# SUPPLEMENTAL REMEDIAL INVESTIGATION REPORT FOR ATLAS PARK SITE – PARCEL B GLENDALE, QUEENS

## NYSDEC BCP Site No. C241088

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# 1.0 INTRODUCTION

This Final Supplemental Remedial Investigation Report (SRI Report) presents the results of various supplemental remedial investigation (RI) activities initiated during the summer of 2005 through August 2006 on Parcel B of The Shops at Atlas Park development site in Glendale, Queens, New York (the "Site"). This report serves as a companion document and a supplement to an initial remedial investigation conducted in 2004 at the Site and documented in a Remedial Investigation Report issued in January 2005, and finalizes the draft version of this report issued in March 2006, which was subject to a 30-day public notice comment period. The January 2005 RI Report identified certain areas of the Site with semi-volatile organic compounds (SVOCs) and metals present in soil above New York State soil cleanup objectives, volatile organic compounds (VOCs) present in soil vapor, and VOCs present in groundwater above the New York State Department of Environmental Conservation's (NYSDEC's) Ambient Water Quality Standards and Guidance Values (hereafter referred to as NYSDEC SGVs).

The SRI activities were conducted pursuant to an SRI Work Plan, dated July 2005, and a letter addendum to the SRI Work Plan, dated August 15, 2005, both of which were approved by the NYSDEC and New York State Department of Health (NYSDOH) on September 19, 2005. The SRI was expanded as field data became available during implementation of the SRI, at the request of NYSDEC and NYSDOH.

This SRI Report also describes the implementation of various Interim Remedial Measure (IRM) work plans and other intrusive activities conducted concurrent with the SRI that were associated with the early stages of Site renovation on Parcel B. IRM work plans and correspondence were submitted to NYSDEC and NYSDOH to inform the agencies about the planned work, and comments were provided by the agencies on the IRM work plans. NYSDEC and NYSDOH were periodically informed of environmental conditions discovered during these activities.

In all, during the implementation of the RI and SRI activities at the Parcel B site, 102 soil borings were installed, including the collection and analysis of more than 243 soil samples, and over 94 soil vapor probe samples. A combined total of sixteen groundwater monitoring wells (twelve on-site and four off-site) were installed during the RI and SRI. An additional off-site

"sentinel" well (OSW-5) will be installed and sampled in the very near future. The results from this well will be provided to NYSDEC and NYSDOH in an addendum to this SRI. Sentinel well OSW-5 will be incporporated into the existing off-site monitoring well network (OSW- 1 through 4) to monitor off-site groundwater quality.

## 1.1 PROGRAM BACKGROUND

Atlas Park, LLC (hereafter referred to as the Developer) entered into a Brownfield Cleanup Agreement (BCA) Index No. W2-0984-04-02, Site No. C241045 with the NYSDEC on March 5, 2004. This BCA required the Developer, as a "Participant", to investigate and remediate contaminated soil and groundwater at a 12-acre portion of the former Atlas Terminals industrial park, which is located in Glendale, Queens County, New York (see Figures 1 through 3). A new, mixed-use project, The Shops at Atlas Park, was proposed for the 12-acre parcel. When completed, The Shops at Atlas Park will include nearly 400,000 square feet of shopping, entertainment, dining, and office space.

The BCA originally covered the entire 12-acre parcel. However, the 12-acre parcel was formally separated into two distinct areas: Parcel A (formerly known as the "IRM Area"), which was fully excavated, and Parcel B (formerly known as the "RI Area"), where pre-existing buildings were preserved and renovated. The IRM Area and RI Area are shown on Figure 2. Parcel A consists of an 8.474-acre portion of the 12-acre parcel, and Parcel B (which is the subject of this report and is hereafter referred to as the "Site") consists of the remaining 3.531-acre portion of the 12-acre parcel. With concurrence from NYSDEC during a meeting on April 18, 2005, the Developer subsequently completed the administrative process of separating Parcels A and B into separate BCAs.

The original BCA was amended to reflect the IRM Area as Parcel A, and the RI Area as Parcel B. The Amendment clarifies that the original BCA now relates to Parcel A exclusively. As of the date of execution, Parcel B is subject to a new BCA Index No. W2-1070-05-06 Site No. C241088. Parcel A was fully remediated to Track 1 cleanup levels and received a Certificate of Completion from NYSDEC on December 31, 2005.

## 1.2 INITIAL WORK PLANS

In January 2004, an IRM Work Plan for Parcel A, and a Remedial Investigation Work Plan (RI Work Plan) for the entire 12-acre property (Parcels A and B), were prepared by Langan Engineering & Environmental Services, P.C. (Langan), on behalf of the Developer, and were submitted to NYSDEC and the NYSDOH. The Work Plans were approved by NYSDEC and NYSDOH on June 10, 2004. The objectives and significant findings of the activities conducted under these Work Plans are summarized below.

### 1.2.1 Initial Remedial Investigation

The RI Work Plan addressed remedial investigation activities conducted predominantly on Parcel B, as well as a site-wide groundwater investigation of the entire 12-acre property. The initial RI was conducted during the summer and fall of 2004 in accordance with the RI Work Plan and concurrent with implementation of the IRM on Parcel A. The initial RI field investigation performed on the portion of the Atlas Park Site that became Parcel B, included the collection of 38 soil samples from 20 borings, four (4) groundwater samples, and seven (7) soil vapor samples. On Parcel A, the RI work was limited to installation and sampling of two upgradient groundwater monitoring wells and one cross-gradient monitoring well.

The initial RI did not reveal any significant source areas in soil or groundwater, but did reveal elevated concentrations of VOCs in soil vapor (most notably trichloroethene (TCE) and tetrachloroethene (PCE)) under Building 8 (former Building 1) and the southern half of Building 3 (former northern half of Building 28) from samples taken approximately 5-6' below the sub slab of these buildings.

In summary, this initial RI confirmed historic fill was present under the buildings, which contained similar contaminants to those revealed in the fill on Parcel A. Since the pre-existing buildings would remain on Parcel B subject to engineering controls, little to no remediation in the form of excavation was anticipated as necessary on Parcel B based on these initial RI results. Nevertheless, the need for vapor mitigation systems was subsequently confirmed as necessary for Buildings 3 and 8 based on detectable concentrations of TCE and PCE in the subsurface during not only this initial round of sampling 3' below the slab, but also during

subsequent sampling conducted at a depth of 6" immediately below the slab, which revealed higher levels of vapor than the deeper sub slab samples.

A Remedial Investigation Report (RI Report) was submitted to NYSDEC and NYSDOH on 19 January 2005 following completion of the initial RI. This report was prepared before the Atlas Park Site was formally separated into Parcels A and B; thus, the report addresses both parcels including site-wide groundwater conditions. The NYSDEC and NYSDOH provided verbal comments on the RI Report at a meeting held on 16 June 2005 at NYSDEC offices in Long Island City, NY, and thereafter issued written comments on July 7, 2005. Modifications to the scope of work to address these comments were described in the August 18, 2005 Addendum #1 to the Work Plan for Supplemental Remediation Investigation. A draft version of this report was issued in March 2006. At a meeting held in May 2006 with NYSDEC and NYSDOH, a request for an off-site groundwater investigation to further delineate off-site groundwater conditions was requested by the the agencies to finalize the nature and extent of investigation of the Site. The results of this off-site groundwater investigation confirmed a minor off-site migration of the plume extending from the delineated source area identified in the southeastern corner of Buidling 3. These results led the agencies to request three additional rounds of off-site soil vapor investigations. The results of all on- and off-site investigation activities are further described in this SRI.

### 1.2.2 Parcel A Interim Remedial Measure (IRM)

The IRM Work Plan addressed the remedial activities, planned excavation, and major earthwork on Parcel A for remediation to Track 1 standards. Although no VOC source areas were discovered on Parcel A during the remediation, in April 2005 near the conclusion of the IRM, NYSDEC and NYSDOH requested that soil vapor probes be installed beneath the footprints of the planned basements of two future occupied buildings on Parcel A; notably Buildings 4 and 6. Two probes were installed beneath the footprint of the future Building 4 basement, and three probes were installed beneath the footprint of the future Building 6. Despite the fact that no VOC source was identified on Parcel A, elevated concentrations of TCE and PCE were detected under these planned buildings.

Given there was no evidence of a source of TCE or PCE on Parcel A based on the soil, groundwater, and prior soil vapor sampling data collected on Parcel A, the NYSDEC and NYSDOH agreed that these soil vapors were the result of migration of vapors from one or more source(s) located on Parcel B that were not discovered during the initial RI.

### 1.3 PARCEL B IRMs

Several IRMs were performed on Parcel B, which are also described in this SRI Report. Two known underground storage tank (USTs) were removed in February-March 2005 after it was determined that these tanks were no longer necessary. These tanks were previously identified as an Area of Concern (AOC) in the RI Work Plan and initial RI Report. One new AOC involving process tanks and vaults containing glue-like material was discovered during trenching activity in Building 7. This work was performed simultaneous with the Parcel A IRM work, but before the vapor exceedances were discovered beneath the basement footprints of Buildings 4 and 6 on Parcel A. IRM letter work plans and correspondence were submitted to NYSDEC and NYSDOH to inform the agencies about this planned IRM work. The agencies provided comments on these plans and correspondence. The NYSDEC and NYSDOH were initially informed of the start of the UST removal activities through letter documentation dated January 7, 2005. Subsequently, NYSDEC and NYSDOH were periodically informed of environmental conditions discovered during these IRM activities. This IRM work is described in Section 5.0 of the SRI.

### 1.4 INTRUSIVE SITE RENOVATION WORK AND INVESTIGATION

Certain intrusive work was performed on Parcel B, described herein, that was necessary to continue the process of site renovation. In all instances, investigation of subsurface conditions was performed in conjunction with these intrusive site activities. This work was communicated to the NYSDEC and NYSDOH verbally and through daily emails and other electronic mail communications. In 2005, an addition to the south side of Building 8 was constructed to house new Con Edison transformers and associated equipment to serve the development (see Section 5.5). In October 2005, a concrete vault was cleaned and removed to make way for

new Con Edison Service (see Section 5.3), and in February 2006 a transformer and associated structure were removed (see Section 5.6). From the end of January 2006 through March 2006, excavation for new building footings was completed for the extension of the south half of Building 3 (the northern half of former Building 28) which has allowed investigation of suspected source areas of PCE and TCE vapors present beneath the existing portion of this building (see Section 4.4.1).

## 1.5 SUPPLEMENTAL REMEDIAL INVESTIGATION

An SRI Work Plan was prepared by Langan and submitted to NYSDEC on July 1, 2005. A letter addendum to the SRI Work Plan was submitted on August 15, 2005, in response to comments provided by the NYSDEC and NYSDOH on the SRI Work Plan. The primary objective of the SRI Work Plan was to delineate the nature and extent of VOCs in soil and soil vapor beneath certain buildings and one adjoining outdoor area on Parcel B. The SRI was expanded as field data became available during implementation of the SRI, and following progress meetings held between the NYSDEC, NYSDOH, Langan and the Developer in November and December, 2005, and January, 2006, subsequent to review of raw data result summaries.

## 1.6 ORGANIZATION OF THE SRI REPORT

This Supplemental RI Report (SRI Report) for Parcel B presents the following:

- findings of the SRI initiated by Langan in October 2005,
- findings of additional work requested by NYSDEC and NYSDOH based on the first and second round of SRI data results,
- findings of the IRMs and other intrusive activities associated with the early Site renovation phase,
- findings of a qualitative exposure assessment,
- conclusions based on all of the data gathered on the Parcel B Site including the initial RI results, and

- Presentation of a unified conceptual model regarding the nature and extent of contamination based on all of the Parcel B investigation and IRM activities conducted to date.

This SRI Report is organized as follows:

- Section 1.0 presents the project background including the various work plans prepared covering the remedial investigation activities documented in the January 2005 RI Report and in this SRI Report.
- Section 2.0 presents Site background information including a description of the Site boundaries, surrounding properties, a summary of the initial RI scope and findings, and a summary of the known and newly-discovered AOCs that were investigated as part of the SRI.
- Section 3.0 presents the SRI scope of work and objectives.
- Section 4.0 presents the SRI field investigation and sample analytical procedures used.
- Section 5.0 discusses the Parcel B IRM activities that were conducted during the early stages of the Site renovation and independent of the SRI activities.
- Section 6.0 presents the nature and extent of contamination at the Site in soil vapor (VOCs), soil (VOCs and lead), and groundwater (VOCs) as documented through the SRI field investigation and analysis of environmental samples.
- Section 7.0 presents a qualitative exposure assessment.
- Section 8.0 presents conclusions and recommendations based on the SRI findings.

The reader is referred to the January 2005 RI Report submitted under separate cover for additional background information, such as the physical characteristics of the study area and Site, and a detailed description of the initial RI findings.

In summary, Parcel B was occupied by three large manufacturing buildings; Buildings 1, 28 and 37. A small building, Building 29, was also present and remains on the Site, but will not be part of the occupied retail center. It will serve as a maintenance building. A small Building 7/7A was also present, and it housed the boiler and associated equipment. This building and the associated boiler stack have been demolished. Unlike Parcel A, on which all historic industrial

buildings were removed, on Parcel B historic industrial Buildings 1, 28, and 37 remain on the Site and were renovated to preserve the former industrial history of the Site. Building 28 was cut in half into two buildings (Building 7 is the southern half of former Building 28 and Building 3 is the northern half of former Building 28, and former Building 37). The table below relates the new building numbers designated for the renovation project. The original building numbers were used in the January 2005 RI Report, and other previously issued Brownfield Cleanup Program (BCP) documents. The building locations and former and new numbers are also shown on the figures.

| New Building Number | Old Building Number |
|---|---|
| Building 3 | Building 37 and North Half of Building 28 |
| Building 7 | South Half of Building 28 |
| Building 8 | Building 1 |
| N/A | Building 7/7A Demolished |
| Building 29 | Building 29 |

Hereafter, the new building designations are generally used in this document. To facilitate the presentation and discussion of the RI activities conducted and documented in this SRI Report, the Site is presented as three separate areas as illustrated on Figures 4, 5, and 6 respectively, Building 8/Service Corridor, Building 7, and Building 3. Figure 3 is an index map showing the break out of the Site into these three areas.

# 2.0 SITE BACKGROUND

## 2.1 SITE DESCRIPTION

The Parcel B Site is a portion of the parcel identified as New York City Tax Block 3810 and Lot 350. The Site is bounded by 80th Street to the west, Cooper Avenue to the north, the Long Island Rail Road (LIRR) Right-of-Way to the south, and Parcel A to the east. Figure 1 consists of a Site Location Map and Figure 2 shows the Atlas Park property boundary and existing, former, and future buildings.

The Site contains Buildings 3, 7, 8 and 29. All of these buildings will be renovated. Building 3 and Building 7 are separated by a strip of land that lies within the Parcel A boundaries.

The original RI Area/Parcel B boundary was modified to its final configuration as documented in the metes and bounds description. In all, there are three areas that were added to Parcel B from Parcel A, and two areas were removed from Parcel B and incorporated into Parcel A (see metes and bounds description in the BCA).

The three areas originally included within Parcel A that were incorporated into Parcel B include: (1) the far southwest corner of the Site where extensive excavation was anticipated for a storm water detention basin but was subsequently eliminated from the design, (2) the alleyway between Buildings 7 and 8 was remediated to Track 1 cleanup objectives as part of the Parcel A IRM, but was then transferred into Parcel B because the area was needed to temporarily stockpile some historic fill to free up space on the site, and (3) the water storage tank footprint was originally included in the Parcel A boundary but was transferred into Parcel B because historic fill could not be removed from beneath this area to achieve the Track 1 cleanup being implemented on Parcel A.

The two areas that were removed from Parcel B and incorporated into Parcel A include: (1) a strip of property off the southeast corner of Parcel A, and (2) the old Building 15 footprint, which was originally anticipated to remain as an intact building but was subsequently demolished. Both of these areas were remediated to Track 1 cleanup objectives as part of the Parcel A IRM. The boundaries maps for Parcel A and Parcel B attached to the BCAs for each site accurately reflect these minor boundary adjustments distinguishing Parcels A and B.

## 2.2 ADJOINING PROPERTY DESCRIPTION

The areas surrounding Atlas Park are zoned mixed residential and manufacturing. Atlas Park is located directly south of St. John's Cemetery. The area west of the Site, across 80th Street is predominantly zoned for light manufacturing, with some private residences. Approximately 1,200 feet west of the Site is the Kliegman Brothers New York State Superfund Site. South of the Site is the LIRR easement; the areas immediately south of the LIRR easement are primarily residential. There are also five documented spill sites immediately west and northwest of the site. The portion of the Shops at Atlas Park located on Parcel A lies to the east; the area further to the east consists of commercial and manufacturing properties that are part of the Atlas Terminals industrial park.

## 2.3 SITE HISTORY AND USE

The former historical commercial and light industrial uses for the entire, 20-acre Atlas Terminals property were presented in a Phase I Environmental Site Assessment (ESA), completed by Ambient Group, Inc. (Ambient) in March 2001. In early 2002, a Phase II Environmental Site Investigation (ESI) was conducted by Metcalf & Eddy across the entire Atlas Terminals property, and a Phase II ESI Report was prepared. Both documents described the Site history and prior uses in detail, and were provided as attachments to the BCP Application submitted on December 11, 2003 to NYSDEC. The reader is referred to these documents for a detailed description of the Site history. Both documents are also provided in the official document repository for the project.

In April 2006, an additional, previously unknown historic use was discovered on the second floor of the south half of Building 3. This space was used by a company known as Manhattan Postcard for the manufacturing and assembly of novelties and the printing of postcards. Manhattan Postcard is believed to be the generator and the source of VOCs that resulted in the vapor exceedances and groundwater contamination found under Parcel B. This is further discussed in Section 2.6.4 of this report.

## 2.4 PREVIOUS INVESTIGATIONS BY OTHERS

Two investigations were completed at the Site prior to entry into the BCP: 1) Phase I ESA completed by Ambient in March 2001, and 2) Limited Phase II Investigation completed by Metcalf & Eddy in March 2002 (Phase II ESI). The findings of these investigations were used to identify on-Site AOCs on Parcel B. The pertinent findings of these two investigations relating to Parcel B are presented in the RI Report.

## 2.5 SUMMARY OF INITIAL REMEDIAL INVESTIGATION FINDINGS

The initial RI Work commenced after the January 2004 RI Work Plan was reviewed and approved by NYSDEC and NYSDOH in June 2004. The scope and findings of the January 2005 RI Report are summarized below.

### 2.5.1 Soil

Thirty-eight soil samples were collected from 20 soil boring locations during the initial RI. The sampling locations and findings are shown on Figures 4, 5, 6, 11, and 12, and the data are presented on Tables 5 through 10 of the January 2005 RI Report. The analytical findings are summarized as follows:

General Findings

- The historic fill is present throughout the Site, including under all of the existing buildings that will remain, and ranges in thickness from 6 to 15 feet.
- There were no exceedances of the NYSDEC Technical and Administrative Guidance Memorandum (TAGM) HWR-4046 Recommended Soil Cleanup Objectives (RSCOs) for VOCs, Polychlorinated Biphenyls (PCBs), pesticides, or herbicides in any samples.

Metals Findings

- TAGM exceedances occurred in the historic fill for the metals mercury, arsenic, barium, cadmium, copper, and lead.

SVOCs Findings

- TAGM exceedances occurred in the historic fill for individual SVOCs in 15 of the 38 samples, collected from 10 of the 20 borings locations. The exceedances occurred exclusively for the polynuclear aromatic hydrocarbon (PAH) suite of SVOCs.

### 2.5.2 Groundwater

Groundwater samples were collected from eight monitoring wells during the initial RI, four of which were located on or adjacent to Parcel B (MW-6, 16, 38 and 58; see Figure 7). The groundwater findings are presented on Figure 12 and Tables 17 through 21 of the January 2005 RI Report. The analytical findings of the initial RI investigation are summarized as follows:

- Two VOCs, TCE and PCE, were detected in Site upgradient and downgradient groundwater above the NYSDEC SGVs.
- TCE was higher in an upgradient well than the downgradient Site wells.
- PCE was highest in a downgradient well located west of Building 8.
- The source(s) of these VOC detections is unknown.
- There were no PCBs, pesticides, herbicides or SVOCs detected above the NYSDEC SGVs in any groundwater samples.
- The nearest public water supply wells are approximately 1.9 miles southeast and cross-gradient of the Site. Based on calculations using the RI data, the PCE and TCE in groundwater will attenuate to concentrations below the state standard (to undetected levels) well before it reaches these public water supply wells. (Note: Since issuance of the January 2005 RI Report it was confirmed with the New York City Department of Environmental Protection (NYCDEP) that there are no public drinking water supply wells located downgradient of the Site. The supply wells noted above are located cross-gradient of the Site (see Figure 8 of the RI Report).

Therefore, while low level TCE and PCE groundwater contamination was detected, its distribution suggested background contamination believed to be present in a number of locations throughout the Queens aquifer where industrial areas are present.

### 2.5.3 Soil Vapor

Ten soil vapor samples were collected during the initial RI, seven of which were located on Parcel B from probes installed 5-6' under sub slab foundations. The sampling locations and findings are shown on Figures 4 and 11, and the data are presented on Table 22 in the RI Report. The analytical findings are summarized as follows:

- VOCs, including TCE and PCE, were detected in the soil vapor samples under former Building 8 and the southhalf of Building 3.
- No VOCs were detected on field instruments during ambient air screening during the RI at any time within the buildings, suggesting that vapor intrusion is minimal, if occurring at all. However, some level of vapor mitigation was anticipated as a mitigation measure to address the elevated soil vapors.

### 2.5.4 Underground Storage Tanks (USTs)

Apparent petroleum impacts were noted in one of two soil borings conducted adjacent to two heating oil USTs formerly located in the southwest corner of the Site. Petroleum-like odors and photoionization detector (PID) readings were observed in soil between a depth of 11 to 23 feet. One SVOC TAGM exceedance, for chrysene, occurred in a soil sample collected from 19 to 23 feet below ground surface (bgs). Low levels of typical petroleum compounds (benzene, ethylbenzene, and xylenes) were also detected but below the TAGM RSCOs.

## 2.6 ON-SITE AREAS OF CONCERN

This section describes the AOCs on Parcel B identified in the RI Work Plan and investigated during the initial RI and/or the SRI. Several of these AOCs were addressed through IRMs concurrent with Site renovation, while other AOCs that were later discovered were addressed during ongoing intrusive work. The recently discovered AOCs included VOC contamination associated with a network of pipes under the south half of Building 3. These pipes were removed during SRI activities to further define and delineate potential source areas under the

pipes. Forty-one additional soil borings were installed under the former pipes once removed. The identified source area was discovered in an area where the pipe cracked. This pipe was connected to a vertical pipe that extended down from the facility of a former tenant – Manhattan Postcard - that was located on the second floor of Building 3. The associated VOC contamination will be addressed as part of the Remedial Action for Parcel B.

AOCs identified below by number, i.e. "AOC-#," were those previously identified and described in the RI Work Plan and the January 2005 RI Report.

### 2.6.1 Parcel B AOCs Addressed Through IRMs

Underground Heating Oil Storage Tanks (AOC-1C)

Two registered, 10,000 gallon capacity heating oil USTs were formerly located between Buildings 8 and 29**.** These tanks were decommissioned and removed in February and March 2005. Petroleum-impacted soil uncovered beneath the tanks was removed to the extent possible and disposed appropriately at a permitted, off-site facility. Further details regarding this work are provided in Section 5.1.

A report was prepared and submitted to NYSDEC for closure of the spill under the NYSDEC spills program. A copy of the previously submitted closure report is provided in Appendix A. NYSDEC has previously indicated that this spill will be closed out by the Department.

Chemical Storage Areas in Building 7 (AOC-6H)

During trenching activities associated with Site renovation, previously unidentified underground tanks and vaults were discovered beneath the building slab. The tanks and vaults may have been associated with former historic glue and adhesive chemical operations that occurred in Building 7. These structures contained process residues that may have been associated with these former operations. Interstate Cardboard Corp. was a cardboard box manufacturer that occupied the first floor of this Building for approximately 50 years, and apparently used these tanks to store glue for their cardboard box operations. The tanks and vaults were not discovered during the RI, but discovered during trenching. Pursuant to an IRM letter work plan, which described the discovery of these structures during trenching, the tanks and vaults were evacuated, and either removed or abandoned in place, and otherwise closed out in accordance

with a work plan submitted to NYSDEC, DER-10 requirements, and other NYSDEC UST regulations (see Section 5.2). A UST Closure Report has been prepared and submitted to NYSDEC for closure under the NYSDEC UST program, and is attached in Appendix J.

### 2.6.2 Parcel B AOCs Investigated During the Initial RI and SRI

Historical Building Uses (AOC-7)

Within Building 8, miscellaneous businesses operated over the years including the Chocolate & Paint Machinery Co., the Triangle Cable Co., Amity Dyeing and Finishing, Glendale Steel, and Eureka Oil. Potential impacts from these former operations, which may have involved storage, use, handling or disposal of petroleum or hazardous substances, were previously investigated during the initial RI and during the SRI through an extensive soil vapor and soil sampling program (see January 2005 RI Report and Sections 4.2, 4.3, and 6.3 of this SRI Report). No source areas of soil contamination were discovered under Building 8 despite the presence of soil vapor results that require mitigation (see Section 6.5).

Historic Fill (AOC-9)

The historic fill AOC was identified during the RI. However, during the IRM on adjacent Parcel A, a layer of lead-impacted soil (hazardous in some instances) was encountered within the historic fill, and was removed up to the western boundary with Parcel B in the vicinity of Building 7. The layer was projected to extend beneath the southeast side of Building 7 under that portion of Parcel B (see Figure 5). The areal extent of this material beneath Building 7 was fully delineated during the SRI through a Geoprobe soil sampling program (see Sections 4.4 and 6.4).

### 2.6.3 Parcel B AOCs Removed During Intrusive Work and as Required for Investigation

Transformer (AOC-3A)

A Con Edison-owned transformer was formerly located on a concrete pad adjacent to a brick and wood shed south of Building 8, along the south property boundary. The transformer was removed by Con Edison on January 18, 2006. Samples of the concrete pad and adjacent and

underlying soils were collected and tested for the TCL/TAL parameters, including PCBs (see Section 5.6).

Concrete Vault in Southwest Corner of Site

While trenching to bring in new Con Edison electrical service in September 2005, a concrete vault was discovered in the southwest corner of the Site that contained materials consisting of white and gray, clay-like material and exhibiting odors and elevated PID readings. The material was entirely excavated from the vault, characterized, and disposed at a permitted disposal facility. The concrete vault walls were also removed and disposed as a regulated waste. The vault floor was lifted and the exposed soils were inspected, screened, and two soil samples were collected from beneath the slab. There was no evidence of contamination in the exposed soils on the sidewalls or below the slab nor were there any exceedances of the TAGM criteria in either soil sample (see Section 5.3)

Building 3 Piping Network

On November 10, 2005, during Geoprobe soil sampling, a 2-foot by 2-foot concrete drain structure was discovered in the southwest corner of the existing portion of Building 3. Initial observations and PID readings did not indicate the presence of VOCs within the structure. A Geoprobe soil boring was advanced into the center of the drain resulting in the discovery of a grey/black glue-like substance mixed with soil at a depth of 2.5 feet. The material yielded highly elevated PID readings. Two soil samples were collected with the shallow sample yielding high concentrations of numerous VOCs. The structure was removed to investigate its horizontal and vertical extent. Two pipes were identified running east and south from the drain.

Further investigation triggered by the drain discovery included a GPR survey that located a sub-slab pipe network under Building 3. This network was investigated, all piping removed, and 41 sub-pipe soil samples were collected for VOC analyses under the former pipe network in an attempt to discover a source of the VOC contamination. (see Section 4.4.1).

### 2.6.4 Recently Identified Historic Use: South Half of Building 3

In April 2006, a previously unknown historic use was identified on the second floor of the south half of Building 3. This space was used by a company known as Manhattan Postcard for the

manufacturing and assembly of novelties and the printing of postcards. A number of slop sinks and piping networks were identified from the second floor tenant's space leading down to the first floor of Building 3, into the piping network discussed in Section 2.6.3. This piping network combined with the roof-drain system that lead out into the combined city sewer system. It is suspected that the former tenant used glues and solvents in the manufacturing and assembly process of their products. The piping network was the likely source of the PCE and TCE contamination encountered in the groundwater at the Site. Notably, the highest detected PCE concentrations in the soil were discovered directly below a cracked pipe in the piping network. The investigation of the piping network is further described in Section 4.4.1.

## 2.7 OFF-SITE AREAS OF CONCERN

The Kliegman Brothers New York State Superfund Site, located approximately 1,200 feet west of the Parcel B Site, was identified as a significant PCE-impacted site with documented PCE contamination of soil, soil vapor, and groundwater and other chlorinated hydrocarbons. The Kliegman Brothers operated a solvent distribution business, and significant quanitites of solvent were stored and subsequently spilled on their site. This site was added to the state registry in 2001. The Kliegman Brothers New York State Superfund Site was declared a significant threat site by NYSDEC based on off-site migration of PCE and other chlorinated hydrocarbons that caused groundwater impacts and vapor intrusion into nearby residences. While the plume direction documented by the ongoing Remedial Investigation of the Kliegman Brothers site does not reveal that the off-site plume has any direct impact on Parcel B, the off-site vapor study into the adjacent neighborhood has not yet been completed. Therefore, the extent of the vapor plume emanating from that site has not been fully delineated.

In addition to the Kliegman Brothers Site, there are a number of potentially significant, former petroleum spill sites and/or abandoned gasoline stations in close proximity to the Site. There are two abandoned gasoline stations near the site: the first, which is a spill site (Spill No. identified as C&M Auto Center, is situated across Cooper Avenue to the northwest of the Site at 79-59 Cooper Avenue. The second abandoned gasoline station with no documented spills is located to the east on Cooper Avenue at the southwest corner of Metropolitan and Cooper Avenues. In addition, there are several other spills sites located to the west along Copper

Avenue. One spill site, identified as Old Gas Station, is situated across 80th Street to the west of the Site at 79-59 Cooper Avenue. Another spill site identified as Hansel and Gretel is also situated across 80th Street at 79-39 Cooper Avenue just west of the Old Gas Station. Furthermore, there are a number of potential brownfield sites are also located west of the site along Cooper and to the north of the Kliegman Brothers New York State Superfund Site.

At the request of NYSDEC, Langan evaluated historical Sanborn maps for potential PCE/TCE source areas on Parcels A and B, and in the surrounding neighborhoods and industrial/commercial areas beyond the limits of Parcels A and B. In all, approximately 150 historical Sanborn maps were reviewed and evaluated from the period of time of 1902 to 1996. Identified potential areas of environmental concern were presented on a series of maps. The maps were submitted to NYSDEC and NYSDOH on September 26 2005. A former dry cleaning establishment was located just southwest of Building 8 on the west side of 80th Street less than 200 feet from the Site and east of the Kliegman Brothers New York State Superfund Site. Therefore, there are multiple potential off-site contributors to area-wide VOC contamination in groundwater and VOC vapor exceedances.

## 3.0 SRI SCOPE OF WORK AND OBJECTIVES

The objectives of the SRI as defined in the July 2005 SRI Work Plan, and summarized below and in Table 1 were to:

1) Characterize the nature and extent of chlorinated VOCs, specifically PCE, TCE, and their degradation products, in soil vapor and soil beneath Building 8 and beneath the south half of Building 3 based on the initial RI results;

2) Evaluate whether there is an on-Site source (or sources) of chlorinated VOCs;

3) Evaluate the potential for off-site soil vapor migration;

4) Further characterize and delineate the extent of chlorinated VOCs in groundwater; and

5) Delineate the extent of lead-impacted soil believed to extend beneath Building 7 that might be associated with the lead-impacted soil removed during the IRM conducted on Parcel A.

The scope of the SRI soil and soil vapor sampling programs was expanded significantly after November 2005 as the field efforts proceeded, and data became available suggesting an on-site chlorinated VOC source area at Building 3 as a result of several cracked pipes in the pipe network through which VOCs apparently migrated downwards and impacted groundwater. Summaries of the data were periodically shared with NYSDEC and NYSDOH since November 2005, and after consultation and concurrence with the agencies, additional sampling activities have proceeded.

The expanded SRI activities and objectives are listed below, and are summarized in Table 1:

1) Substantially greater number of Geoprobe borings with soil sampling to delineate chlorinated VOCs in soil beneath Building 3 and lead beneath Building 7

2) Additional Geoprobe borings with soil sampling in Building 7 to delineate an area of elevated VOCs discovered beneath the south side of the building;

3) Additional soil vapor sampling in Building 7 to assess the presence and extent of any soil vapors originating from the newly-discovered VOC hot spot;

4) Additional soil vapor sampling in Building 7 and the north half of Building 3 (former Building 37) to "zero out" the soil vapor plumes identified, respectively, beneath Building 8 and the south half of Building 3

5) Additional soil sampling in the Service Corridor to zero out soil and soil vapor concentrations measured beneath Building 8 and to insure that no source area was present under this building;

6) Additional soil sampling at all soil vapor sampling locations to develop a correlation between the soil and soil vapor findings;

7) Additional perimeter/off-site soil vapor sampling west of Buildings 3 and 7 to delineate and zero out the off-site soil vapor plume;

8) Expanded analysis of all soil, soil vapor, and groundwater samples collected for the full TCL parameters, not solely the chlorinated VOCs as specified in the SRI Work Plan;

9) Collection and analysis of soil samples collected during drilling for wells MW-60 (located centrally along the west side of Building 7)and MW-61 (located centrally along the western perimeter of Building 3)in response to VOCs detected in the field in the soil; and

10) An offsite groundwater investigation for the purpose of delineating the PCE and TCE contaminant plumes in the groundwater outside of the Site boundary.

11) An off-site soil vapor investigation to determine the levels of off-site vapor outside the Site boundary.

The SRI sampling locations are shown on Figures 4, 5, and 6 respectively, for the Building 8/Service Corridor, Building 7, and Building 3 areas.The SRI activities are described in more detail in the following Section 4, and the additional investigation work conducted during Site renovation work is described later in Section 5.0.

# 4.0 SRI FIELD INVESTIGATION

Langan initiated the SRI field investigation in October 2005, and has recently completed the on-Site Parcel B investigation. The SRI field investigation was conducted in accordance with the following:

- Field procedures outlined in the original May 2004 RI Work Plan;
- The scope of work and soil vapor sampling procedures outlined in the SRI Work Plan, dated July 1, 2005;
- Modifications to the scope of work described in Addendum #1 to Work Plan for Supplemental Remediation Investigation, dated August 18, 2005; and
- Subsequent discussions and agreements made with NYSDEC as the SRI progressed and field findings and data were submitted to NYSDEC and NYSDOH over the period of November 2005 to immediately before submittal of this SRI report.

## 4.1 GENERAL PROCEDURES

General field procedures were as follows:

- Update the utilities One-Call file for the proposed subsurface drilling work.
- Obtain sidewalk-opening permits from NYCDOT for wells and soil-vapor sample locations within the public sidewalk.
- Conduct Geoprobe soil sampling; monitoring well installation, development, and sampling; and other associated all field activities in accordance with Langan's May 2004 RI Work Plan.
- Collect soil vapor samples as per NYSDOH's Guidance for Evaluating Soil Vapor Intrusion in the State of New York: Public Comment - Draft - February 2005 (hereafter referred to as the NYSDOH Guidance Document).
- Monitor the field work in accordance with the site-specific HASP and CAMP, as per Section 3.3 and Appendix A of the RI Work Plan.

- Install four off-site groundwater monitoring wells outside of the Site boundary, and a fifth and final sentinel well for purposes of monitoring the off-site plume.

## 4.2 ON-SITE SOIL VAPOR INVESTIGATION

### 4.2.1 Objectives and Sampling Locations

Based on the initial RI results, and in accordance with the NYSDOH Guidance Document and the SRI Work Plan, soil vapor sampling was conducted within all of the Parcel B buildings, with an additional concentration of sampling within Buildings 3 and 8 where detectable soil vapors had been identified. The objectives of the soil vapor sampling program were to: 1) characterize the nature and extent of chlorinated VOCs in soil vapor, and 2) evaluate whether there is a chlorinated VOC source or sources beneath the buildings. The soil vapor probes installed during this SRI were extended only 6 inches under the sub slab in accordance with the NYSDOH Guidance Document, whereas the initial round of soil vapor probes were extended 3' under the slab during the initial RI work.

As noted previously in Section 3, additional soil vapor sampling was conducted in Building 7 to characterize soil vapors that might be originating from a localized, deep-lying (9-10 feet bgs) VOC hot spot discovered in soil during the SRI soil investigation, and to zero out the soil vapor plumes identified beneath Building 8 to the south and Building 3 to the north. A total of seven additional soil vapor samples were collected in Building 7 as part of the expanded sampling program. No significant detections of soil vapors were encountered in Building 7.

Four additional soil vapor samples were collected in the north half of Building 3 (former Building 37) to zero out the soil vapor plume identified beneath the south half of Building 3. These sample results identified detectable soil vapor concentrations of PCE. In addition, petroleum related vapors also were identified with these samples. Moreover, the indoor air samples for these same substances were low, and may be attributed to the petroleum consuming equipment that was being used on site.

Two types of subsurface soil vapor samples were collected as follows:

- Soil vapor samples (as this term is defined in the NYSDOH Guidance Document) collected from depths of 4 to 6 feet bgs from outdoor, open areas not covered by a building (alleyway between Buildings 7 and 8 and the area south of Building 3); and
- Sub-slab vapor samples (as this term is defined in the NYSDOH Guidance Document) collected immediately beneath (approximately 6 inches below) the foundation or slab of a building (within Buildings 3, 7, and 8).

Soil vapor and sub-slab vapor sample locations are illustrated on Figures 4, 5, 6, 11, and 12.

### 4.2.2 Field Methods

Soil Vapor Sampling Methodologies

Soil vapor samples were collected as follows:

- A direct-push Geoprobe rig was used to create +/- 1.5-inch hole to a depth of 5 to 7 feet below grade.
- A stainless steel Geoprobe screen implant (5/16" diameter, +/- 8-inch length) was threaded to laboratory- or food-grade Teflon tubing (0.313-inch diameter) and lowered to the bottom of the hole.
- The Geoprobe rods were removed from the hole and a +/- 2-foot long sand filter pack was installed around the screen implant by pouring the sand into the annulus. The remainder of the annulus was filled to grade surface with a bentonite slurry seal.
- The bentonite seal was allowed to set for at least 24 hours.
- Prior to sampling, the annulus seal was checked using a helium source and bucket assembly placed over the probe head in accordance with the NYSDOH Guidance Document. The bucket was sealed to the ground/concrete surface with hydrated bentonite. A peristaltic purge pump was attached to the Teflon tubing and a volume of air at least three times that of the tubing and screen setup was purged. The purged soil vapor was monitored for VOCs with a photoionization detector (PID) equipped with an

11.8 eV lamp, and for helium with a MARK HE9822 helium monitor. Any detection of helium required replacement of the bucket-to-ground, bentonite seal and re-purging and monitoring for helium.

- When a good annulus seal was documented and after purging was completed, a laboratory-supplied, 6-liter Summa canister with a one-hour flow controller (+/- 0.1 L/min) was attached to the Teflon tubing. The summa canisters arrive from the lab with approximately +/- 30 inches of Hg vacuum.
- Sampling was started by fully opening the canister valve.
- The start time and stop time (after +/- one hour) were recorded on the chain of custody.
- Completed samples were packaged for shipment to Spectrum Analytical, Inc. (Spectrum) of Agawam, MA under full chain-of-custody protocols. The samples were analyzed for chlorinated VOCs using USEPA Method TO-15.

Sub-Slab Vapor Sampling Methodologies

Sub-slab vapor samples were collected as follows:

- Using a dry impact tool, jack hammer, or Geoprobe bit, an approximately ½ to 1 inch hole was bored through the foundation or slab to install a temporary probe.
- The temporary probe was constructed with laboratory- or food-grade Teflon tubing (0.313-inch diameter), and the probe and tubing was lowered to the bottom of the hole extending no more than two inches into the sub-slab material.
- Coarse sand was added to envelope the probe tip.
- The annulus was sealed to grade surface with non-shrinking hydraulic cement.
- When a good annulus seal was documented and after purging was completed, sampling was conducted as described above.

Chain of custody documentation is presented in Appendix B.

Representative indoor and outdoor air samples were collected for comparison to the soil vapor sample results. A minimum of one indoor air sample was collected from each of the three buildings at the same time that soil vapor sampling was conducted in that particular building.

Several outdoor air samples were also collected during the soil vapor sampling program in various areas of the Site; these samples are designed to check for potential influence on the samples from non-site-related, ambient air sources above the subsurface being sampled. Appropriate trip blanks, designed to check for contamination of the samples by non-site-related influences, were also collected and analyzed by the lab.

## 4.3 OFF-SITE/PERIMETER SOIL VAPOR SAMPLING

### 4.3.1 Objectives and Sampling Locations

Based on the initial RI results and in accordance with the SRI Work Plan, the potential for off-site soil vapor migration was evaluated. A total of six (6) soil vapor samples were initially collected in November of 2005 along the Site property line on each side of the Site at the locations shown on Figures 4, 5, and 6. Sample locations SV-PER1 and SV-PER5 were situated on either side of Building 8 where elevated soil vapors were detected during the RI (see Figure 4). Similarly, sample locations SV-PER2 and SV-PER4 were situated on either side of Building 3 where elevated soil vapors were detected during the RI (see Figure 6). Sample locations SV-PER3 and SV-PER6 provided representative coverage of the north and south property lines, respectively, although elevated soil vapors were not previously detected in these areas (see Figures 4 and 6).

The off-site/perimeter sampling program was expanded [from the initial six samples at the request of NYSDOH] to include three additional samples along the sidewalk west of Buildings 3 and 7 (B3-SV1, B3-SV35, and B7-SV12) and three samples along the sidewalk across 80$^{th}$ Street from these buildings (B3-SV34, B3-40SV, and B7-SV13[OS]) to evaluate whether off-site soil vapors were present (see Figures 5, 6, and 11). Based on the results of the above phase of soil vapor probe installations and sampling, NYSDOH requested more off-site soil vapor sampling since some of the results had minor detections. In early August, NYSDOH provided a map identifying additional soil vapor sampling locations.

Five additional on-site and off-site soil vapor probes were installed and sampled in mid August 2006 to supplement the soil vapor database, including three locations requested by NYSDOH. Two soil vapor probes (OSV-1 and OSV-2) were installed and sampled along 80$^{th}$ Street just east

of the residences to the south of Cooper Avenue in the locations requested by NYSDOH. One soil vapor probe (OSV-3) was installed and sampled adjacent to off-site monitoring well OSW-1 adjacent to the viaduct in the northwest corner of the residential area in another location requested by NYSDOH. Two on-site soil vapor probes (SV-PER6(re-installed) and SV-PER7) were installed and sampled within the southern boundary of Parcel B, north of the LIRR right-of-way and the residential area west of 80th Street to re-evaluate soil vapor concentrations at the southern perimeter of Parcel B. Note that the original SV-PER6 was damaged and was replaced by SV-PER6(re-installed).

### 4.3.2 Field Methods

The samples were collected consistent with the on-site soil vapor sampling program methods described above. Chain of custody documentation is presented in Appendix B.

## 4.4 SOIL SAMPLING INVESTIGATION

### 4.4.1 Objectives, Sampling Locations, and Field Observations

The objectives of the soil sampling investigation as outlined in the July 2005 SRI Work Plan (as amended by the August 2005 Addendum) were to:

- Characterize the nature and extent of chlorinated VOCs in soil in locations identified by soil vapor results, and
- Delineate the extent of lead-impacted soil that was apparently associated with the waste layer encountered and removed from the adjacent Parcel A, and extends beneath Building 7.

Soil samples were collected from beneath the slabs of Buildings 3, 7 and 8, and from adjoining outdoor areas as shown on Figures 4, 5, and 6. The soil samples from all locations were analyzed for VOCs, and from Building 7 were also analyzed for lead. The scope and objectives of the investigation were expanded based on the soil vapor results; discoveries made during intrusive, Site-renovation related activities; and discussions with NYSDEC and NYSDOH, as described in more detail below by building area.

Building 3 – South Half

*Geoprobe Soil Sampling Program*

As per the SRI Work Plan, five Geoprobe borings were initially completed at and around soil vapor sample location B28-SV8 where the highest VOC levels were registered (borings B3-21, B3-22, B3-23, B3-24, and B3-27). No significant PID readings were recorded in soil from these borings.

During the Geoprobe investigation, a drain was uncovered in the southwest corner of the building, which was a potential source of the detected soil vapors. Four additional soil borings were completed and sampled for VOCs in and around the drain. Elevated VOCs were detected in soil samples collected from a boring completed through the center of the drain structure (see below). Based on these findings and discussions with NYSDEC and NYSDOH, the decision was made to expand the soil sampling program further to delineate VOCs in soil throughout this building footprint. As a result, in addition to the four borings completed around soil vapor sample location B28-SV8, and the four borings completed in and around the drain, 16 additional borings with soil sampling for VOCs were completed. Borings with soil sampling were also completed, including sampling at each of nine initial soil vapor locations to correlate the soil and soil vapor sampling results. The soil vapor investigation for the south half of Building 3 in further described in Section 6.3.2.

*Drain Structure Investigation*

On November 10, 2005, during Geoprobe soil sampling, a 2-foot by 2-foot concrete drain structure was discovered in the southwest corner of the existing portion of Building 3. The drain was covered with a steel grate, which was removed for the purpose of investigation. Initial screening of the drain contents with a PID did not show any elevated readings but two pipes were observed entering the drain on the east and south sides. A boring (B3-37) was conducted through the center of the drain structure, and three borings (B3-36, B3-38, and B3-39) were conducted within ten feet of the drain sides, all to a maximum depth of nine feet. B3-37 was advanced to refusal at a depth of 7.5-feet below the floor slab. Elevated PID readings were observed in the soil/material from this boring. The contents of the drain structure were a mixture of soils, organic material, and a grey/black viscous glue-like material. Two soil samples

were collected at depths registering the highest PID readings, 2.5-feet and 7.5-feet, and sent to Spectrum Analytical for TCL VOC analyses.

The NYSDEC was formally notified of this discovery in an email on November 29, 2005, after the soil data were received. A work plan was prepared and submitted to the NYSDEC and NYSDOH for review and comment. The work plan outlined Langan's plan to further investigate the structure via: 1) a geophysical survey to locate any associated piping beneath the slab (see Section 4.6), 2) removal of the upper portion of the drain structure and the impacted soil/sediment within, to inspect the construction and integrity of the bottom portion, and 3) clean out the structure to allow deeper probing for vertical delineation.

The soil/sediment was removed to the apparent bottom of the structure and stockpiled for waste characterization purposes. Upon further investigation, what was believed as the apparent concrete bottom at the boring B3-37 turned out to be a boulder. The boulder was removed via excavation, and a Geoprobe was extended deeper and two soil samples were collected from three and nine feet bgs for vertical delineation.

*Piping Network Investigation*

In response to the discovery of the drain structure and underground piping, a geophysical survey was conducted to trace out the piping network to investigate this system. The geophysical survey is described later in Section 4.6 and the piping network is shown on Figure 13. The concrete over the entire extent of piping network was first removed to gain access to and inspect the condition of the piping and surrounding soils. Soil overlying the pipe was removed using a backhoe or hand excavated, and screened with a PID. The piping was inspected for cracks or potential leaking joints. Probe holes were driven every 10 feet along the piping and screened for VOCs.

The pipe network was investigated in the above manner throughout the interior part of the building and leading up to the south edge of the existing building at two locations, where the pipe passed into the adjacent, outdoor area. The piping outside of the building was investigated via test pits using a backhoe and excavator. These two lengths of piping were traced to their point of termination as shown on Figure 13.

All of the piping was then removed by Earth Tech, under the direct oversight of Langan. Soil beneath the piping was screened with a PID and soil samples were collected from beneath the piping at a frequency of one sample per 10 feet of pipe length. Forty-one sub-pipe grab soil samples were collected along the pipe runs (B3-Pipe1 to B3-Pipe41). There were no significantly elevated PID readings observed in any areas with the exception of two locations represented by soil samples B3-Pipe3-0.5 and B3-Pipe2-1, as shown on Figure 13, where PID readings of 20 parts per million (ppm) and 30 ppm were recorded, respectively. All soil samples were analyzed for TCL VOCs by Spectrum. Soil generated during the investigation was used to backfill the open pipe trenches. All soil was staged/stockpiled on poly and covered until backfill operations commenced.

*Location of Source Area of Groundwater Contamination*

Upon completion of the investigation, it was determined that the piping network consisted of a combination sanitary/roof drain system that lead from the east to the west side of the building and is believed to connect to the city sanitary system along 80th Street. Based on the pitch of the horizontal piping, flow was inferred from the roof drains to the outlet on the west side of the building. Of particular significance was the finding of a breach in the pipe close to the east wall of Building 3 where the highest PID readings were observed and clearly VOC-impacted liquids had drained into the soil from slop sinks formerly located on the second floor of Building 3. Soil sample B3-Pipe2-1 was collected here accordingly. Notably, the highest groundwater detections of TCE and PCE were found in MW-63, which is situated [historically] downgradient of the piping network in Building 3. Prior to development of Parcel A, the historic regional direction of groundwater flow was to the south-southwest (see Regional Water Table Elevation Map Insert on Figure 7). Therefore, Well MW-63 was at one time situated hydraulically downgradient of sub-pipe sample B3-Pipe2-1, where the highest PCE level was detected in soil supporting the theory that the sub-slab piping network in Building 3 was indeed the source of the PCE and TCE in groundwater.

This area also corresponded to the location of the connection of the vertical roof drain to the sub-slab network. The roof drains have now been taken out of use, with storm water diverted into a temporary feeder until the building renovation is complete. However, it is likely in the past that significant roof runoff had drained from the breached pipe and in the process, carried

down the VOC contamination discharged by the second floor tenant into their sinks and subsequently into the groundwater via the breached piping network below Building 3. This is also the area where the highest groundwater concentrations were detected and close to where the highest vapor concentrations were detected on the adjacent Parcel A. Hence, the Parcel B chlorinated VOC source area was discovered.

*Investigation/Sampling During Foundation Excavation*

On January 24th, 2006, the foundation contractor, Ruttura Construction (Ruttura), began excavating for foundations and footings in the outdoor portion of the south half of Building 3 to close up that side of the building where the former Building 28 had been cut in half. The foundation/footing work consisted of excavating a trench along the length of proposed building walls, approximately 5-feet deep and 8-feet wide. Langan provided oversight and screened the soils as excavation progressed. This extension work facilitated investigation of additional potential sources of the VOC contamination in this area. No significant PID readings were recorded during excavation for the foundations. Upon reaching the final excavation depth, endpoint soil samples were collected and submitted to the laboratory for TAGM 4046 analyses. Sampling locations are shown on Figure 13. Soil samples were collected along the excavation bottom at a frequency of one per 20 feet of trench. A total of 21 grab soil samples were collected and analyzed for full TAGM 4046 compounds (EP-B3F-1 to EP-B3F-21).

Building 3 – North Half (Former Building 37)

No soil sampling was proposed in the north half of Building 3 (former Building 37) in the SRI Work Plan based on the lack of any significant results during the RI. However, as previously discussed in Section 4.2.1, four Geoprobe borings were completed in the north half of Building 3 to collect soil vapor samples to zero out the soil vapor plume. Soil samples were also collected from each boring to allow correlation between the soil and soil vapor findings (borings B3-6, B3-7, B3-30, and B3-31).

Building 7 (AOC-6H)

As per the SRI Work Plan, a Geoprobe (B7-1) was completed at the initial RI location B-49, to sample the 4-10 foot interval that correlated to the depth of the lead-containing fill layer, and that was not tested during the RI due to poor sample recovery. Geoprobe borings B7-2, B7-3,

B7-4, and B7-5 were also completed in accordance with the SRI WP. The lead-impacted soil found on Parcel A, containing the characteristic rubber- and clay-like material, was visibly identified at only one boring location within Building 7 during the SRI, at B7-5.

In this same boring B7-5, and in boring B7-5E, elevated VOCs were detected in the soil at a depth of about 9-10 feet bgs. In particular, the soil sample collected at B7-5E at a depth of 9-9.5 feet showed highly elevated concentrations of VOCs (see Section 6.4.2). Samples were collected at two deeper depths at B7-5 (B7-5-12-12.5 and B7-5-14-14.5), and at four deeper depths at B7-5E (B7-5E-11-13, B7-5E-15-17, B7-5E-19-21, and B7-5E-26-28) to vertically delineate VOCs. Additional borings were completed on all four sides of each of these two boring locations to delineate the VOCs in soil (borings B7-1S, B7-1N, B7-5E, B7-5W, B7-5N, and B7-5S). The results of this delineation, which revealed an isolated pocket of VOC contamination, are described in Section 6.6.3.2.

In order to avoid the need to remobilize later to address potential data gaps, the soil sampling program for lead was expanded to include eight additional Geoprobe borings through the slab of Building 7 with soil sampling for lead (borings B7-6, B7-7, B7-8, B7-9, B7-10, and B7-11[1]).

Building 8 (AOC 7)/Service Corridor

The SRI Work Plan called for five Geoprobe borings and soil sampling at and around the soil vapor sample locations that registered the highest VOC levels. Comparable, elevated soil vapor levels were identified in two separate areas of Building 8, centered on B1-SV4 and B1-SV7. Therefore, five Geoprobe borings were completed at and around both soil vapor locations (borings B8-5, B8-7, B8-9, and B8-10 around B1-SV4; and borings B8-14, B8-15, B8-17, and B8-19 around B1-SV7).

In order to avoid the need to remobilize later to address potential data gaps, the soil sampling program for VOCs was expanded to include additional Geoprobe borings and soil sampling for VOCs at three outdoor locations in the Service Corridor (B8-6, B8-12, and B8-20). In addition, soil samples were collected at each of the previous soil vapor sampling locations in Building 8 to allow correlation between the soil and soil vapor results.

### 4.4.2 Field Methods

The Geoprobe soil borings were completed by Aquifer Drilling & Testing, Inc. (ADT) of New Hyde Park, New York, and Earth Technologies, Inc. of North Haven, Connecticut, under the supervision of a Langan field engineer or geologist. Each boring was advanced to a depth of approximately 15 feet and continuously sampled with a 2-inch diameter, 4-foot macro-core tube to the final depth. Soil samples retrieved from each boring were visually inspected for visible evidence of contamination and screened for VOCs with a photo-ionization detector (PID). Soil boring logs are provided in Appendix C.

Soil samples were collected for laboratory analysis based on the field inspection/screening. One sample was collected from each boring except where elevated PID readings were recorded (borings B3-17, B3-27, B3-37, B7-5, and B8-6); at these locations, more than one sample was collected. Where only one sample was collected, the sampled interval corresponded to the zone with the highest PID readings or visual impacts. If no visual impacts or elevated PID readings were observed, this sample was generally collected from the fill material near the bottom of the boring. At locations where multiple samples were collected, the impacted interval and deeper, apparent clean soil was sampled (based on inspection and field screening with PID).

In Building 7, samples for lead analysis targeted the depth of the lead-impacted soil layer encountered on adjacent Parcel A and believed to extend beneath this building. The layer was exposed on the sidewall of the Parcel A IRM excavation limit on the east side of Building 7 with an average thickness of about 2-3 feet and lying at a depth ranging from about 5-10 feet bgs. The depth of the layer beneath Building 7 on Parcel B was established by the soil sample collected from initial RI boring B-48 from a depth of 8-10 feet bgs (lead detected at 921 milligrams per kilogram [mg/kg]).

Samples for VOCs were collected directly from the macro-cores or the split spoons, placed into appropriate pre-cleaned laboratory-supplied glassware, and compacted to minimize head space and pore space. Remaining sample volume was homogenized and placed in appropriate containers for the lead analysis. Chain of custody documentation is presented in Appendix B.

## 4.5 GROUNDWATER MONITORING WELL INSTALLATIONS AND SAMPLING

### 4.5.1 Objectives and Sampling Locations

The objective of the groundwater monitoring well installation and sampling program was to build on the data collected during the initial RI from the five original wells (MW-6, MW-16, MW-38, MW-57, and MW-58) regarding the nature and extent of groundwater contamination. The specific objectives for the proposed new wells as originally outlined in the SRI Work Plan were to:

- Collect additional inferred downgradient groundwater data, including a new well (MW-60) between existing wells MW-38 and MW-6, and a new well (MW-61) in an inferred downgradient location from the RI soil vapor sampling location with the highest measured PCE/TCE levels (SG-3),
- Collect additional groundwater samples at the inferred upgradient side of the Site (wells MW-62 and MW-63), and
- Sample on-site groundwater at speculated VOC hot spots in soil in Buildings 3 and 8 (wells MW-65 and MW-64, respectively)
- Re-sample groundwater from the existing wells.

All but one of the six planned new groundwater monitoring wells were installed (MW-60 through MW-63, and MW-65) at the locations shown on Figures 4, 5, and 6. Well MW-64 was not installed because a viable source area of VOCs in soil was not identified in this building. One additional well, MW-66, was installed in an inferred downgradient direction from the apparent VOC source areas in soil in Building 3. One additional existing, upgradient well, MW-58, not originally intended to be sampled, was re-sampled to confirm the initial RI results. Monitoring well MW-UST#2 was installed during the closure of heating oil tanks UST-1 and UST-2 (see Section 5.1), both of which were closed during the remediation of Parcel A. MW-UST#2 was incorporated into the on-site monitoring well network.

In addition to the onsite groundwater investigation, the NYSDEC requested an investigation of conditions located outside of the Site boundary. In response to this request, a total of four off-site monitoring wells (OSW-1 through OSW-4) were installed at strategic locations to the south and west of the Site (See Figures 9 and 10). The purpose of the off-site investigation was to

delineate the extent of PCE and TCE contamination off-site. One complete round of groundwater samples was collected from the off-site wells in June 2006. With the installation of these additional wells, a combined total of sixteen groundwater monitoring wells (twelve on-site and four off-site) were installed during the RI and SRI. An additional off-site "sentinel" well (OSW-5) will be installed and sampled in the very near future. Sentinel well OSW-5 will be incporporated into the off-site monitoring well network to monitor off-site groundwater quality.

### 4.5.2 Monitoring Well Installation

Drilling for the groundwater wells was accomplished using the hollow-stem auger drilling method. Drilling; split-spoon soil sampling; and well installation, development and sampling was conducted in accordance with Section 3.5 of the IRM/RI Work Plan and Sections 4.3 and 5.0 of the FSP. The new monitoring well construction data are presented in Table 2. Wells MW-6 and MW-38 were destroyed previously during early site development work and were reinstalled. The well construction and well development logs are included in Appendices D and E.

Groundwater samples were collected directly following development to provide preliminary results. The samples were collected as described below in Section 4.5.3 and submitted to Spectrum laboratory for analysis for the TCL VOCs. The results were used for expedited mapping of detected compounds. Subsequently, as per NYSDEC requirements and for presentation in this report, the wells were re-sampled for the TCL VOCs no sooner than one week following well development after allowing the aquifer conditions to stabilize following well installation.

The top of the new well casings were surveyed by Langan's NYS-certified surveyors to an accuracy of 0.01 foot relative to the Site datum. The existing and re-installed well casings were re-surveyed to the same Site datum.

### 4.5.3 Groundwater Sampling

Groundwater sampling was conducted in accordance with Section 3.5 of the IRM/RI Work Plan and Sections 4.3 and 5.0 of the FSP. The groundwater purging and sampling logs are included in Appendix F.

On-site groundwater samples were collected from all six new monitoring wells and from five existing wells (MW-6, MW-16, MW-38, MW-57, and MW-58). In all, a combined total of sixteen groundwater monitoring wells (twelve on-site and four off-site) were installed during the RI and SRI. It should be noted that one of these wells (MW-63) has since been destroyed and is no longer part of the on-site monitoring well network, which is comprised of fifteen on-site wells that includes monitoring well MW-66 that was installed in the historic downgradient direction of Building 3 to evaluate the VOC plume. All wells were purged and sampled at least one week after development and in accordance with procedures set forth in the Work Plans and U.S. EPA's low-flow groundwater purging procedure. Groundwater sampling logs are presented in Appendix F.

Groundwater samples were collected directly from the low-flow pump discharge line and analyzed for the TCL VOCs. The sample containers were labeled, placed in a laboratory-supplied cooler, and packed on ice (to maintain a temperature of 4°C). Sample coolers were picked up by a courier or shipped to the laboratory under proper chain of custody protocol for analysis. Table 3 summarizes the groundwater analytical program including quality control samples collected. Chain of custody documentation is presented in Appendix B.

### 4.5.4 Groundwater Elevations and Flow Direction

Numerous synoptic rounds of water level measurements were collected from the new and existing wells to update the groundwater elevations and flow direction. The water level data are presented in Table 4. Groundwater elevation ranged from 14.22 to 15.51 feet relative to the Queens Borough President Datum (QBPD).

Groundwater elevation contours were developed from synoptic water levels collected during the SRI on January 26, 2006 and June 29, 2006. The groundwater elevations are presented on Figure 7, with the prior groundwater elevations measured in October 2004 and presented in

Appendix C of the Final Engineering Report for Parcel A. Currently, there is an apparent water table high point present in the middle of Parcel B, resulting in a northwest to northerly groundwater flow direction on the north half of the Site, and a southwest to southerly groundwater flow direction on the south half of the Site. The earlier configuration, covering both Parcels A and B, showed an apparent water table high point present in the center-east side of Parcel A, resulting in a radial flow pattern, ranging generally from a southwesterly to northwesterly groundwater flow direction.

The current flow direction beneath Parcel B is generally consistent with the earlier mapping, although neither is consistent with the regional flow direction documented by the U.S. Geological Survey, which is to the south-southwest. It is not unusual for localized groundwater flow patterns to deviate from regional conditions. It appears that the localized Site groundwater flow has been modified by the ongoing construction on Parcel A, specifically removal of the impermeable surface cover (buildings, asphalt pavement and concrete), which created a large open area for infiltration of precipitation rather than diversion to the storm sewers, and more significantly by construction and operation of the storm water detention basin on Parcel A due east of Building 7. The detention basin is constructed of large-diameter plastic piping with small perforations that allows infiltration of the storm water to recharge the ground. The vast majority of the storm water runoff generated on Parcel A is currently being conveyed to this storm water detention basin. During large storm events, some of the runoff entering the basin passes through directly into the city storm system, with the rest either being stored inside the pipes or infiltrating slowly into the ground.

Historic groundwater flow (prior to start of Site development) beneath the Site, as inferred by the PCE and TCE isoconcentration lines presented on Figures 8 and 10, is consistent with the regional flow direction to the south-southwest. The long axes of the PCE and TCE plumes mark the historic direction of flow, and are clearly aligned in a north-south orientation generally consistent with regional flow (see Figures 8 and 10). The recent, combined effects of the Site construction and storm water detention basin on local groundwater flow patterns are evident in the deflection of the north end of the plume isoconcentration lines towards the west on Figure 8 and further illustrated in Figure 10, illustrating the most recent groundwater sample results (June 2006) which indicate an increased deflection of the plume.

Based on the groundwater elevation database generated in connection with the RI investigation at the Kliegman Brothers New York State Superfund Site, URS Greiner concluded that the flow direction of the water table is variable, possibly due to the very gentle hydraulic gradients and seasonal fluctuations of the water table. They further concluded that the overall flow direction was generally towards the south at a very gentle hydraulic gradient. During the presentation made by URS Greiner at a recent public hearing for the on-site Operable Unit No. 1 preferred remedy implementation, URS confirmed that regional groundwater flow is not consistent and it fluctuates during different conditions and times of the year. This statement was not clarified, and the Kleigman Brothers site clearly requires more extensive investigation. We believe that there is a significant potential that groundwater to the southwest of Parcel B could be impacted by the Kliegman Brothers Site due to a) the sheer quantity of solvent that was apparently discharged into the aquifer in this area, and b) the dense nature of the solvent, which can flow against the normal hydraulic gradient (over and around any confining strata.

## 4.6 GEOPHYSICAL SURVEY

A geophysical survey was completed by Hager-Richter Geoscience, Inc. of Salem, NH (HRG) on January 19 and 20, 2006, inside the south half of Building 3 and inside Building 8 using Ground Penetrating Radar (GPR), electromagnetics (EM), and a precision utility locator (PUL). The objective of the survey was to locate any subsurface structures that could represent sources of solvent vapors detected in these buildings. The HRG report is included as Appendix G.

The EM survey in both buildings showed extensive anomalous signals, the precise source(s) of which could not be ascertained to be solely reinforced metal in the concrete slabs or subsurface metallic structures, piping, etc.

There were numerous single-point anomalies located within Building 8 using the GPR, interpreted as that which is typical of shallow utilities or small, unidentified buried objects, but no significant anomalies were identified that might be indicative of sub-grade tanks, vaults or other structures. No significant anomalies were located using the utility-locating instrument.

Within Building 3, numerous single-point anomalies were located using the GPR, interpreted as that which is typical of shallow utilities or small unidentified buried objects, but no significant

anomalies were identified that might be indicative of sub-grade tanks or vaults. However, a sub-slab piping network was located inside Building 3 using the utility-locating instrument as shown on Figure 13. The pipes were energized using the PUL and two piping runs were traced leading to the south outside the building where the signal terminated (see Figure 13). The indoor piping was subsequently uncovered and removed and the underlying soils investigated (see Section 4.4.1).

In both buildings, the depth of penetration of the GPR signal was limited to approximately 1.5 – 2.5 feet due to the soil conditions. The GPR proved ineffective throughout the outdoor (southern) portion of Building 3. The geophysicist reported essentially no resolution of the GPR signal apparently due to clay-rich soil conditions, which seriously dampen the signal; therefore, use of the GPR was discontinued in this area after several test traverses were performed.

## 4.7 SAMPLE ANALYSIS

All laboratory analyses of soil, groundwater, and soil vapor samples during the SRI were conducted by Spectrum Analytical, a NYSDOH-Environmental Laboratory Analysis Program (ELAP) approved laboratory certified for analyses using the most recent Analytical Services Protocol (ASP). Laboratory analyses were conducted in accordance with the USEPA SW-846 methods and NYSDEC ASP Level B deliverable format. Laboratory analytical reports are provided in Appendix H.

Soil sample analyses included TCL VOCs by EPA Method 8260B, TCL SVOCs by EPA Method 8270, and TAL metals by EPA Methods 6010B and 7471A, while soil vapor samples were analyzed for VOCs by EPA Method TO-15.

## 4.8 QUALITY CONTROL SAMPLING

During the SRI field investigation, field blanks, coded field duplicate samples, and matrix spike/matrix spike duplicate (MS/MSD) samples were collected and submitted for laboratory analysis in accordance with the Quality Assurance Project Plan (QAPP), contained within the RI/IRM WP.

Field blanks were collected to determine the effectiveness of the decontamination procedures for sampling equipment. The field blanks were collected by running deionized water over decontaminated sampling equipment. The field blank samples were analyzed for the same compounds as the associated environmental samples.

Coded field duplicates were collected to determine the accuracy of the analytical methods. The samples are termed "coded" because they were labeled in such a manner that the laboratory will not be able to determine that they are a duplicate sample. This will eliminate any possible bias that could arise.

Matrix Spike/Matrix Spike Duplicate samples were collected to assess the effect of the sample matrix on the recovery of target compounds or target analytes. MS/MSD samples were analyzed for the same compounds as the associated environmental samples. For the air matrix, quality control samples included in general one indoor ambient air sample for each building footprint and at least one outdoor ambient air sample. Trip blanks were collected per each soil vapor sampling event.

## 4.9 DATA VALIDATION

Upon receipt of final ASP Level B laboratory reports, copies of the reports were shipped to Alpha Environmental Consultants, Inc. of Clifton Park, New York (Alpha Environmental) for data validation. Data validation was performed in accordance with the USEPA validation guidelines for organic and inorganic data review.

Data reduction, validation, and reporting procedures were completed in accordance with the project QAPP provided in the RI/IRM WP. Data validation was completed for all laboratory reports. Data Usability Reports (DUSRs) are presented in Appendix I.

## 4.10 FIELD EQUIPMENT DECONTAMINATION

Temporary decontamination areas, lined with polyethylene sheeting, were constructed indoors within the north half of Building 3 and in the south end of the Site south of the Atlas Terminals Water Tower, for steam cleaning the drilling equipment and down-hole well development and

purging equipment. Water collected from the decontamination activities was collected in 55-gallon drums and managed as described in Sections 3.1 and 3.2 of the FSP.

## 4.11 INVESTIGATION-DERIVED WASTE (IDW) MANAGEMENT

All IDW has been and will continue to be managed, removed, and disposed as per Section 3.10 of the RI Work Plan and Section 3.3 of the Field Sampling Plan (FSP) as non-hazardous material by an approved waste disposal contractor.

# 5.0 ADDITIONAL INVESTIGATION ACTIVITIES

Prior to and on a parallel track with implementation of the SRI, additional investigation and soil sampling was conducted at certain potential AOCs uncovered during intrusive renovation. This work was performed in compliance with the Soil Management Plan (SMP) contained within the RI Work Plan.

Several investigative activities were completed as part of Site demolition work associated with several smaller structures (e.g. boiler house and transformer pad) and in conjunction with the early stages of the Site renovation associated with the pre-existing buildings (e.g. interior trenching for utilities). One new Con Edison transformer vault was also added to the south wall of Building 8. These activities are described in this section and identified on Figures 4, 14, 15 and 17. Screening and endpoint soil sampling results are presented and discussed, where applicable.

Excess excavated soil associated with these activities was re-used for backfill and regrading where required. No grossly-contaminated soil or soil generating PID readings was re-used on-site (e.g. petroleum-impacted soil removed from the heating oil tank area [Section 5.1], and soil was removed from the concrete vault in the southwest corner of the Site [Section 5.3]). Excess excavated soil associated with these activities that was not re-used on the Site was stockpiled, characterized, and ultimately transported and disposed off-site as non-hazardous regulated waste, at permitted facilities and in accordance with the procedures outlined in the IRM/RI Work Plan. The results of the waste characterization are summarized in this section and the laboratory reports are included in Appendix H.

## 5.1 HEATING OIL TANKS UST-1 AND UST-2 (AOC-1C)

### 5.1.1 General

As part of early planning for the Site renovation, two heating oil USTs located south of the former boiler house (Building 7/7A) that formerly served the industrial park were removed. The NYSDEC was notified of the pending tank removals by letter correspondence dated 7 January 2005. The PBS change-in-status form for the removal was submitted to the PBS office in

February 2005. During the initial RI geophysical survey, the boundaries of the tanks/vaults and piping were located and marked out in the field (see Figures 4 and 15 for the tank locations).

### 5.1.2 Summary of Tank Removals

The two heating oil USTs (UST-1 and UST-2) were removed in February and March, 2005, in accordance with DER-10 and other NYSDEC tank closure regulations and the approved IRM/RI Work Plan. The tanks were each 20,000 gallons in capacity. The tanks were drained, thoroughly cleaned, and removed by Earth Technologies Incorporated (ETI) under the supervision of Langan.

Evidence of past petroleum releases from each tank was apparent during the removals. A spill was called into the NYSDEC spill hotline as required (Spill No. 04-12201 was assigned). UST-1 was contained within a concrete vault. Some free product was pumped from the bottom of the UST-1 vault. There were two square-cut openings in the bottom slab on the west end of the vault (see Figure 15). The concrete bottom slab was broken and removed from around the openings, and petroleum-impacted soil was removed from beneath the area shown on Figure 15. Appropriate endpoint soil samples were collected, which showed only one compound slightly exceeded its applicable RSCO in one sample, specifically chrysene.

UST-2 rested on a concrete slab. A limited volume of free product was pumped from the bottom slab and petroleum-impacted soil was removed to the extent possible. A band of petroleum-stained soil approximately 1.5 feet thick was exposed on all sides of the tank pit. However, excavation along the sidewalls was limited due to unstable sidewall conditions and the proximity of Building 29 and the LIRR easement to the tank pit.

A work plan was submitted to NYSDEC proposing a plan to terminate active excavation and to backfill the tank pits, supported by the lack of significant RSCO exceedances in the UST-1 pit and unstable conditions around UST-2 (*Building 7 Underground Storage Tanks/Vaults Closures*). A copy of the work plan is provided in Appendix A. The tank pits were subsequently backfilled in accordance with the work plan using soil excavated from Parcel A. Afterwards, a report was prepared and submitted to NYSDEC for closure of the spill under the NYSDEC spills program.

A copy of the previously submitted closure report is also provided in Appendix A. NYSDEC has previously indicated that this spill will be closed out by the Department.

Subsequently, the additional remaining supply, return, and vent piping leading from UST-1 to former Building 7/7A to the north were removed. Petroleum-impacted soils were uncovered and removed. Endpoint soil samples collected showed some exceedances of the RSCOs. It is unclear if the exceedances were related to the historic fill, or petroleum. No piping was found leading from UST-2 to Building 7/7A.

Figure 15 illustrates the tank, vault and piping locations, and post-excavation soil sampling locations. Copies of these data and the piping endpoint soil data are included in Table 5.

### 5.1.3 Petroleum-Impacted Materials Disposal

Free product removed from inside the tanks and vaults, and petroleum-impacted soils were characterized and disposed off the Site. Free product was pumped directly into a vacuum truck and disposed at a permitted treatment and disposal facility. Soil from the tank removals was temporarily stockpiled adjacent to the tank pits and waste characterization samples were collected for disposal purposes.

### 5.1.4 Soil Boring and Groundwater Monitoring Well Installation and Sampling

A soil boring with monitoring well installation was completed to investigate soil and groundwater quality beneath the inferred downgradient side of the tank area (see well location MW-UST#2 shown on Figures 4 and 7). During drilling there was no evidence of petroleum impacts through the entire drilled depth, with the exception of slight odors noted between a depth of 10 and 16 feet bgs (see Boring/Well Log in Appendices C and D). A soil sample from within this depth interval (10-12 feet bgs) was collected for confirmation testing for the STARS VOCs and STARS SVOCs. A second confirmation soil sample was collected from the capillary fringe (54-56 feet bgs), as per the RI Work Plan.

The soil analytical results are presented in Table 6. There were no VOCs detected in either soil sample, and the only SVOCs detected were naphthalene and phenanthrene in the shallow sample at concentrations at least two orders of magnitude below the associated RSCOs.

There was no free product found on the water table surface, and a groundwater sample was also collected from the well. The groundwater analytical results are presented in Table 7. No petroleum-related compounds (e.g., BTEX) were detected in the groundwater sample collected from the well, and only low levels of PCE and TCE were detected at, respectively, 14.3 micrograms per liter (ug/l) and 16.7 ug/l, above the groundwater standard of 5 ug/l for each compound.

### 5.1.5 Spill Closure Report

A copy of the spill closure report that is included in Appendix A also will be provided as an attachment to the Final Engineering Report to support closure of the spill by NYSDEC. NYSDEC has previously indicated that this spill will be closed out by the Department.

## 5.2 BUILDING 7 (SOUTH HALF OF FORMER BUILDING 28) PROCESS TANK AND VAULT CLOSURES (AOC-6H)

### 5.2.1 General

During trenching for new utilities inside the southwest corner of Building 7, five underground tanks and two underground vaults were discovered that contained apparent residuals from prior operations in this building. The structures were likely used to store glues and adhesives by a former tenant of the building, Interstate Container Corporation, a manufacturer of cardboard boxes.

Each structure was inspected, the contents were tested, and a plan to close out the structures was prepared and submitted to NYSDEC (*Building 28 Process Tanks/Vaults Closures*, dated March 16, 2005). A copy of the closure plan is provided in Appendix J. NYSDEC provided comments on the closure plan. All five tanks were subsequently cleaned, removed, and disposed, and the two vaults were cleaned and abandoned in place, in accordance with the

work plan cited above, DER-10 and other NYSDEC tank closure regulations. NYSDEC indicated that these spills will be closed out by the Department.

### 5.2.2 Description of Structures and Contents

The tanks were cylindrical steel USTs, each approximately 10,000 gallons in capacity. Four of the tanks contained hardened white solid residue. One tank contained about 2-3 feet of a white liquid, mostly water. The vaults measure about 10 feet wide by 50 feet long by 4 feet deep below the floor slab and are separated by cinder block wall and soil. The vaults contained a white liquid and some residue at the bottom. No VOCs were detected during screening of the tanks, vaults, or their contents using the field PID, nor were odors apparent.

### 5.2.3 Characterization of Contents

Samples of the material contained within the structures, both liquids and solid material, were collected and submitted for lab analysis to characterize the material and determine the proper disposal methods and facilities. Liquids were present in three of the structures. Solid material consisting of a white residue was present in four of the structures. The materials were tested for the TCL VOCs and SVOCs; TAL metals; PCBs; diesel range organics (DRO); gasoline range organics (GRO); forensic petroleum "fingerprint" analysis by modified Method 8015B; full RCRA TCLP; total organic halogens (TOX); percent sulfur; and/or RCRA Ignitability, Reactivity, and Corrosivity (I/R/C).

No TCL VOCs were detected. Low levels of three PCB monomers and four SVOCs were detected at concentrations well below the TAGM 4046 criteria; the SVOCs included two phthalate compounds, benzo(a)anthracene, and chrysene. Both liquid and solid samples tested non-hazardous. Some TAL metals were present at elevated levels as discussed below:

- Liquids: Barium, arsenic, selenium, and vanadium were elevated in one liquid sample, and sodium was elevated in both liquid samples.
- Solid Material: As with the liquid samples, sodium was consistently elevated in the solid samples above the TAGM criteria. Chromium, copper, nickel, and zinc were

slightly elevated above their associated TAGM criteria in 1 or 2 samples each. The remaining metals results are somewhat confounding due apparently to the unusual matrix. In particular, leachable (TCLP) barium, arsenic, lead, and selenium were detected in the samples, but none of these four metals were detected at elevated levels in the associated totals samples. These findings are, however, consistent with

The liquid sample results; barium, arsenic, and selenium (total concentrations) were also elevated in one of the liquid samples.

A sample of the solid material was submitted to Meta Laboratories, a specialized forensics laboratory, for more definitive characterization. Meta concluded that the material was a mixture of mostly an industrial process residue, possibly from abrasive cleaning/scrubbing products or residue from alkaline washes, and a refined petroleum-based material such as a heavy lubricant, hydraulic fluid, and/or mineral oil. The fingerprint testing of one of the liquid samples matched it to motor oil.

### 5.2.4 Geoprobe Soil Investigation around the Vaults

Both vaults contained liquid when they were uncovered, hence, it was inferred that neither had leaked its contents to the ground. As the vaults did not need to be removed as part of Site renovation, a Geoprobe soil investigation was conducted to verify the subsurface conditions beneath the vaults and to support in-place abandonment following removal of their contents.

Soil samples were obtained using the Geoprobe method at the locations shown on Figure 16 between the two vaults. Soil samples were collected continuously to a depth of 15 feet bgs. No soil samples exhibited any evidence of contamination such as staining, PID readings, odors, etc. The sample from each Geoprobe boring collected directly below the bottom of the vault (4 to 6 foot depth) was submitted for laboratory analysis for the following metals that were elevated in the waste characterization samples: chromium, copper, nickel, zinc, barium, arsenic, selenium, and vanadium.

The Geoprobe soil analytical results are presented in Table 8. Chromium slightly exceeded its RSCO (40 mg/kg) in one of the five samples at 42 mg/kg. Copper exceeded its RSCO (50 mg/kg) in all five samples, ranging from 63.9 mg/kg to 227 mg/kg. These concentrations fall

within the range of copper concentrations of other samples collected from the historic fill on Parcel B (see Table 8 of the January 2005 RI Report for comparison).

### 5.2.5 Tank and Vault Closure

The tanks and vaults were closed out as per the closure plan cited above, NYSDEC UST closure regulations, DER-10 procedures, and the approved IRM/RI Work Plan, as described below.

Tanks

The tanks were removed to complete the remediation of this AOC and accommodate new building foundations. Decommissioning, removal, and post-excavation (end-point) soil sampling was completed as follows:

1. Liquids and pumpable sludge and semi-solid material were pumped out using a vacuum truck, and disposed at Bridgeport United Recycling, Inc., Bridgeport, CT, under a Uniform Waste Disposal Manifest for treatment and disposal.
2. The concrete floor slab above the tanks was demolished and soil was excavated as required to expose the tank tops.
3. An access point was cut into the top of each tank and the solid material was removed from each tank and disposed at Bridgeport United Recycling, Inc.
4. Each tank was removed, cut up, and disposed as scrap metal.
5. The exposed soil at the bottom and sidewalls of the tank excavations was inspected and field screened for any evidence of contamination; none was observed and there were no PID readings above background levels recorded.
6. Post-removal endpoint soil samples were collected at the locations shown on Figure 16 as per DER-10. Specifically, bottom post- removal samples were collected along the centerline of each tank, at a frequency of 5 samples per tank. The samples were analyzed for the following metals that were elevated in the waste characterization samples: chromium, copper, nickel, zinc, barium, arsenic, selenium, and vanadium.

Prior to removal, the tanks and the intended removal work were registered under the NYSDEC Chemical Bulk Storage Program, as well as the plans for their removal. The tank pits were backfilled using soil that was excavated to remove the tanks and additional certified-clean sand.

Vaults

The vaults were closed out as follows:

1. Liquids and pumpable sludge and semi-solid material were pumped out using a vacuum truck, and transported to Bridgeport Recycling for treatment and disposal.
2. The exposed interior of each vault was inspected and its condition documented to the extent possible without entering the structures; the exposed surfaces appeared intact without any damage, rusting/pitting or corrosion observed.
3. The tanks were filled with cement slurry.

### 5.2.6 Tank Post-Removal Endpoint Soil Sampling Results

The tank post-removal soil analytical results are presented in Table 8. No samples exceeded the chromium, nickel, or vanadium RSCOs. Selenium was not detected in any samples. Two of the 25 samples slightly exceeded the arsenic RSCO (14.1 and 21 mg/kg compared to the RSCO of 12 mg/kg). Twenty of the 25 samples exceeded the zinc RSCO. These zinc concentrations fall within the range of concentrations of other samples collected from the historic fill on Parcel B (see Table 8 of January 2005 RI Report).

### 5.2.7 Process Waste Off-Site Transport and Disposal

All former process wastes were disposed at Bridgeport United Recycling, Inc., Bridgeport, CT, under a Uniform Waste Disposal Manifest for treatment and disposal (see Appendix J).

### 5.2.8 Inspection for Additional Process Tanks or Vaults

Following the initial discovery and inspection of these structures, the remaining existing buildings on Parcel B were re-inspected for evidence of similar sub-slab process structures. No additional structures were located.

### 5.2.9 Process Tank/Vault Piping Investigation

While excavating for new utilities on the west side of new Building 7, a 3-inch diameter, steel pipe was located, terminating in a fill-type port with threaded cap. There were no odors or PID readings from the pipe when the cap was removed. Given the proximity of this pipe to the process tank/vault area, and no evidence of other structures located inside the building in this area (e.g., USTs), it was suspected that the pipe was related to the former process operations.

In conjunction with the excavation for new utilities and to investigate this AOC, a trench was excavated along the entire pipe run length to inspect the pipe, locate its entry point into the building, and to inspect and sample the underlying soil for any contamination. The pipe ran just below the surface and inside the curb line, and entered the building just outside of the former process tank/vault area, confirming it was related to the former process operations.

There was no evidence of contamination in the soil beneath the pipe, such as staining, PID readings, or odors. Three soil samples were collected from directly beneath the pipe to investigate soil conditions. The samples were tested for the TCL VOCs and the same metals that were elevated in the process residuals (chromium, copper, nickel, zinc, barium, arsenic, selenium, and vanadium). There were no VOCs detected in the samples, and no exceedances of the metals RSCOs in any of these samples.

The pipe location and soil sampling locations are shown on Figure 16. The tabulated endpoint data are provided in Table 9.

## 5.3 CONCRETE VAULT – SOUTHWEST CORNER OF SITE

While trenching to bring in new Con Edison electrical service in September 2005, a concrete vault was discovered on the extreme south end of the Site that contained materials that consisted of white and gray, clay-like material in a dark brown soil matrix. The material exhibited odors and PID readings up to 75 ppm at close range.

The material was entirely excavated from the vault and stockpiled for waste characterization sampling, and to allow inspection of the interior of the vault. The material was temporarily

stockpiled south of Building 8 on a double layer of plastic sheeting, and covered with plastic sheeting pending waste characterization analyses.

Waste characterization samples were collected on September 27 and 28, and October 6, 2005. The significant waste characterization results were:

- Metals: Exceedance of Hg = 0.56 mg/kg, Na = 41,700 mg/kg, Zn = 153 mg/kg
- pH range = 9.8 - 10.3
- VOCs: Acetone = 3,200 ug/kg (laboratory artifact)

The vault measured approximately 6 feet wide by 15 feet long by 4 feet deep. The sides and floor of the vault appeared intact with no staining, and the vault held liquid that had accumulated following a light rainfall. Upon receipt and evaluation of the waste characterization results, Langan authorized removal of the structure to allow utility installation to proceed in this area. The concrete walls were initially demolished and removed to allow Langan to inspect and screen the soils lying outside of the vault walls. There was no evidence of contamination in the exposed soil, such as staining, odors, or PID readings. The concrete was stockpiled on plastic sheeting separately from the soil, and was ultimately disposed as a regulated waste.

It was not necessary to remove the vault floor for the utility installation. However, Langan directed the contractor to lift the slab to allow inspection, screening, and collection of soil samples from beneath the slab. Two soil samples were collected from beneath the slab and analyzed for the TAGM 4046 parameters. There was no evidence of contamination in the exposed soils nor were there any exceedances of the TAGM criteria in either sample. The endpoint soil data are presented in Table 10.

## 5.4 NEW CON EDISON TRANSFORMER ADDITION TO BUILDING 8

Concurrent with decommissioning and demolition of the boiler plant, a structure to house new Con Edison transformers and other associated equipment and controls was constructed as an addition to the south side of Building 8 (see Figures 4 and 12). The structure consists of a slab on grade construction with strip footings, which required some soil excavation to a depth of about 4 feet below grade surface. The excavation was deepened in the northeast corner to

remove unsuitable materials for foundation construction. The excavated soil was continuously inspected and screened by Langan for any evidence of contamination other than the typical historic fill documented to exist throughout the Site. No material other than the typical historic fill was observed during the entire excavation.

Excavated soil was temporarily stockpiled and waste characterization samples were collected for disposal purposes. Excess excavated soil that was not re-used on the Site was stockpiled to the east near the area of the former boiler house, characterized, and ultimately transported and disposed off the Site to a permitted facility.

Once the final excavation depth was reached, a total of four soil samples were collected from the bottom and sidewalls of the excavation and tested for the complete TAGM 4046 parameters list to document endpoint soil conditions (see Table 11). Figure 4 shows the endpoint soil sampling locations. There were some exceedances of the RSCOs in these samples, but the concentrations fell within those detected previously for the historic fill layer on Parcel B. RSCO exceedances occurred specifically for SVOCs and the metals arsenic, copper, and mercury.

## 5.5 OLD TRANSFORMER BUILDING INVESTIGATION (AOC-3A)

On January 18, 2006, the old Con Edison transformer was removed from the transformer building area located in the extreme southwest corner of the Site, because this structure is no longer needed as part of the Site renovation. On this same date, the associated building, which consisted of a brick and wooden structure sitting on a concrete slab on grade, was demolished. The transformer was located outside of the building to the west, resting on the concrete slab, and was enclosed within a chain link fence (see Figure 14).

Upon removal of the transformer and building, the concrete slab/pad was inspected for staining and screened for VOCs with a PID. Nine concrete core samples were collected and analyzed for polychlorinated biphenyls (PCBs). A total of five soil samples were collected from the edges of the concrete slab prior to its removal and analyzed for PCBs and VOCs. Once the slab was removed, the subsurface soils were inspected and screened with a PID. Four additional samples were collected from the underlying soil and analyzed for PCBs and VOCs.

Soil sampling was completed in accordance with the appropriate USEPA guidance documents for sampling for PCBs around transformer pads, and the DER-10 guidance document for sampling around concrete slabs. The data are presented in Table 12 and showed no significant detections of tested compounds, including PCBs.

# 6.0 NATURE AND EXTENT OF CONTAMINATION

This section presents the nature and extent of contamination on Parcel B as determined during the SRI. The SRI findings are presented on Figures 4 through 12. The soil vapor analytical results for the Building 8/Service Corridor, Building 7, and Building 3 areas are presented in Tables 13A, 13B, and 13C, respectively. The soil analytical results for the Building 8/Service Corridor, Building 7, and Building 3 areas are presented in Tables 6A, 6B, and 6C, respectively. The ambient outdoor air data are presented in Table 14 and the indoor air data are presented in Tables 13A, 13B, and 13C. The groundwater analytical results are presented in Table 7 for both on-site and off-site monitoring wells.

## 6.1 STANDARDS, CRITERIA, AND GUIDANCE VALUES

The analytical results were compared to the following standards, criteria, and guidance values:

- Background Indoor Air – NYSDOH Background Indoor Air Quality Database
- Soil - NYSDEC TAGM-4046 RSCOs.
- Groundwater – NYSDEC SGVs.

The initial RI soil and groundwater samples were analyzed for the full TCL and TAL compounds and the soil vapor samples were analyzed for the TO-15 VOCs (See Section 2.5). Based on the findings of the initial RI soil and groundwater samples, subsequent samples were analyzed for a reduced parameters list of compounds. Therefore, samples collected for the subsequent SRI were analyzed primarily for the TCL VOCs and/or lead as discussed in Section 3.0.

## 6.2 AMBIENT OUTDOOR AIR

Three ambient outdoor air samples were collected to evaluate the presence and concentrations of VOCs that could influence the soil vapor findings. The ambient outdoor air sample results are presented in Table 14. There were no detected concentrations of PCE, TCE, or 1,1,1-TCA in any of the ambient outdoor air samples. Other than these compounds, there were generally low concentrations of numerous compounds including acetone, ethanol, hexane, chlorofluorocarbons (freons), and petroleum-related compounds (e.g., benzene, toluene, and

xylene). Benzene, toluene, and hexane were detected in at least one sample above the NYSDOH 75th percentile concentration. All other VOCs were either ND or detected below the 75th percentile concentration (NYSDOH Guidance Document).

## 6.3 SOUTH HALF OF BUILDING 3 (NORTH HALF OF FORMER BUILDING 28)

### 6.3.1 Indoor Air

Investigation Summary

A single indoor air sample (B28-SVI-100405) was collected in the south half of Building 3 and analyzed for a TO-15 scan by Spectrum Analytical. This sample was collected in accordance with the NYSDOH Guidance Document utilizing a 6-liter Summa canister. The results are contained in Table 13C.

Investigation Findings

No compounds were detected above the 75$^{th}$ percentile for background indoor air in the south half of Building 3. Acetone and ethanol were present either at comparable or only slightly higher concentrations than in the outdoor ambient air samples.

Conclusions

The low indoor air concentrations detected are likely the result of petroleum fueled equipment and construction related materials operating inside the building at time of sampling.

### 6.3.2 Soil Vapor

Investigation Summary

A total of 12 soil vapor samples were collected from the south half of Building 3. See Figure 11 and Table 13C for the sample locations and results. All samples were analyzed for TO-15 by Spectrum Analytical. The raw analytical data can be found in Appendix H.

Investigation Findings

Detectable levels of TCE and PCE were identified in the south half of Building 3. The data are indicative of a soil vapor plume centering on the prior RI soil vapor sampling location SG-3 and SRI soil vapor sampling location B28-SV8.

*PCE:* The highest concentration of PCE was detected at 16,500 ug/$m^3$ at B28-SV8, which is located at the southeast corner of the current Building 3 outline. Elevated PCE levels were confined generally to the south half of the building. Detectable, but lower PCE levels were measured beneath the west/northwest portion of the south half of Building 3, at one perimeter location (SV-PER2), which is located on the sidewalk just west of Building 3, and in sample B7-SV14, which was located further south just north of Building 7.

*TCE:* Similar to PCE, the highest concentration of TCE was also detected at location B28-SV8 at 570 ug/$m^3$. Elevated TCE levels were confined to the central portion of the south half of Building 3, including SRI sample locations B28-SV8, B28-SV5, and initial RI sample SG-3, suggesting breakdown of the upgradient PCE source. TCE was also detected to the south, beneath the portion of Parcel A between Buildings 3 and 7, and just west of SRI sample location B3-SV1 (see Figure 11)

Conclusions

PCE and TCE concentrations encountered during the sub-slab and soil vapor investigation of Building 3 indicate a potential future exposure risk that will be addressed with the design and installation of a sub-slab vapor mitigation system.

### 6.3.3 Soil

Investigation Summary

A total of 109 soil samples were collected from the south half of Building 3. All samples were analyzed for VOCs by Spectrum Analytical. See Figures 6 and 13, and Tables 6C, 15, and 16 for the sample locations and results.

Investigation Findings

Soils exceeding the NYSDEC RSCOs were identified at three locations within the Building 3 area (see Figure 13), specifically at SRI boring location B3-37 and in soil samples B3-Pipe3-0.5 and B3-Pipe2-1 collected along the underground piping network. These findings are supported by the 41 soil samples collected from under the piping that was removed to attempt to locate a source area, and by the 21 soil samples collected at the base of foundation excavations from the south (outdoor) portion of the building, in addition to the numerous additional soil borings that were installed in Building 3.

*Boring Location B3-37 - Concrete Drain Structure Samples*

Solvent-impacted material (including TCE and PCE) was found within the concrete drain structure in the southwest corner of the building. The following compounds were detected in sample B3-37-2.5-3, collected from a depth of 2.5 to 3 feet below the building slab, at the concentrations noted: methyl ethyl ketone at 1,020 ug/kg, benzene at 126,000 ug/kg, chloroform at 151,000 ug/kg, dichloromethane at 11,700 ug/kg, ethylbenzene at 17,800 ug/kg, methylbenzene at 345,000 ug/kg, PCE at 294,000 ug/kg, TCE at 1,420,000 ug/kg, and total xylenes at 67,300 ug/kg.

In the next deeper sample from B3-37 (B3-37-7-7.5), collected from 7 to 7.5 feet below the building slab at the apparent bottom of the drain, four compounds exceeded their RSCOs at substantially lower levels than those detected in the shallow sample: benzene at 148 ug/kg, methylbenzene at 1,570 ug/kg, PCE at 2,510 ug/kg, and TCE at 3,410 ug/kg.

One additional deeper sample was collected to vertically delineate the VOCs present in the upper two samples, samples B3-37-9 from a depth of nine feet bgs. The sample showed only low level detections of VOCs below the TAGM RSCOs, thus the VOCs were vertically delineated in this area.

There were no VOC exceedances in the soil samples collected from borings located outside the drain structure (B3-36, B3-38, and B3-39) and at the same depth as the affected sample from B3-37 (2.5-3 feet bgs), thereby laterally delineating the VOC-impacted soil/sediment and confirming that it was confined to the drain structure.

*Sub-Pipe Sample B3-Pipe2-1*

As concluded in Section 4.4.1, the area around sample B3-Pipe2-1 represents the source area in soil of the groundwater plume. The following compounds were detected in this sample at the concentrations noted: PCE at 5,640 ug/kg; and benzene at 92.3 ug/kg. (see Table 15).

*Sub-Pipe Sample B3-Pipe3-0.5*

The following compounds were detected in the second sample collected from beneath piping (sample B3-Pipe3-0.5) at the concentrations noted: PCE at 3,060 ug/kg (see Table 15).

Conclusions

Based on the configuration of the soil vapor plumes and the locations of the two sub-pipe samples noted above, the areas of the drain structure and piping network in the south half of Building 3 appear to be the primary sources of the PCE/TCE in soil vapors beneath Building 3 that extend onto the spur of Parcel A leading to 80$^{th}$ Street. Although the location of the drain structure does not correlate to the core of the soil vapor plumes, it is possible that this structure was a contributing source to the soil vapors. Further, the location of the easternmost sub-pipe sample, B3-Pipe2-1, which was directly beneath a cracked portion of the pipe, correlates to the apparent point of origin of the groundwater plume; therefore, we conclude that historic release of PCE- and TCE-containing liquids from the piping in this area is the source of the groundwater contamination. Periodic downwards flushing of this material by rainwater draining from the roof and through the cracked pipe facilitated the downward migration of contamination to the water table. Other than these two isolated areas, no significant VOC hot spots were identified. The data suggest that the piping system functioned properly as designed with only minor leaks. As was typical for historic facilities of this type, it is likely that solvent wastes were discharged into sinks or drains into the underground piping network by former tenants in Building 3, including a tenant on the second floor, Manhattan Postcard, which glued plastic parts together to make Christmas novelties, and these wastes found their way into the ground through these identified breaks in the piping.

## 6.4 NORTH HALF OF BUILDING 3 (FORMER BUILDING 37)

### 6.4.1 Indoor Air

Investigation Summary

A single indoor air sample (B3-SVIN-111405) was collected in the north half of Building 3 and analyzed for a TO-15 scan by Spectrum Analytical. This sample was collected in accordance with the NYSDOH Guidance Document utilizing a 6-liter Summa canister. The results are contained in Table 13C.

Investigation Findings

Only hexane was detected at a concentration above the 75$^{th}$ percentile for background indoor air in the north half of Building 3. All other VOCs were either ND or detected below the 75$^{th}$ percentile concentration, including detected levels of hexane, toluene, and xylene. This is near the corner of Cooper and 80$^{th}$ Street, where there have been five documented spills, and near former USTs that were discovered and removed on Parcel A. Acetone and ethanol were present either at comparable or higher concentrations than in the outdoor ambient air samples.

Conclusions

The low indoor air concentrations that were detected are likely the result of petroleum fueling equipment that was used inside Building 3 during site renovation work and/or as a result of residual vapors from the UST removal effort on Parcel A or adjacent vapors from nearby spill sites.

### 6.4.2 Soil Vapor

Investigation Summary

A total of four soil vapor samples were collected from the north half of Building 3. See Figure 11 and Table 13C for the sample ID's, locations and results. All samples were analyzed for TO-15 by Spectrum Analytical. The raw analytical data can be found in Appendix H.

Investigation Findings

TCE was not detected in soil vapor under this building. Despite the PCE vapor plume beneath the south half of Building 3, PCE was present at only two of the four sampled locations in the north half of Building 3, on the east side of the building. Detectable levels were identified in B3-SV30 at 936 ug/$m^3$ and B3-SV31 at 392 ug/$m^3$. PCE was not detected in the other two SRI samples (B3-SV6 and B3-SV7) collected from the north half of Building 3, nor in the two initial RI soil vapor samples, B-46/SG-2 and B-45/SG-1 (see Figure 11).

Although toluene was detected in soil vapor at concentrations ranging from non-detected to 89 ug/$m^3$, there is no history of petroleum storage or use on this portion of the Site, and no petroleum-related compounds were found in soil or groundwater samples collected from beneath this building.

Conclusions

Two fuel oil storage tanks and limited quantity of petroleum-impacted soil were removed at the adjoining Parcel A site due east of the southeast corner of this building suggesting that residual vapors from these tanks may be the source of the toluene. The tanks and spill were properly closed per NYSDEC regulations. In addition, there are five documented off-site spills to the west and northwest of the Cooper Avenue and 80$^{th}$ Street intersection (see Section 2.7).

TCE was not detected in soil vapor under this building. PCE was detected at two locations (B3-SV31 and B3-SV30) at 392 and 936 ug/$m^3$, respectively. As a precautionary measure, a vapor mitigation system will be designed and installed in this portion of the Building.

### 6.4.3 Soil

Investigation Summary

A total of four soil samples were collected in the north half of Building 3. All samples were analyzed for VOCs by Spectrum Analytical. See Figures 6 and 13, and Table 6C for the sample IDs, locations, and results.

Investigation Findings

There were no TAGM exceedances identified in any of the four soil samples collected. Only detections of VOCs below TAGM RSCOs were noted.

Conclusions

Based on the results of these four soil samples, no further investigation or remediation is warranted due to the absence of TAGM exceedances.

## 6.5 GROUNDWATER IN THE VICINITY OF BUILDING 3

### 6.5.1 Investigation Summary

A round of groundwater samples was collected in both March and June 2006, from the four groundwater monitoring wells in the vicinity of Building 3. All samples were analyzed for VOCs by Spectrum Analytical. See Figures 7, 8, 9, and 10, and Table 7 for the sample locations and results. The raw analytical results can be found in Appendix H.

### 6.5.2 Investigation Findings

Well MW-65 was installed within 10 feet of the solvent-impacted concrete drain structure in Building 3, but only PCE was detected at a trace concentration well below the SGVs. Based on these data, the concrete drain structure is not the source of PCE or TCE in the groundwater.

The highest concentration of PCE and TCE in groundwater on the Site was measured in well MW-63, with PCE at 337 ug/l and TCE at 23.9 ug/l. Prior to development of Parcel A, the historic regional direction of groundwater flow was to the south-southwest (see Regional Water Table Elevation Map Insert on Figure 7). Therefore, Well MW-63 was at one time situated hydraulically downgradient of sub-pipe sample B3-Pipe2-1, where the highest PCE level was detected in soil supporting the theory that the sub-slab piping network in Building 3 was the source of the PCE and TCE in groundwater. Figures 8 and 10 illustrate the locations of these wells and the groundwater isoconcentration lines for PCE and TCE. See Section 6.8 for a discussion of on-site groundwater issues.

## 6.6 BUILDING 7 (SOUTH HALF OF FORMER BUILDING 28)

### 6.6.1 Indoor Air

Investigation Summary

A single indoor air sample (B7-SVIN-111105) was collected in Building 7, during soil vapor sampling, and analyzed for a TO-15 scan by Spectrum Analytical. This sample was collected in accordance with the NYSDOH Guidance Document utilizing a 6-liter Summa canister. The results are contained in Table 13B.

Investigation Findings

No VOCs were detected at a concentration above the 75$^{th}$ percentile for background indoor air in Building 7.

Conclusions

There were no indoor air quality issues observed in Building 7.

### 6.6.2 Soil Vapor

Investigation Summary

A total of six soil vapor samples were collected from the footprint of Building 7. See Figures 5, 11, and 12, and Table 13B for the sample locations and results. All samples were analyzed for TO-15 by Spectrum Analytical. The raw analytical data can be found in Appendix H.

Investigation Findings

PCE concentrations in the area of Building 7 ranged from ND to 118 ug/m$^3$, and TCE concentrations ranged from ND to 13.5 ug/m$^3$ at B7-SV5. The 118 ug/m$^3$ of PCE was detected at B-7-SV14, which is located on the sidewalk outside and just north of Building 7. Detected PCE concentration within Building 7 peaked at only 13.2 ug/m$^3$ at B7-SV6.

Conclusions

These soil vapor data for the Building 7 area do not appear to reflect any PCE source within Building 7, but they do serve to delineate the leading edge of the PCE and TCE vapor plume originating in Building 3 and extending to the south-southwest. Although soil vapor is not

considered a significant concern within Building 7, as a precautionary measure, an active vapor mitigation system will be designed and installed in this building.

### 6.6.3 Soil

Investigation Summary

A total of 30 soil samples were collected within the footprint of Building 7 and analyzed for VOCs and lead. See Figure 5 and Table 6B for sample locations and results. Appendix H contains the raw analytical data.

Investigation Findings

*VOCs*

VOC-impacted soil was identified beneath the south end of the building at a depth of about 9-10 feet at soil-boring locations B7-5, B7-5E, B7-1, and B7-1N. Four soil samples were collected from this layer and showed exceedances above the RSCOs for benzene (one exceedance at 80.7 ug/kg), chloroform (exceeded in all four samples ranging from 342 to 19,300 ug/kg), carbon tetrachloride (one exceedance at 5,460 ug/kg), TCE (one exceedance at 1,370 ug/kg), o-xylene (one exceedance at 4,120 ug/kg), total xylenes (one exceedance at 3,470 ug/kg), and dichloromethane (one exceedance at 352 ug/kg). The sample collected at B7-5E (9-9.5') indicated the highest concentrations of VOCs. As a result, deeper soil samples were collected at B7-5E to delineate the vertical extent of VOC impacted soil at this location. Additional sampling and analysis of deeper soil samples at B7-5E (B7-5E-11-13, B7-5E-15-17, B7-5E-19-21, and B7-5E-26-28) indicated that no VOCs exceeded their respective RSCOs in any of the deeper samples, and therefore, VOCs were vertically delineated at B7-5.

Six soil borings were completed on all four sides of borings B7-5 and B7-5E, specifically borings B7-5S, B7-5N, B7-5W, B7-2, B7-1S, and B7-11 in order to delineate the lateral extent of VOC–impacted soil. Soil samples were collected within the impacted depth interval (9-10 feet bgs). There were no RSCO exceedances of VOCs in any of these samples.

*Lead*

Lead exceeded its RSCO in two of the four samples that exhibited the highest VOCs in Building 7, samples B7-5E-9-9.5 at 601 mg/kg and B7-1-9.5-10 at 1,230 mg/kg. No other soil samples collected in Building 7 during the SRI exceeded the lead RSCO.

Conclusions

The lateral extent of the VOC-impacted soil was delineated through the completion of six adjacent soil borings around borings B-7-5 and B7-5E, specifically borings B7-5S, B7-5N, B7-5W, B7-2, B7-1S, and B7-11. There were no RSCO exceedances of VOCs in any of these lateral borings. The vertical extent of VOC-impacted soil was delineated below B7-5E (9-9.5'), where the highest concentrations of VOCs were detected. Additional sampling and analysis of deeper soil samples at B7-5E indicated that no VOCs exceeded their respective RSCOs in any of the deeper samples.

There is no impact to soil vapor from this contaminated soil layer and it is effectively capped by the building floor. However, due to the presence of the VOCs, vapor mitigation in the form of a sub-slab vapor depressurization system will be installed in Building 7 as a precautionary measure.

Besides the limited VOC-impacted soil area, soil possibly containing lead above the RSCO is extrapolated to exist beneath the east central portion of the building in isolated pockets based on the initial RI findings and data and the SRI data (see Figure 5). This lead contaminated area is capped and isolated under the slab, and is thus not leaching into the groundwater. Lead will be identified as a constituent of concern (COC) for soil in the Site Management Plan to be developed for the Site in the FER.

### 6.6.4 Groundwater in the Vicinity of Building 7

Investigation Summary

Two wells are located in proximity to Building 7, MW-60, and MW-6. MW-60 is located along the west boundary of Building 7 along 80th Street and MW-6 was re-installed on the northwest side of Building 7, along 80th Drive West. Each well was sampled in both March and June of

2006. Samples were submitted to Spectrum Analytical for VOC analyses. Laboratory reports are provided in Appendix H.

Investigation Findings

PCE and TCE were detected in groundwater in MW-60, and MW-6. In March 2006 the concentrations of PCE and TCE, respectively, were 173 ug/l and 7.0 ug/l for MW-60 and 123 ug/l and 5.9 ug/l for MW-6. In June 2006 the concentrations of PCE and TCE, respectively, were 208 ug/l and 9.9 ug/l in MW-60, and 253 ug/l and 12.1 ug/l in MW-6. MW-60 is located along the west boundary of Building 7 along 80th Street, and MW-6 is located near the northwest corner of Building 7.

Conclusions

Based on a comparison between the March and June sampling events, PCE and TCE concentrations slightly increased in both monitoring wells (see Figures 8 and 10). See Section 6.8 for a discussion of on-site groundwater issues.

## 6.7 BUILDING 8 (FORMER BUILDING 1) AND SERVICE CORRIDOR

### 6.7.1 Indoor Air

Investigation Summary

Two indoor air samples (B1-SVIN-100505, and AIN-110405) were collected in Building 8 and analyzed for a TO-15 scan by Spectrum Analytical. These samples were collected in accordance with the NYSDOH Guidance Document utilizing a 6-liter Summa canister. The results are contained in Table 13A.

Investigation Findings

Benzene, hexane, and xylenes were detected at concentrations above the 75th percentile for background indoor air in Building 8. All other VOCs were either ND or detected below the 75th percentile concentration.

Conclusions

The indoor air concentrations detected are likely the result of petroleum fueled equipment and construction related activities that were occurring in the building during sampling.

### 6.7.2 Soil Vapor

Investigation Summary

Ten soil vapor samples were collected from the footprint of Building 8 and the covered alleyway between Buildings 8 and 7. See Figures 4 and 12 and Table 13A for the sample locations and results. All samples were analyzed for TO-15 by Spectrum Analytical. The raw analytical data can be found in Appendix H.

Investigation Findings

PCE was detected in all eight soil vapor samples collected below Building 8, with TCE was detected in six of the eight samples. The two soil vapor samples collected in the alleyway did not result in detection of PCE or TCE. Figure 12 shows the detected TCE and PCE levels, posted next to each sampling location, and the resulting isoconcentration lines.

*PCE:* PCE was detected in all soil vapor samples collected under the building. The highest PCE concentrations were found in the center and the eastern portion of the building at B1-SV4 (1550 ug/l) and B1-SV7 (1380 ug/l). PCE was not detected north of Building 8.

*TCE:* The area under Building 8 where TCE was detected is generally limited to the eastern portion of the building. TCE was not detected north of Building 8 or in the western portion of Building 8. The most elevated TCE concentrations are in the northeastern portion of the building. Concentrations ranged from ND at both B1-SV1 and B1-SV2, to 1210 ug/l at B1-SV7.

Conclusions

Due to the presence of PCE and TCE in the soil vapor below the building, the potential exists for a future exposure risk. An active vapor mitigation system will be designed and installed in Building 8. The north boundary of the PCE and TCE vapor concentrations does not extend beyond the building. TCE vapor concentrations do not extend beyond the west and southwest limit of the building. PCE vapor concentrations beyond the west and southwest limit of the

building are, in our opinion, not significant. However, given the presence of TCE and PCE in soil vapor beneath the southern portion of the building, the NYSDOH required additional soil vapor sampling to evaluate the extent of soil vapor impacts to the south of Building 8. The results of the additional soil vapor sampling south of Building 8 is described in Section 6.9.

### 6.7.3 Soil

Investigation Summary

A total of 28 soil samples were collected from the Building 8 footprint and surrounding areas. All samples were analyzed for VOCs by Spectrum Analytical. See Figure 4, and Table 6A for the sample locations and results.

Investigation Findings

No VOCs were detected within the Building 8/Service Corridor area soil samples above their respective RSCOs.

Conclusions

A soil source of soil vapors was not identified despite comprehensive soil investigations. No further soil investigation or remediation is warranted.

### 6.7.4 Groundwater in the Vicinity of Building 8

Investigation Summary

Two wells are located in close proximity to Building 8, MW-62, and MW-38. MW-62 is located at the northeastern corner of Building 8. MW-38 is one of the original RI groundwater well locations and is located along the west boundary of the Site. Each well was sampled in March and June of 2006. Samples were submitted to Spectrum Analytical for VOC analyses. See Figure 4, 7, 8, 9, and 10 and Table 7 for the well locations and sample results. The laboratory reports are located in Appendix H.

Investigation Findings

PCE and TCE were detected in both wells. In March, PCE and TCE concentrations in well MW-38 were, respectively, 144 ug/l and 20.7 ug/l. In June, these concentrations decreased to 51.8 ug/l and 10.8 ug/l. Similarly, in MW-62, PCE and TCE concentrations decreased from 47.7 ug/l to 43.6 ug/l, and from 13.9 ug/l to 9.5 ug/l.

Conclusions

MW-38 is the most downgradient well on the Site, and shows decreasing groundwater concentrations compared to upgradient wells MW-60 and MW-63. See Section 6.8 for a discussion of on-site groundwater issues.

## 6.8 SITE-WIDE GROUNDWATER

### 6.8.1 Investigation Summary

A combined total of sixteen groundwater monitoring wells (twelve on-site and four off-site) were installed during the RI and SRI. It should be noted that one of these wells (MW-63) has since been destroyed and is no longer part of the on-site monitoring well network, which is comprised of fifteen on-site wells that includes monitoring well MW-66 that was installed in the historic downgradient direction of Building 3 to evaluate the VOC plume.

In May 2006, at the request of NYSDEC, four off-site groundwater monitoring wells were installed outside of the Site boundary. At the request of NYSDEC, An additional off-site "sentinel" well (OSW-5) will be installed and sampled in the very near future to define the leading edge of the plume. The results from this well will be provided to NYSDEC and NYSDOH in an addendum to this SRI. Sentinel well OSW-5 will be incporporated into the existing off-site monitoring well network (OSW- 1 through 4) to monitor off-site groundwater quality.

The twelve on-site monitoring wells were sampled in March 2006. In June 2006, the eleven remaining on-site monitoring wells ***and*** the four off-site wells were sampled. All wells were analyzed for VOCs by Spectrum Analytical. See Figures 7, 8, 9, and 10, and Table 7 for the well locations and groundwater sample results. Laboratory reports are located in Appendix H.

### 6.8.2 Investigation Findings

The only VOCs exceeding any NYSDEC SGVs were PCE and TCE. Figures 8 and 10 show the groundwater isoconcentration lines for PCE and TCE for both recent sampling events. Figure 10 includes the most recently installed off-site wells. The March sampling event resulted in the highest concentration of PCE and TCE observed in well MW-63, at 337 ug/l for PCE and at 23.9 ug/l for TCE. Comparatively lower off-site concentrations were detected in off-site wells (see Figure 10 and Table 7). Off-site monitoring well OSW-2 exhibited PCE and TCE concentrations of 0.7 ug/l and 7.2 ug/l, respectively. The PCE concentration is well below the NYSDEC SGV. However, the TCE concentration in this well was slightly above the NYSDEC SGVs, and therefore, sentinel well OSW-5 will be installed further downgradient to define the leading edge of the TCE plume. Sentinel well OSW-5 will be the most downgradient off-site well, and it will be incporporated into the off-site monitoring well network to monitor off-site groundwater quality,, which is further described in the Remedial Action Work Plan for the Site.

In the groundwater (as in the soil), PCE occurs at higher concentrations than TCE. Neither PCE nor TCE were detected in the two Site upgradient wells (MW-57, and MW-58) installed previously as part of the original RI.

The PCE and TCE in groundwater exist as individual coincident plumes oriented in a general north-south alignment originating in the southeast corner of Building 3 (see Figures 8 and 10). The groundwater plume orientation is generally consistent with the regional south-southwesterly groundwater flow direction, with a deflection of the north end of the plume to the west due to the combined effects of the Site construction and storm water detention basin (compare Figures 7, 8, 9, and 10).

### 6.8.3 Conclusions

- The highest groundwater detections of TCE and PCE were found in MW-63, which is situated [historically] downgradient of the piping network in Building 3. Prior to development of Parcel A, the historic regional direction of groundwater flow was to the south-southwest (see Regional Water Table Elevation Map Insert on Figure 7).

Therefore, Well MW-63 was at one time situated hydraulically downgradient of sub-pipe sample B3-Pipe2-1, where the highest PCE level was detected in soil supporting the theory that the sub-slab piping network in Building 3 was indeed the source of the PCE and TCE in groundwater.

- Groundwater concentrations are not indicative of the presence of non-aqueous phase liquid (NAPL) PCE or TCE at the Site
- There are no groundwater receptors located downgradient of the Site,
- The historic regional groundwater flow direction at the Site is to the south-southwest (Figure 7). However, localized groundwater flow is now influenced by a subsurface stormwater detention field that was installed on Parcel A resulting in a mounding effect, and a localized radial flow beneath Parcel B from the southwest to the northwest (Figures 7 and 9).
- The nearest public water supply wells are located approximately 1.9 miles southeast and cross-gradient of the Site.
- Delineation of the leading edge of the PCE and TCE plume in the downgradient direction of the Site will be complete with the installation of sentinel well OSW-5.
- Due to the presence of on-site groundwater concentrations of PCE and TCE above the NYSDEC SGVs, which are migrating off-site, active groundwater remediation is recommended.
- Given the low levels of both TCE and PCE in off-site groundwater, and the intention for active remediation of the on-site groundwater plume, we believe the combination of active on-site treatment and monitoring of the minor off-site plume, is a reasonable approach to satisfy short- and long-term groundwater quality goals and address any potential human health protection objectives.
- An on-site remedy is being designed to remediate the groundwater plume. The existing on- and off-site well network is sufficient to allow future monitoring of the plume.
- As part of the original RI, a groundwater monitoring well (MW-20) was installed along the southeast border of Atlas Park-Parcel A and the Atlas Terminals property. Historic

sampling results indicate the presence of TCE concentrations in the range of 10 to 20 ug/l in this well (See Figure 12 from the January 2005 Langan RI Report). This information is useful in evaluating the configuration of the TCE plume along the southern boundary of Parcel B. It is likely that an off-site source further to the east is contributing to the TCE concentrations along the south

- With the installation of sentinel well OSW-5, it is anticipated that the leading edge of the VOC plume will be defined. Sentinel well OSW-5 will be utilized as part of the proposed monitoring well network to monitor off-site groundwater quality, which is further described in the Remedial Action Work Plan for the Site.

## 6.9 OFF-SITE SOIL VAPOR

### 6.9.1 Investigation Summary

Based on the initial RI results and in accordance with the SRI Work Plan, the potential for off-site soil vapor migration was evaluated. A total of six (6) soil vapor samples were initially collected along the Site property line on each side of the Site at the locations shown on Figures 4, 5, and 6. Sample locations SV-PER1 and SV-PER5 were situated on either side of Building 8 where elevated soil vapors were detected during the RI (see Figure 4). Similarly, sample locations SV-PER2 and SV-PER4 were situated on either side of Building 3 where elevated soil vapors were detected during the RI (see Figure 6). Sample locations SV-PER3 and SV-PER6 provided representative coverage of the north and south property lines, respectively, although elevated soil vapors were not previously detected in these areas (see Figures 4 and 6).

The off-site/perimeter sampling program was expanded to include three additional samples along the sidewalk west of Buildings 3 and 7 (B3-SV1, B3-SV35, and B7-SV12) and three samples along the sidewalk across 80$^{th}$ Street from these buildings (B3-SV34, B3-40SV, and B7-SV13[OS]) to evaluate whether off-site soil vapors were present (see Figures 5, 6, and 11). Based on the results of the above phase of soil vapor probe installations and sampling, the NYSDEC and NYSDOH requested additional soil vapor sampling.

Five additional on-site and off-site soil vapor probes were installed and sampled in mid August 2006 to supplement the soil vapor database. Two soil vapor probes (OSV-1 and OSV-2) were

installed and sampled along 80th Street just east of the residences to the south of Cooper Avenue. One soil vapor probe (OSV-3) was installed and sampled adjacent to off-site monitoring well OSW-1 adjacent to the viaduct in the northwest corner of the residential area. Two soil vapor probes (SV-PER6(re-installed) and SV-PER7) were installed and sampled on the Site within the southern boundary of Parcel B, north of the LIRR right-of-way and the residential area west of 80th Street to re-evaluate soil vapor concentrations at the southern perimeter of Parcel B.

All soil vapor probes were analyzed for TO-15 analyses by Spectrum Analytical. See Figures 11 and 12, and Tables 13D for sample locations and analytical results. See Appendix H for the raw analytical data.

### 6.9.2 Investigation Findings

PCE and TCE were identified in samples B3-SV1 and SV-PER2, both of which were located on the sidewalk directly west of Building 3. Off-site TCE and PCE observations in the soil vapor further west of Building 3 and across 80th Street demonstrate significant attenuation between soil vapor probe locations B3-SV1 and SV-PER2, and the five soil vapor probe locations (B3-SV34, B3-40SV, B7-SV13[OS], OSV-1 and OSV-2) that are located further to the west and northwest across 80th Street (see Figure 11).

The soil vapor results from the new on-site probes within the southern property boundary were as follows: non-detect for TCE and 4.5 ug/$m^3$ in SV-PER7 and 1.6 ug/$m^3$ TCE and 5.5 ug/$m^3$ PCE in SV-PER6(re-installed). These results were significantly lower by an order of magnitude when compared to the initial SRI results from original SV-PER6 at the property boundary which were 30.3 ug/$m^3$ for TCE and 40.6 ug/$m^3$ for PCE.

### 6.9.3 Conclusions

Based on the soil vapor sampling conducted at the five soil vapor probe locations (B3-SV34, B3-40SV, B7-SV13[OS], OSV-1 and OSV-2) in mid August, it is evident that there is significant attenuation of soil vapors across 80th Street. Concentrations of PCE and TCE measured on the west side of 80th Street are significantly lower than those encountered on Site. NYSDOH has

advised that its concern was TCE and not PCE, and therefore, we do not believe that these minimal concentrations in the soil vapor warrant any additional soil vapor sampling or mitigation along 80th Street. It is evident that there is no significant off-site migration of TCE or PCE vapors across 80th Street.

One soil vapor probe (OSV-3) was installed adjacent to monitoring well OSW-1 adjacent to the viaduct in the northwest corner of the residential area. Although groundwater concentrations at OSW-1 were 25.3 ug/l for PCE and 6.4 ug/l for TCE, it should be noted that no TCE was detected in the soil vapor at this location, and PCE was detected at only 7.1 ug/m3. Because of these data, we propose no further action for soil vapor in the vicinity of the viaduct because of the following factors: demonstrated attenuation of soil vapors by several orders of magnitude when compared to on-site soil vapor results beneath Building 8, and no detected TCE in the soil vapor despite trace levels of TCE in the groundwater. To this end, we do not believe that a soil vapor probe further downgradient at well OSW-2 is warranted based on the favorable soil vapor results from OSV-3 at well OSW-1. Groundwater concentrations at OSW-2 were 0.7 ug/l for PCE and 7.2 ug/l for TCE. Therefore, we expect that any PCE in the soil vapor at well OSW-2 would be significantly less or "not detected" since PCE in the groundwater attenuates by nearly three orders of magnitude between OSW-1 and OSW-2. No TCE was detected in OSV-3, which is the soil vapor probe adjacent to OSW-1. Therefore, since groundwater concentrations are similar in both wells, we also would expect the absence of TCE in the soil vapor at OSW-2 as was the case at OSW-1.

Two soil vapor probes (SV-PER6(re-installed) and (SV-PER7) were installed along the southern boundary of Parcel B, north of the LIRR right-of-way and the residential area west of 80th Street to evaluate soil vapor concentrations at the southern perimeter of the site. Note that these probes were located adjacent to monitoring wells MW-UST#2 and MW-16. PCE in the soil vapor was detected at 4.5 and 5.5 ug/m3, respectively at these locations. TCE was not detected in SV-PER7, and only 1.6 ug/m3 was detected in SV-PER6. Groundwater concentrations adjacent to SV-PER6 in well MW-16 were "not detected" for PCE and 7.3 ug/l for TCE. The groundwater concentrations were slightly higher at MW-UST#2 (9.6 ug/l for PCE and 11.0 ug/l for TCE), where TCE was not detected in soil vapor probe SV-PER7. These results along with the groundwater and soil vapor results at OSW-1 and OSV-3, respectively,

confirm that low concentrations of TCE in groundwater do not result in any significant concentrations of TCE in soil vapor under these localized hydrogeologic conditions.

In light of this new data and information along the boundaries of Parcel B, it is evident that TCE is not migrating off-site in significant or even measurable concentrations. Additionally, we do not believe that the minimal detections of PCE in the soil vapor pose a significant risk or warrant any additional soil vapor sampling off site. In conclusion, we propose no further action in regards to performing any additional off-site soil vapor investigation or remediation.

## 6.10 CONCLUSION REGARDING SIGNIFICANT THREAT

Despite the absence of downgradient groundwater receptors, an assessment of off-site migration and degradation/attenuation of the PCE and TCE groundwater plume was completed principally due to NYSDOH's concern over vapor migration from the groundwater plume. It is important to note that the groundwater is present at depths in the range of 55-65' bgs in the eleven on-site and four off-site wells that comprise the monitoring well network for Parcel B. The assessment originally presented in the January 2005 RI Report was updated using the current SRI data.

Both PCE and TCE are subject to attenuation by naturally-occurring processes, including advection, dispersion, sorption, volatilization, and biological degradation. Both compounds are microbially-degraded through a process known as reductive dehalogenation, which is most prevalent under anaerobic conditions. The RI and SRI data indicate that groundwater conditions are anaerobic to neutral, with stabilized pH measured between about 5.5 and 7 (See January 2005 RI Report and Appendix F of the current report).

Several calculations were conducted using the current Site-specific data (PCE concentrations, hydraulic gradient), regional estimates for hydraulic conductivity of the Upper Glacial Aquifer, and default values for the remaining equation parameters. The equations used, the input parameters, and the results are provided in Appendix K. Based on these calculations, PCE concentrations are estimated to naturally attenuate to below the groundwater standard of 5 ug/l within one-quarter mile of the Site without any groundwater remediation. As a conservative,

worst-case scenario, the highest PCE concentration of 337 ug/l that was observed at the Site (MW-63) was assigned to the Site's downgradient boundary as an initial condition.

It is our conclusion that the Parcel B Site is not a "significant threat" site, particularly given the planned remediation. According to the ECL Title 14 Brownfield Cleanup Program law, a site is not a significant threat site merely based on contaminants in groundwater at the site boundary that only slightly contravene drinking water standards. To the contrary, Section 27-1415(7)(c) suggests that if the concentrations at the property boundary are not significant, subsequent to the implementation of an on-site remedy, such concentrations need only be monitored through an Site Management Plan, which must be annually certified by a Remedial Engineer such that no new information has come to the owner's attention, including groundwater monitoring data from wells located at the site boundary, to indicate that the assumptions made in the qualitative exposure assessment of off-site contamination are no longer valid. Every five years the owner at such sites shall certify that the assumptions made in the qualitative exposure assessment remain valid. The requirement to provide such certifications may be terminated by a written determination by the commissioner in consultation with the commissioner of health, after notice to the parties on the brownfield site contact list and a public comment period of thirty days.

According to the qualitative exposure assessment in this SRI (Section 7.0), while there may be some off-site migration of groundwater slightly exceeding the state standards for PCE and TCE, the cumulative results of the RI and SRI investigation of the Site groundwater does not appear to be a significant source of the detected soil vapor contamination. As demonstrated by recent investigations performed by NYSDEC and NYSDOH, vapor lingers immediately under building slabs even after the sources have been removed. No significant sources of VOCs were located on the Parcel B site with the exceptions of VOCs located in the piping network of Building 3 that has since been removed from the Site. Removal of the source under Building 3 may have already resulted in lower vapor concentrations. However, the concentrations present in groundwater when coupled with the minor former tenant's uses of VOC products (a second floor tenant that likely washed parts with solvent when manufacturing and assembling Christmas novelty items) do not suggest the type of significant original source contamination that could have ever resulted in significant off-site vapors that could still exist under slabs.

Moreover, it appears that the Parcel B groundwater plume is situated upgradient and is migrating generally towards a significantly more contaminated groundwater plume associated with the Kliegman Brothers New York State Superfund Site that was declared a significant threat site by NYSDEC based on off-site groundwater impacts that is causing vapor intrusion into nearby residences. The highest detected concentrations of PCE in the soil vapor at the Kliegman Brothers Site are four orders of magnitude greater than the highest concentrations detected at the Parcel B Site, and the Kliegman Brothers Site is located only 1,200 feet away from Parcel B. Unlike the fully delineated soil, vapor and groundwater plume delineation that has been performed at Parcel B through the installation of over 100 soil borings, eighty-five on-site and nine off-site_ soil vapor samples, and twelve on-site and four off-site groundwater wells, the delineation of the Kleigman on- and off-site contamination is far from complete. _Nevertheless, when comparing the sites, and the proposed remedy, the planned remedy for the Parcel B Site, once implemented, will address the groundwater plume and vapor issues. Further, by comparison, the Parcel B Site does not pose a significant threat to those who will occupy the buildings nor the surrounding community. All on-site occupants and off-site residents will be protected by the proposed remedy.

# 7.0 QUALITATIVE HUMAN HEALTH EXPOSURE ASSESSMENT

An assessment of human health, flora, and fauna exposure was conducted for both current (Site renovation) and future site conditions in accordance with the NYSDEC Draft DER-10 Technical Guidance for Site Investigation and Remediation, dated December 2002. The assessment included an evaluation of potential exposure media, receptor populations, and pathways of exposure to Site-related constituents of concern (COCs). Complete exposure pathways have the following five elements: 1) a contaminant source; 2) contaminant release and transport mechanism; 3) a point of exposure; 4) a route of exposure; and 5) a receptor population.

## 7.1 POTENTIAL EXPOSURE MEDIA

Potential on-Site sources of impacted materials include the historic fill containing certain SVOCs and metals above NYSDEC RSCOs, localized pockets of more elevated SVOCs in soil beneath two of the Buildings (7 and 8), a localized area potentially containing lead-impacted soil beneath the east side of Building 7, and localized areas containing VOC-impacted soil. The historic fill is present throughout the Site, including under all of the buildings, although levels of COCs do not exceed the NYSDEC RSCOs at all sampled locations.

VOCs were detected in the soil vapor samples collected from beneath the south half of Building 3 and beneath Building 8 at concentrations that would warrant a mitigation system. However, the presence of vapor exceedances did not correlate to any significant soil source areas that remain on site. The source of the VOCs detected in soil vapor beneath the south half of Building 3 appeared to be form former releases that left a localized area of minor VOC-impacted soil beneath the southeast portion of this building from leaks under a former piping system. A source of the VOCs detected in soil vapor beneath Building 8 was not identified. If releases did occur in this building as suggested by the soil vapor data, these sources are no longer present even though vapor exceedances persist under the building slab.

Based on the RI and SRI data, the PCE/TCE groundwater plume is not a significant source of PCE/TCE detected in soil vapor, because the depth to the water table is approximately 55-60 feet below grade. No elevated PCE/TCE was detected in soil vapors under Building 7 beneath

which the core of the on-site groundwater plume is situated. Therefore, the soil vapor under the buildings was likely the result of former releases, which are for the most part no longer present. However, the RI and SRI data collectedly suggest that none of these former releases were of such magnitude to cause significant off-site exposure conditions. On-site potential exposure will be addressed by the planned on-site remedy and vapor mitigation systems planned in each building.

In summary, the environmental media that may serve as pathways for contaminant migration are subsurface soil/fill and groundwater, the latter only if directly accessed through pumping and utilized for consumption or other uses. Vapor intrusion to indoor on-site air presents a low, but potential, exposure pathway post-construction that will be addressed by sub-slab depressurization systems in each of the on-site buildings. Surface soil is not considered a pathway for contaminant migration because the Site is currently paved or covered with buildings. No landscaped areas exist on Parcel B. Surface water runoff is not considered a pathway for contaminant migration, currently because the pavement and buildings prevent contact between surface water runoff and subsurface soils, and in the future because the Site will be served by an engineered storm water drainage system.

## 7.2 CONSTITUENTS OF CONCERN (COCS)

A constituent of concern is defined as a compound that is present within Site media (e.g., soil, soil vapor, groundwater) at concentrations exceeding the applicable standards and attributable to Site operations or conditions. Site-specific COCs for Parcel B were determined from a review of the Site analytical data, specifically the detected levels, frequency of detection, and any apparent trends in distribution suggesting they are potentially related to Site operations. Based on this analysis, COCs were identified for soil vapor, subsurface soil, and groundwater as discussed below.

### 7.2.1 Soil Vapor

The COCs for soil vapor were identified as the chlorinated solvents PCE, TCE, and 1,1,1-TCA.

### 7.2.2 Soil

The COCs for soil were identified as SVOCs (i.e., PAHs); chlorinated VOCs including PCE, TCE, 1,1,1-TCA, carbon tetrachloride, chloroform; and the metals mercury, arsenic, barium, cadmium, copper, and lead.

### 7.2.3 Groundwater

PCE and TCE were detected in groundwater above the NYSDEC SGVs, and they are identified as COCs in groundwater. Metals, specifically sodium, magnesium, iron, and manganese, were also detected in groundwater at levels exceeding the NYSDEC SGVs; however, these analytes are not COCs and are likely due to naturally occurring conditions.

## 7.3 EXPOSURE ASSESSMENT

### 7.3.1 Current Conditions

In most of Parcel B, soils are currently covered by the existing buildings, pavement, or construction stone on access roadways. Where present, these structures and the existing surface cover prevent human physical exposure to the underlying historic fill, lead-impacted soil, and solvent-impacted soil.

Where they are intact, the building slabs represent vertical barriers to intrusion of VOCs into the buildings. While the existing structures are currently unoccupied and the slabs undisturbed, there are currently no complete exposure pathways between soil vapors in the ground and human receptors in the on-Site buildings. In addition, no VOCs were detected in ambient air at any time within the buildings during the RI field program, suggesting that vapor intrusion is minimal, if occurring at all, and therefore, is not impacting current on-site construction workers. However, even when the slabs have been disturbed, there have been no PID readings. This is principally because when vapors that have been trapped under the sub slab in low concentrations are exposed to indoor air (if well ventilated) or outdoor air, such vapors immediately volatilize and do not cause an exposure. Indoor air sampling performed during the SRI was slightly impacted by petroleum operating equipment.

Groundwater COCs, specifically PCE and TCE, are present on site and found to be migrating off the Site at low concentrations as evident from the off-site groundwater sampling results (Figure 10 and Table 7). There is a potential that human contact could occur via groundwater pumping. However, there are no public drinking water supply wells downgradient of the Site. In addition, both the City and State of New York prohibit pumping of groundwater for consumption or other use without first obtaining a permit that includes testing to confirm the groundwater source meets the state standards. Finally, groundwater is very deep (approximately 55-60 feet below grade), and there is no evidence of off-site vapor migration originating from groundwater or the vadose zone soils. Therefore, this potential migration pathway is incomplete.

It is also important to note that there may be contamination of PCE and TCE in this area from other sites. The property boundary and off-site concentrations of PCE and TCE contamination in MW-38, MW-60, OSW-1, OSW-2, OSW-3, OSW-4, and OSW-5 are extremely low, particularly when compared to the groundwater concentrations for these substances emanating into groundwater from the Kliegman Brothers New York State Superfund Site located only 1,200 feet to the west.

Given the PCE and TCE groundwater contaminant concentrations at the Site boundary and in the off-site wells, in conjunction with all of the other conclusions reached in this qualitative exposure assessment in relation to groundwater and other Site contamination, it does not appear possible that the off-site groundwater plume could be causing any off-site exposures. However, groundwater concentrations will be monitored through an Operation, Monitoring, and Maintenance Plan subsequent to the implementation of the on-site remedy to verify that the remedy is effective in reducing concentrations and stabilizing the plume.

Therefore, we conclude there are currently no complete exposure pathways from soil, soil vapor, or groundwater to human receptors on or emanating from Parcel B, although exposure to soil may be present during renovation work by construction workers. There are no significant flora or fauna in this urbanized area in Queens that are not otherwise co-existing in this urban environment. Therefore, the proposed remediation will only serve to benefit any existing urban flora and fauna by remediaitng chlorinated VOC vapors and groundwater contamination from the environment.

### 7.3.2 Short-Term Conditions during Site Renovation

The planned and ongoing renovation activities at the Site will result in potential exposures to Site COCs by current on-site construction workers. Renovation activities include excavation, demolition/renovation of the existing buildings, and excavation and removal of some impacted soil for new utilities and other structures. All five elements are present, therefore, there is a moderate potential for soil exposure to occur to construction workers and facility representatives to soil COCs via direct contact and ingestion of contaminated soils dust containing Site COCs arising from the excavation activities.

As noted above, the inhalation of soil vapors is unlikely to occur at the levels detected because the NYSDOH has publicly stated, in regards to the IBM Endicott Site near Binghamton, NY, where the NYSDOH conducted an air quality study following the installation of hundreds of SSDSs in public residences, that when vapors trapped under the sub slab in low concentrations, are then exposed to outdoor air, such vapors immediately volatilize, and do not cause an exposure. In addition, for most of the building renovation process, the exterior building walls in each building had large openings providing ventilation during the renovation work. The potential for vapor intrusion will increase once the buildings are fully enclosed, at which time the planned mitigation systems (SSDSs) will be in place and operational beneath Buildings 3, 7 and 8 to relieve the build up of soil vapors thereby eliminating this potential exposure pathway to future occupants in these buildings.

The proposed renovation activities may also result in exposure to the public through off-site migration of dust containing site COCs. However, during the implementation of the Site renovation work conducted on Parcel B to date, there have been only isolated incidents of dust migrating off-site. In these instances, immediate dust suppression measures were implemented to restrict additional offsite migration of dust. Perimeter air monitoring data will be supplied in the Final Engineering Report for Parcel B.

There is neither currently, nor in the future will there be, a completed exposure pathway to groundwater COCs, due to the great depth to groundwater (no construction dewatering required) and because it is not used as a drinking water source downgradient of the Site. However, to prevent any potential for this pathway to occur, Atlas Park, LLC shall agree to a permanent groundwater use restriction that will run with the land, and will be documented in

the environmental easement granted to the NYSDEC. This deed restriction will be provided in the Final Engineering Report for Parcel B.

As part of the ongoing renovation work, potential exposures are being managed/prevented in accordance with the procedures contained within the IRM/RI Work Plan, SMP, HASP, and CAMP, including maintaining site security, and applying appropriate health and safety measures, such as monitoring the air for organic vapors and dust, dust suppression measures, and wearing the appropriate personal protective equipment (PPE). However, none of the exposure levels present on the site exceeds OSHA permissible exposure levels (PELs) for the on-site contaminants.

On one occasion, historic fill was being sorted inside Building 8. The NYSDEC and NYSDOH expressed concern regarding worker safety and exposure to such soil. However, the PID readings did not show any VOC concentrations and the SVOCs and metals in the soil were not present in exceedance of any PELs. Therefore, while minor exposures to on-site workers from dust have been possible, the levels that are present in the on-site soils are well under the exposure limits set by federal OSHA for construction workers. The IRM/RI Work Plan, SMP, HASP, and CAMP requirements, which were incorporated into the general contractor and each subcontractors' own individual SMP, HASP, and CAMP, were re-reviewed with the general contractors and subcontractors, who met with their workers subsequent to this incident. Construction workers cannot be forced to wear PPE by any party other than their own employer. Site conditions were made known to the general contractor, subcontractors and workers, who are responsible contractually for implementing their own SMP, HASP, and CAMP. Langan, as the remedial engineer continued during this incident and continues now to monitor all site construction activities and immediately informs the general contractor and subcontractors project managers when and if a procedure in the IRM/RI Work Plan, SMP, HASP, or CAMP requires compliance.

### 7.3.3 Future (Post-Renovation) Conditions

Upon completion of the proposed renovation activities, Parcel B will be completely covered by the proposed buildings, pavement, and concrete. These surface coverings will prevent direct human exposure to contaminated materials that are left in place. The future use will be

commercial, not residential. Controls and safeguards will be put into place to prevent maintenance and construction workers from being exposed to any such materials in the future. After the buildings are constructed, a complete exposure pathway via potential inhalation of subsurface vapors should not exist as long as the existing building slabs are sealed and the sub-slab depressurization systems are operating.

# 8.0 SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

## 8.1 GENERAL CONCLUSIONS

- Delineation of on-site and off-site soil vapors is complete; no further investigation is recommended.
- Soil vapors requiring mitigation (for PCE and TCE) are present under the Site buildings, but do not extend outside of the Site boundaries at levels requiring mitigation or monitoring.
- Delineation of on-site soils exceeding the NYSDEC RSCOs and groundwater exceeding the NYSDEC SGVs is complete; no further investigation of on-site soil or groundwater is recommended.
- Delineation of off-site groundwater contamination is complete and no further investigation or delineation is recommended. The groundwater plume will be managed and monitored as part of the remedial action that will be described in the Site Managemnt Plan for Parcel B. An air sparge/soil vapor extraction system is proposed to remediate the heart of the plume on the Site, while a monitoring program will address the residuals of the plume.
- Sufficient analytical data were gathered during the SRI to establish site-specific cleanup levels and to develop remedial alternatives for soil vapors under the south half of Building 3 and, and mitigation systems or engineering controls for soil in all areas of the Site. A RAWP addressing the anticipated mitigation and remediation of on-site vapors, and remediation of on-site soil has been prepared and is being simultaneously submitted with this SRI Report.

Specific conclusions are presented separately in the subsections below for soil and soil vapor for each of the three Site buildings. Site-wide groundwater conclusions follow these subsections.

## 8.2 BUILDING 3 CONCLUSIONS

### 8.2.1 Soil Vapor

TCE was not detected in soil vapor under this north half of Building 3. PCE was detected at two locations (B3-SV31 and B3-SV30) at 392 and 936 ug/$m^3$, respectively. As a precautionary measure, a vapor mitigation system will be designed and installed in the north half of Building 3.

PCE and TCE concentrations encountered during the sub-slab and soil vapor investigation of Building 3 indicate a potential future exposure risk that will be addressed with the design and installation of a sub-slab vapor mitigation system.

### 8.2.2 Soil

Two small, localized pockets of soil containing PCE and TCE exceeding the NYSDEC RSCOs were located beneath cracked segments of the building's former, combined sanitary/roof drainage piping system. These locations in the south half of Building 3 correlate to the central core of the PCE/TCE soil vapor plume beneath Building 3, and the estimated point of origin of the PCE/TCE groundwater plume delineated beneath the Site. Thus, we believe that waste drainage from the former postcard/novelty manufacturing operations on the second floor of the Building and leakage from the damaged floor drains are the source of the PCE/TCE soil vapor and groundwater contamination on Parcel B.

In the southwest corner of Building 3, a third area containing VOC-impacted soil contained within a concrete drain structure was located. PCE and TCE were detected at their highest Site concentrations in shallow soil samples collected from within the structure at a depth of 2.5-3 feet bgs. VOC-impacted soil exceeding the TAGM criteria was vertically and laterally delineated using Geoprobe borings, and was limited to the area directly around the structure to a total depth of 7.5 feet. The data indicated that the impacted soils were contained within the structure and had not migrated downwards.

Impacted soil associated with these three areas was delineated and removed from the Site in conjunction with the investigation of deeper soil conditions in these areas.

## 8.3 BUILDING 7 CONCLUSIONS

### 8.3.1 Soil Vapor

These soil vapor data for the Building 7 area do not appear to reflect any PCE source within Building 7, but they do serve to delineate the leading edge of the PCE and TCE vapor plume originating in Building 3 and extending to the south-southwest. Although soil vapor is not considered a significant concern within Building 7, as a precautionary measure, an active vapor mitigation system will be designed and installed in this building.

### 8.3.2 Soil

The lateral extent of the VOC-impacted soil was delineated through the completion of six adjacent soil borings around borings B-7-5 and B7-5E, specifically borings B7-5S, B7-5N, B7-5W, B7-2, B7-1S, and B7-11. There were no RSCO exceedances of VOCs in any of these lateral borings. The vertical extent of VOC-impacted soil was delineated below B7-5E (9-9.5'), where the highest concentrations of VOCs were detected. Additional sampling and analysis of deeper soil samples at B7-5E indicated that no VOCs exceeded their respective RSCOs in any of the deeper samples.

There is no impact to soil vapor from this contaminated soil layer and it is effectively capped by the building floor. However, due to the presence of the VOCs, vapor mitigation in the form of a sub-slab vapor depressurization system will be installed in Building 7 as a precautionary measure.

Besides the limited VOC-impacted soil area, soil possibly containing lead above the RSCO is extrapolated to exist beneath the east central portion of the building in isolated pockets based on the initial RI findings and data and the SRI data (see Figure 5). This lead contaminated area is capped and isolated under the slab, and is thus not leaching into the groundwater.

## 8.4 BUILDING 8/SERVICE CORRIDOR CONCLUSIONS

### 8.4.1 Soil Vapor

Due to the presence of PCE and TCE in the soil vapor below the building, the potential exists for a future exposure risk. An active vapor mitigation system will be designed and installed in Building 8. The north boundary of the PCE and TCE vapor concentrations does not extend beyond the building. TCE vapor concentrations do not extend beyond the west and southwest limit of the building. PCE vapor concentrations beyond the west and southwest limit of the building are, in our opinion, not significant. However, given the presence of TCE and PCE in soil vapor beneath the southern portion of the building, the southern boundary of soil vapor impacts has not been determined. Additional soil vapor sampling is required to evaluate the extent of soil vapor impacts to the south of Building 8.

### 8.4.2 Soil

No soil exceeding the RSCOs for VOCs was identified in the Building 8/Service Corridor area.

## 8.5 SITE-WIDE GROUNDWATER CONCLUSIONS

- The highest groundwater detections of TCE and PCE were found in MW-63, which is situated [historically] downgradient of the piping network in Building 3. Prior to development of Parcel A, the historic regional direction of groundwater flow was to the south-southwest (see Regional Water Table Elevation Map Insert on Figure 7). Therefore, Well MW-63 was at one time situated hydraulically downgradient of sub-pipe sample B3-Pipe2-1, where the highest PCE level was detected in soil supporting the theory that the sub-slab piping network in Building 3 was indeed the source of the PCE and TCE in groundwater.
- Groundwater concentrations are not indicative of the presence of non-aqueous phase liquid (NAPL) PCE or TCE at the Site
- There are no groundwater receptors located downgradient of the Site,

- The historic regional groundwater flow direction at the Site is to the south-southwest (Figure 7). However, localized groundwater flow is now influenced by a subsurface stormwater detention field that was installed on Parcel A resulting in a mounding effect, and a localized radial flow beneath Parcel B from the southwest to the northwest (Figures 7 and 9).
- The nearest public water supply wells are located approximately 1.9 miles southeast and cross-gradient of the Site.
- Delineation of the leading edge of the PCE and TCE plume in the downgradient direction of the Site will be complete with the installation of sentinel well OSW-5.
- Due to the presence of on-site groundwater concentrations of PCE and TCE above the NYSDEC SGVs, which are migrating off-site, active groundwater remediation is recommended.
- Given the low levels of both TCE and PCE in off-site groundwater, and the intention for active remediation of the on-site groundwater plume, we believe the combination of active on-site treatment and monitoring of the minor off-site plume, is a reasonable approach to satisfy short- and long-term groundwater quality goals and address any potential human health protection objectives.
- An on-site remedy is being designed to remediate the groundwater plume. The existing on- and off-site well network is sufficient to allow future monitoring of the plume.
- As part of the original RI, a groundwater monitoring well (MW-20) was installed along the southeast border of Atlas Park-Parcel A and the Atlas Terminals property. Historic sampling results indicate the presence of TCE concentrations in the range of 10 to 20 ug/l in this well (See Figure 12 from the January 2005 Langan RI Report). This information is useful in evaluating the configuration of the TCE plume along the southern boundary of Parcel B. It is likely that an off-site source further to the east is contributing to the TCE concentrations along the south
- With the installation of sentinel well OSW-5, it is anticipated that the leading edge of the VOC plume will be defined. Sentinel well OSW-5 will be utilized as part of the proposed

monitoring well network to monitor off-site groundwater quality, which is further described in the Remedial Action Work Plan for the Site.

- Detected VOC concentrations in the groundwater plume do not rise to the level of posing a significant threat.

## 8.6 OFF-SITE SOIL VAPOR

Based on the soil vapor sampling conducted at the five soil vapor probe locations (B3-SV34, B3-40SV, B7-SV13[OS], OSV-1 and OSV-2) in mid August, it is evident that there is significant attenuation of soil vapors across 80th Street. Concentrations of PCE and TCE measured on the west side of 80th Street are significantly lower than those encountered on Site. NYSDOH has advised that its concern was TCE and not PCE, and therefore, we do not believe that these minimal concentrations in the soil vapor warrant any additional soil vapor sampling or mitigation along 80th Street. It is evident that there is no significant off-site migration of TCE or PCE vapors across 80th Street.

One soil vapor probe (OSV-3) was installed adjacent to monitoring well OSW-1 adjacent to the viaduct in the northwest corner of the residential area. Although groundwater concentrations at OSW-1 were 25.3 ug/l for PCE and 6.4 ug/l for TCE, it should be noted that no TCE was detected in the soil vapor at this location, and PCE was detected at only 7.1 ug/m3. Because of these data, we propose no further action for soil vapor in the vicinity of the viaduct because of the following factors: demonstrated attenuation of soil vapors by several orders of magnitude when compared to on-site soil vapor results beneath Building 8, and no detected TCE in the soil vapor despite trace levels of TCE in the groundwater. To this end, we do not believe that a soil vapor probe further downgradient at well OSW-2 is warranted based on the favorable soil vapor results from OSV-3 at well OSW-1. Groundwater concentrations at OSW-2 were 0.7 ug/l for PCE and 7.2 ug/l for TCE. Therefore, we expect that any PCE in the soil vapor at well OSW-2 would be significantly less or "not detected" since PCE in the groundwater attenuates by nearly three orders of magnitude between OSW-1 and OSW-2. No TCE was detected in OSV-3, which is the soil vapor probe adjacent to OSW-1. Therefore, since groundwater

concentrations are similar in both wells, we also would expect the absence of TCE in the soil vapor at OSW-2 as was the case at OSW-1.

Two soil vapor probes (SV-PER6(re-installed) and (SV-PER7) were installed along the southern boundary of Parcel B, north of the LIRR right-of-way and the residential area west of 80th Street to evaluate soil vapor concentrations at the southern perimeter of the site. Note that these probes were located adjacent to monitoring wells MW-UST#2 and MW-16. PCE in the soil vapor was detected at 4.5 and 5.5 ug/m3, respectively at these locations. TCE was not detected in SV-PER7, and only 1.6 ug/m3 was detected in SV-PER6. Groundwater concentrations adjacent to SV-PER6 in well MW-16 were "not detected" for PCE and 7.3 ug/l for TCE. The groundwater concentrations were slightly higher at MW-UST#2 (9.6 ug/l for PCE and 11.0 ug/l for TCE), where TCE was not detected in soil vapor probe SV-PER7. These results along with the groundwater and soil vapor results at OSW-1 and OSV-3, respectively, confirm that low concentrations of TCE in groundwater do not result in any significant concentrations of TCE in soil vapor under these localized hydrogeologic conditions.

In light of this new data and information along the boundaries of Parcel B, it is evident that TCE is not migrating off-site in significant or even measurable concentrations. Additionally, we do not believe that the minimal detections of PCE in the soil vapor pose a significant risk or warrant any additional soil vapor sampling off site. In conclusion, we propose no further action in regards to performing any additional off-site soil vapor investigation or remediation.

## 8.7 RECOMMENDATIONS

Based on the collective findings of the RI and SRI, and human health exposure assessment for this Site, the following is recommended:

- No additional on-site investigations of soil, soil vapor, or groundwater are recommended because full delineation of these media has been accomplished.
- Vapor mitigation is warranted in Buildings 3 and 8 due to the concentrations of PCE and TCE in soil vapor.
- No additional off-site investigation of soil vapor is recommended because full delineation of this medium has been accomplished.

- No additional off-site investigation of groundwater is recommended because full delineation of this medium has been accomplished.
- Selected groundwater monitoring wells should be monitored following implementation of the on-site remedy to monitor and verify that the groundwater plume is attenuating.
- Active on-site remediation of groundwater is recommended to reduce the concentrations of PCE and TCE in the most concentrated portion of the plume.
- Off-site plume management will be addressed in the Final Engineering Report for Parcel B as part of the Site Management Plan.