB-1		
VOC (mg/kg)	ACME-EB-1 (1-2)	ACME-EB-1 (26-27)
Lab Sample ID	12I0721-01	12J0014-04
Sample Date	09/19/2012	09/26/2012
Sampling Depth (feet)	1 to 2	26 to 27
VOC (mg/kg)		
1,1,1-TCA	0.00012 U	0.00012 U
1,1,2-TCA	0.0007 U	0.00072 U
1,2-DCA	0.00047 U	0.00048 U
Chloroethane	0.00051 U	0.00053 U
cDEC	0.00027 U	0.00028 U
PCE	0.0005 U	0.00051 U
tDCE	0.00048 U	0.0005 U
TCE	0.00046 U	<b>0.00096</b> J
Vinyl Chloride	0.00025 U	0.00026 U

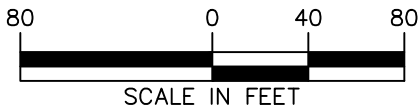
STANDARDS	NYSDEC PART 375 UNRESTRICTED SCO	NYSDEC PART 375 COMMERCIAL SCO
VOC (mg/kg)		
1,1,1-Trichloroethane (1,1,1-TCA)	0.68	500
1,1,2-Trichloroethane (1,1,2-TCA)	-	-
1,2-Dichloroethane (1,2-DCA)	0.02	30
Chloroethane	-	-
cis-1,2-Dichloroethylene (cDEC)	0.25	500
Tetrachloroethylene (PCE)	1.3	150
trans-1,2-Dichloroethene (tDCE)	0.19	500
Trichloroethylene (TCE)	0.47	200
Vinyl Chloride	0.02	13

LEGEND:

- SITE BOUNDARY
- BUILDING OUTLINE
- ACME-SB-2A RI SOIL BORING LOCATION
- ACME-MW-1D/EB-1 RI SOIL BORING AND DEEP GROUNDWATER MONITORING WELL LOCATION
- ACME-MW-2/SB-2C RI SOIL BORING AND SHALLOW GROUNDWATER MONITORING WELL LOCATION

NOTES:

- BASE MAP OBTAINED FROM THE NYCityMap WEBSITE (<http://gis.nyc.gov/doit/nycitymap/>).
- THE REMEDIAL INVESTIGATION (RI) WAS CONDUCTED BY LANGAN BETWEEN SEPTEMBER AND DECEMBER 2012.
- SOIL SAMPLE ANALYTICAL RESULTS ARE COMPARED TO THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYCDEC) TITLE 6 OF THE OFFICIAL COMPILATION OF NEW YORK CODES, RULES, AND REGULATIONS (NYCRR) PART 375 UNRESTRICTED USE AND COMMERCIAL USE SOIL CLEANUP OBJECTIVES (SCO).
- DETECTIONS ARE IN BOLD.
- THERE WERE NO SOIL SAMPLE RESULTS THAT EXCEEDED THE UNRESTRICTED USE AND THE COMMERCIAL USE SCOs.
- VOC = VOLATILE ORGANIC COMPOUNDS
- mg/kg = MILLIGRAMS PER KILOGRAM
- "-" = STANDARD NOT AVAILABLE
- J = DETECTED ABOVE THE METHOD DETECTION LIMIT BUT BELOW THE REPORTING LIMIT; THEREFORE, RESULT IS AN ESTIMATED CONCENTRATION.
- U = ANALYTE INCLUDED IN THE ANALYSIS, BUT NOT DETECTED.
- UJ = THE ANALYTE WAS NOT DETECTED AT A LEVEL GREATER THAN OR EQUAL TO THE REPORTING LIMIT (RL); HOWEVER, THE REPORTED RL IS APPROXIMATE AND MAY BE INACCURATE OR IMPRECISE.
- R = THE SAMPLE RESULTS ARE UNUSABLE DUE TO THE QUALITY OF THE DATA GENERATED BECAUSE CERTAIN CRITERIA WERE NOT MET. THE ANALYTE MAY OR MAY NOT BE PRESENT IN THE SAMPLE.



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**FORMER ACME  
STEEL/METAL WORKS**

**NYSDEC SITE No. 224131  
95 LOMBARDY STREET/  
46 ANTHONY STREET**

**BROOKLYN**

**NEW YORK**

Figure Title

**SOIL SAMPLE  
VOC RESULTS  
MAP**

Project No.  
170157201

Date  
12/31/2012

Scale  
1" = 80'

Drawn By  
EB

Submission Date

Figure No.

**11**

Sheet 11 of 19

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ACME-SV-2/IA-2			
Sample ID	IA-2-20121213		SV-2-20121213
Lab Sample ID	12L0515-08		12L0515-02
Sample Date	12/13/2012		12/13/2012
VOC (µg/m3)			
1,1,1-TCA	0.37	U	110
1,1,2-TCA	0.37	U	10
1,1-DCE	0.27	U	7.4
1,2-DCA	0.27	U	7.5
Chloroethane	0.18	U	4.9
cDCE	0.27	U	7.4
PCE	5.6		920
tdCE	0.27	U	7.4
TCE	3.1		74
Vinyl Chloride	0.35	U	9.5

ACME-SV-4/IA-4			
Sample ID	IA-4-20121212		SV-4-20121212
Lab Sample ID	12L0481-02		12L0481-06
Sample Date	12/12/2012		12/12/2012
VOC (µg/m3)			
1,1,1-TCA	0.37	U	81
1,1,2-TCA	0.37	U	11
1,1-DCE	0.27	U	7.8
1,2-DCA	0.27	U	7.9
Chloroethane	0.18	U	5.2
cDCE	0.27	U	7.8
PCE	2.4	J	2600
tdCE	0.27	U	7.8
TCE	0.58	J	28
Vinyl Chloride	0.35	U	10

LEGEND:

- SITE BOUNDARY
- BUILDING OUTLINE
- ACME-SV-2/IA-2

RI SOIL VAPOR AND INDOOR AIR SAMPLING COUPLET LOCATION

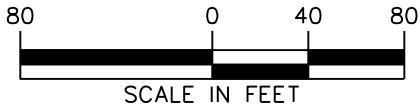
NOTES:

1. BASE MAP OBTAINED FROM THE NYCITYMAP WEBSITE (<http://gis.nyc.gov/doitt/nycitymap/>).
2. THE REMEDIAL INVESTIGATION (RI) WAS CONDUCTED BY LANGAN BETWEEN SEPTEMBER AND DECEMBER 2012.
3. ONLY CHLORINATED VOLATILE ORGANIC COMPOUNDS (CVOC) ARE INCLUDED IN THE FIGURE.
4. SAMPLE RESULTS WERE COMPARED TO THE NEW YORK STATE DEPARTMENT OF HEALTH (NYSDOH) AIR GUIDELINE VALUES (AGV). DETECTIONS ARE IN BOLD.
5. CONCENTRATIONS EXCEEDING NYSDOH AGV ARE HIGHLIGHTED.
7. VOC = VOLATILE ORGANIC COMPOUNDS
8. µg/m3 = MICROGRAMS PER CUBIC METER
9. \*- = NOT AVAILABLE
10. J = THE ANALYTE WAS POSITIVELY IDENTIFIED AND THE ASSOCIATED NUMERICAL VALUE IS THE APPROXIMATE CONCENTRATION OF THE ANALYTE IN THE SAMPLE.
11. NE = NO EXCEEDANCE

ACME-SV-1/IA-1			
Sample ID	IA-1-20121213		SV-1-20121213
Lab Sample ID	12L0515-07		12L0515-01
Sample Date	12/13/2012		12/13/2012
VOC (µg/m3)			
1,1,1-TCA	0.37	U	360
1,1,2-TCA	0.37	U	8.8
1,1-DCE	0.27	U	6.4
1,2-DCA	0.27	U	6.6
Chloroethane	0.18	U	4.3
cDCE	0.27	U	6.4
PCE	4.7		1600
tdCE	0.27	U	6.4
TCE	3.8		1600
Vinyl Chloride	0.35	U	8.3

ACME-SV-3/IA-3			
Sample ID	IA-3-20121213		SV-3-20121213
Lab Sample ID	12L0515-06		12L0515-03
Sample Date	12/13/2012		12/13/2012
VOC (µg/m3)			
1,1,1-TCA	0.37	U	220
1,1,2-TCA	0.37	U	10
1,1-DCE	0.27	U	18
1,2-DCA	0.27	U	7.5
Chloroethane	0.18	U	4.9
cDCE	0.27	U	37
PCE	4		3100
tdCE	0.27	U	7.3
TCE	3.3		4500
Vinyl Chloride	0.35	U	9.4

STANDARDS	NYSDOH AGV
VOC (µg/m3)	
1,1,1-Trichloroethane (1,1,1-TCA)	-
1,1,2-Trichloroethane (1,1,2-TCA)	-
1,1-Dichloroethene (1,1-DCE)	-
1,2-Dichloroethane (1,2-DCA)	-
Chloroethane	-
cis-1,2-Dichloroethylene (cDCE)	-
Tetrachloroethylene (PCE)	100
trans-1,2-Dichloroethene (tdCE)	-
Trichloroethylene (TCE)	5
Vinyl Chloride	-



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NYSDEC SITE No. 224131  
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46 ANTHONY STREET

BROOKLYN NEW YORK

Figure Title

VAPOR / AIR SAMPLE VOC RESULTS MAP

Project No.  
170157201

Date  
12/31/2012

Scale  
1" = 80'

Drawn By  
EB

Submission Date






Figure No.  
13

Sheet 13 of 19





LEGEND:

- |  |   |
|--|---|
|               | SITE BOUNDARY   |
|               | BUILDING OUTLINE                                      |
| <br>ACME-MW-1 | RI SHALLOW GROUNDWATER MONITORING WELL LOCATION       |
| <br>DEC-005   | EXISTING SHALLOW GROUNDWATER MONITORING WELL LOCATION |
|               | PCE ISOCONCENTRATION CONTOUR ( $\mu\text{g/l}$ )      |

NOTES:

1. BASE MAP OBTAINED FROM THE NYCCityMap WEBSITE (<http://gis.nyc.gov/doitt/nycitymap/>).
2. THE REMEDIAL INVESTIGATION (RI) WAS CONDUCTED BY LANGAN BETWEEN SEPTEMBER AND DECEMBER 2012.
3. PCE = TETRACHLOROETHYLENE
4.  $\mu\text{g/l}$  = MICROGRAMS PER LITER
5. PCE CONCENTRATION AT EACH SHALLOW MONITORING WELL IS INDICATED IN PARENTHESIS.
6. ND = NOT DETECTED



WARNING: I IS A L A N E NYS  
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N L E S S I S A I N I N E E E E E N A  
L I E N S E P O E S S I O N A L E N I N E E , A L E I S  
I E I N A N Y A Y .

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FORMER ACME  
STEEL/METAL WORKS

**NYSDEC SITE No. 224131  
95 LOMBARDY STREET/  
46 ANTHONY STREET**

## BROOKLYN

NEW YORK

Figure Title

# SHALLOW OVERBURDEN GROUNDWATER PCE ISOCONCENTRATION MAP

Project No.	170157201
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Date  
01/09/2013

Scale  
1" = 40'

Drawn By EB

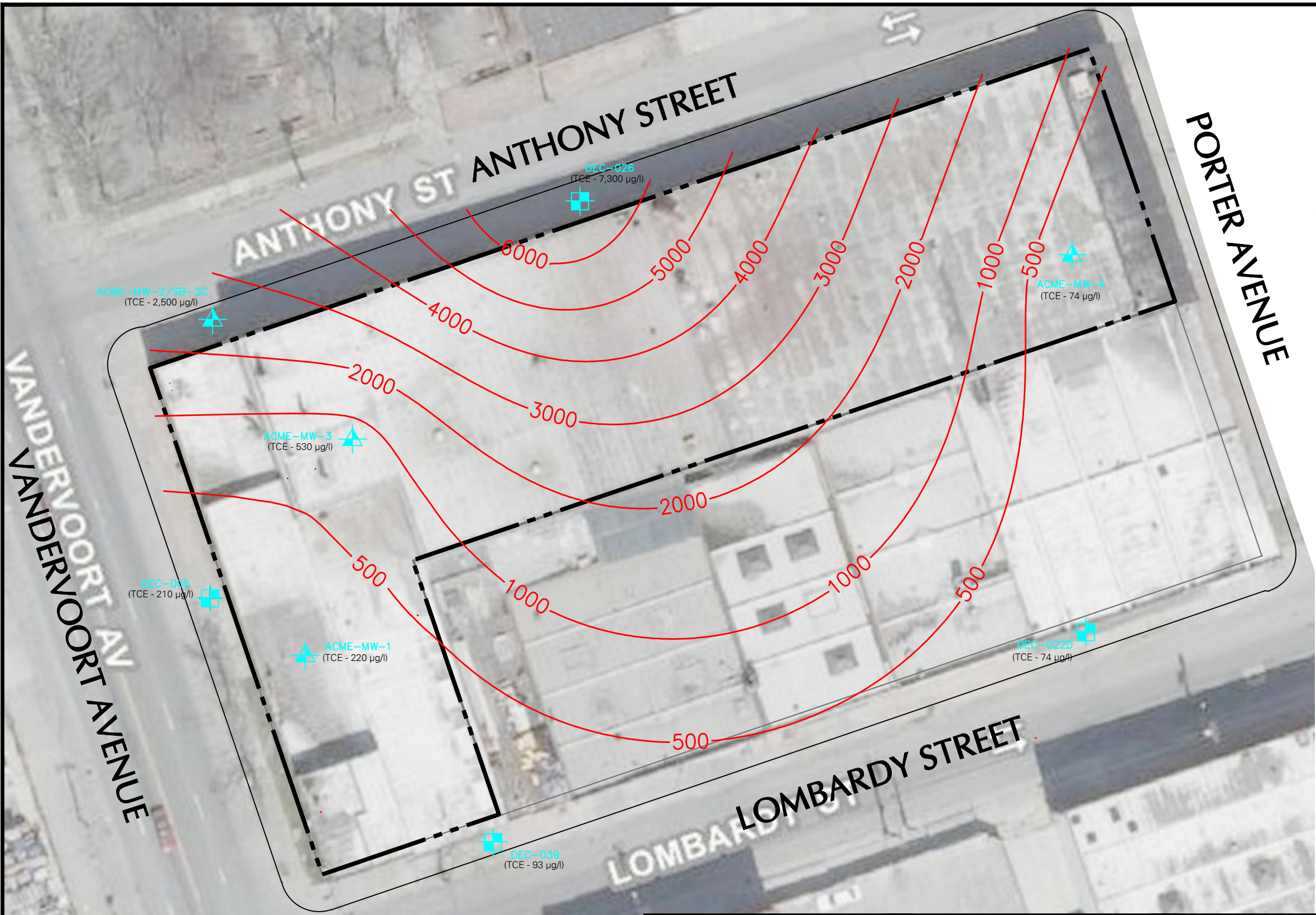
Submission Date
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Figure No.

14

Sheet 14 of 19





LEGEND:

--- SITE BOUNDARY



— BUILDING OUTLINE

ACME-MW-1 RI SHALLOW GROUNDWATER MONITORING WELL LOCATION

DEC-005 EXISTING SHALLOW GROUNDWATER MONITORING WELL LOCATION

1000 TCE ISOCONCENTRATION CONTOUR (µg/l)

- NOTES:
1. BASE MAP OBTAINED FROM THE NYCITYMAP WEBSITE (<http://gis.nyc.gov/doit/nycitymap/>).
  2. THE REMEDIAL INVESTIGATION (RI) WAS CONDUCTED BY LANGAN BETWEEN SEPTEMBER AND DECEMBER 2012.
  3. TCE = TRICHLOROETHYLENE
  4. µg/l = MICROGRAMS PER LITER
  5. TCE CONCENTRATION AT EACH SHALLOW MONITORING WELL IS INDICATED IN PARENTHESIS.



SCALE IN FEET

**LANGAN**

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Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C.  
Langan International LLC

Collectively known as Langan

Project

**FORMER ACME STEEL/METAL WORKS**

NYSDEC SITE No. 224131  
95 LOMBARDY STREET/  
46 ANTHONY STREET

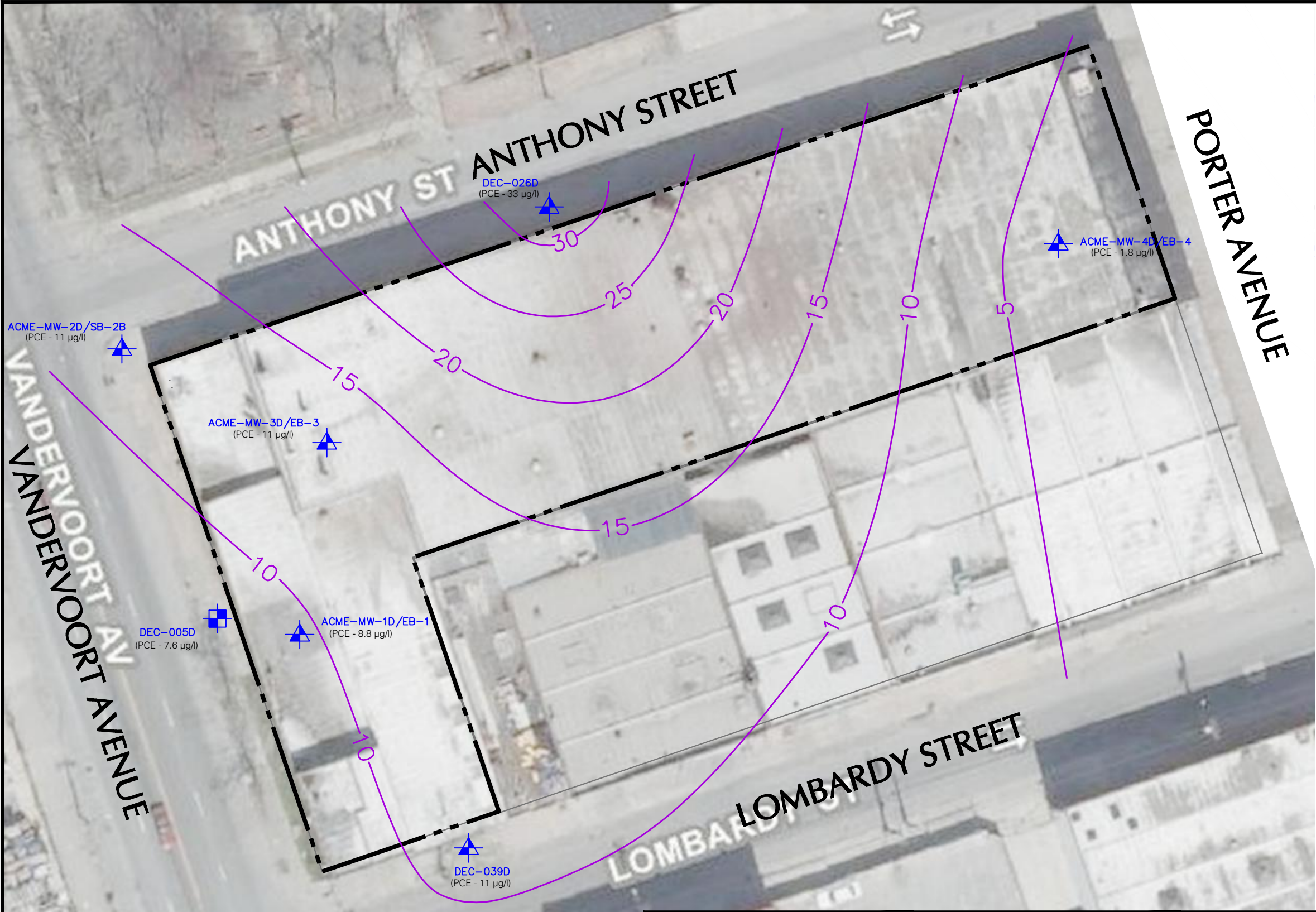
**BROOKLYN NEW YORK**

Figure Title

**SHALLOW OVERBURDEN GROUNDWATER TCE ISOCONCENTRATION MAP**

Project No. 170157201	Figure No.  <b>15</b>
Date 01/10/2013	
Scale 1" = 40'	
Drawn By EB	
Submission Date	Sheet 15 of 19





LEGEND:

--- SITE BOUNDARY

— BUILDING OUTLINE

ACME-MW-1D/EB-1 RI SOIL BORING AND DEEP GROUNDWATER MONITORING WELL LOCATION

DEC-005D EXISTING DEEP GROUNDWATER MONITORING WELL LOCATION

—15— PCE ISOCONCENTRATION CONTOUR (µg/l)

NOTES:

1. BASE MAP OBTAINED FROM THE NYCITYMAP WEBSITE (<http://gis.nyc.gov/doitt/nycitymap/>).
2. THE REMEDIAL INVESTIGATION (RI) WAS CONDUCTED BY LANGAN BETWEEN SEPTEMBER AND DECEMBER 2012.
3. PCE = TETRACHLOROETHYLENE
4. µg/l = MICROGRAMS PER LITER
5. PCE CONCENTRATION AT EACH DEEP MONITORING WELL IS INDICATED IN PARENTHESIS.

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BROOKLYN NEW YORK

Figure Title

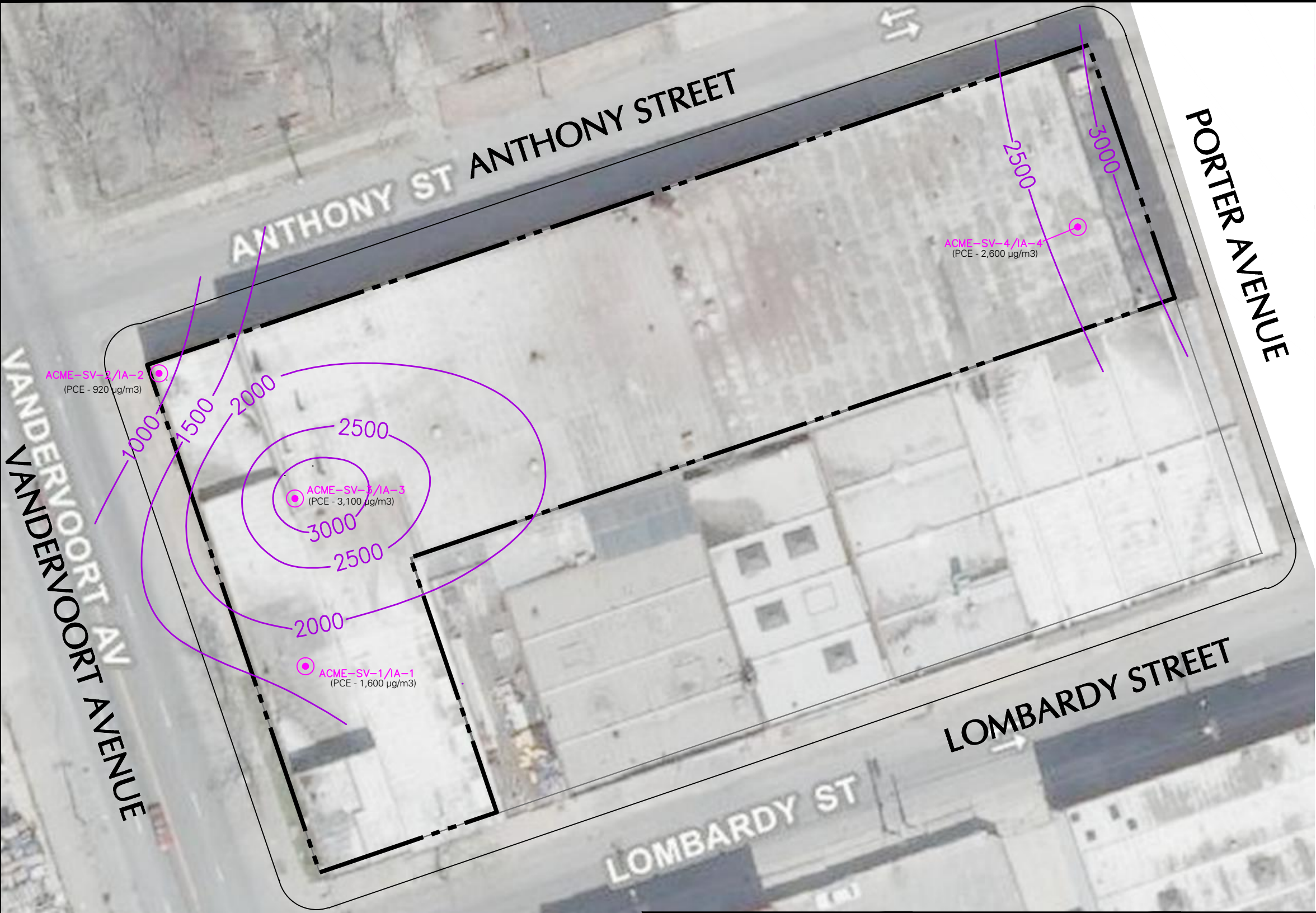
**DEEP OVERBURDEN  
GROUNDWATER  
PCE ISOCONCENTRATION  
MAP**

Project No. 170157201	Figure No.  <b>16</b>
Date 01/10/2013	
Scale 1" = 40'	
Drawn By EB	
Submission Date	Sheet 16 of 19









LEGEND:

--- SITE BOUNDARY

— BUILDING OUTLINE

ACME-SV-2/IA-2 RI SOIL VAPOR AND INDOOR AIR SAMPLING COUPLET LOCATION

—2500— PCE ISOCONCENTRATION CONTOUR (µg/m3)

- NOTES:
1. BASE MAP OBTAINED FROM THE NYCITYMAP WEBSITE (<http://gis.nyc.gov/doitt/nycitymap/>).
  2. THE REMEDIAL INVESTIGATION (RI) WAS CONDUCTED BY LANGAN BETWEEN SEPTEMBER AND DECEMBER 2012.
  3. PCE = TETRACHLOROETHYLENE
  4. µg/m3 = MICROGRAMS PER CUBIC METER
  5. PCE CONCENTRATION AT EACH SUB-SLAB VAPOR POINT IS INDICATED IN PARENTHESIS.

SCALE IN FEET

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BROOKLYN NEW YORK

Figure Title

**SOIL VAPOR PCE ISOCONCENTRATION MAP**

Project No.  
170157201

Date  
01/18/2013

Scale  
1" = 40'

Drawn By  
EB

Submission Date

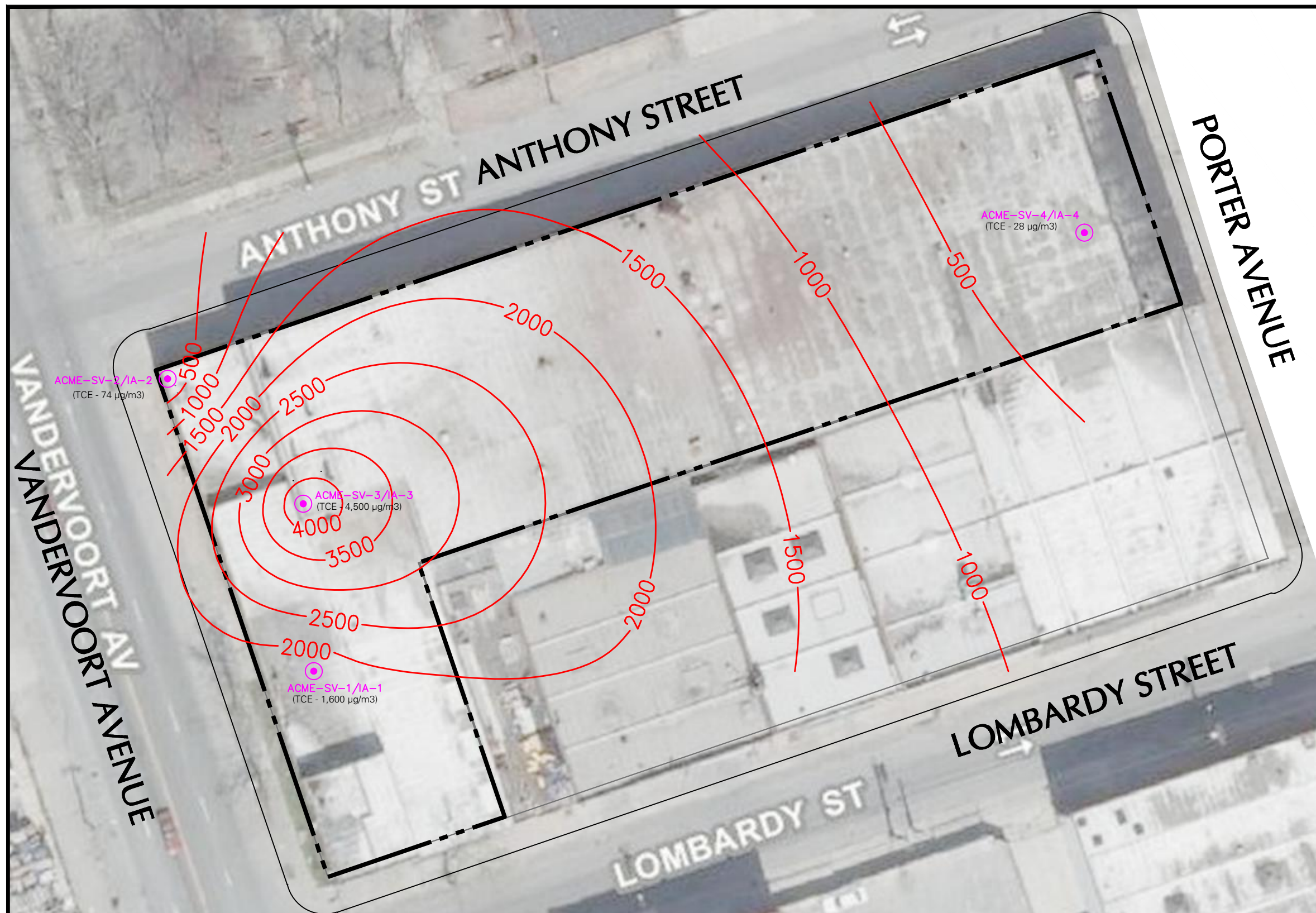
Figure No.

**18**


Sheet 18 of 19

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LEGEND:

- 
- SITE BOUNDARY
  - BUILDING OUTLINE
  - ACME-SV-2/1A-2  
RI SOIL VAPOR AND INDOOR AIR SAMPLING  
COUPLET LOCATION
  - 2500  
TCE ISOCONCENTRATION CONTOUR (µg/m3)

NOTES:

1. BASE MAP OBTAINED FROM THE NYC CityMap WEBSITE (<http://gis.nyc.gov/doitt/nycitymap/>).
2. THE REMEDIAL INVESTIGATION (RI) WAS CONDUCTED BY LANGAN BETWEEN SEPTEMBER AND DECEMBER 2012.
3. TCE = TRICHLOROETHYLENE
4.  $\mu\text{g}/\text{m}^3$  = MICROGRAMS PER CUBIC METER
5. TCE CONCENTRATION AT EACH SUB-SLAB SOIL VAPOR POINT IS INDICATED IN PARENTHESIS.



WARNING: I IS A L A N E NYS  
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Project	Start Date	End Date	Status	Manager	Budget	Actual Cost	Progress (%)	Risk Level	Notes
Project A	2023-01-15	2023-03-31	Completed	John Doe	\$120,000	\$118,500	100	Low	Exceeded budget by \$1,500.
Project B	2023-02-01	2023-05-15	In Progress	Jane Smith	\$85,000	\$72,000	85	Medium	Minor delays in procurement.
Project C	2023-03-10	2023-06-30	On Hold	Mike Johnson	\$200,000	\$0	0	High	Waiting for client approval.
Project D	2023-04-01	2023-07-31	Planned	Sarah Lee	\$95,000	\$0	0	Medium	Initial planning phase.
Project E	2023-05-01	2023-08-31	On Hold	David Kim	\$150,000	\$0	0	Low	Resource allocation pending.

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**NYSDEC SITE No. 224131  
95 LOMBARDY STREET/  
46 ANTHONY STREET**

## BROOKLYN

NEW YORK

Figure Title

## SOIL VAPOR TCE ISOCONCENTRATION MAP

Project No.	170157201
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Date  
01/18/2013

Scale  
1" = 40'

Drawn By  
EB

Submission Date

Figure No.

19

Sheet 19 of 19