CERTIFICATIONS

I, Joel B. Landes, am currently a registered professional engineer licensed by the State of New York. I had primary direct responsibility for implementation of the remedial program for the Atlas Park Parcel B site (NYSDEC BCA Index No. W2-1070-05-06 Site No. C241088).

I certify that the site description presented in this FER is identical to the site descriptions presented in the Environmental Easement, the Site Management Plan, and the Brownfield Cleanup Agreement for Parcel B and related amendments.

I certify that the Remedial Work Plan dated September 1, 2006 and Stipulations in a letter dated December 28, 2006, and approved by the NYSDEC were implemented and that all requests have been substantively complied with.

I certify that the remedial activities were observed by the environmental professionals under my supervision and that the remediation requirements set forth in the Remedial Work Plan and any other relevant provisions of ECL 27-1419 have been achieved.

I certify that all use restrictions, institutional controls, engineering controls, and all operation and maintenance requirements applicable to the site are contained in an environmental easement created and recorded pursuant ECL 71-3605 and that all affected local governments, as defined in ECL 71-3603, have been notified that such easement has been recorded. A Site Management Plan has been submitted by the applicant for the continual and proper operation, maintenance, and monitoring of all engineering controls employed at the site, including the proper maintenance of all remaining monitoring wells, and that such plan has been approved by the Department.

I certify that all export of soil, fill, water or other material from the property was performed in accordance with the Remedial Work Plan, and were taken to facilities licensed to accept this material in full compliance with all federal, state and local laws.

I certify that all import of soils from offsite, including source approval and sampling, has been performed in a manner that is consistent with the methodology defined in the Remedial Work Plan.

I certify that all invasive work during the remediation and all invasive development work were conducted in accordance with dust and odor suppression methodology defined in the Remedial Work Plan.

I certify that all information and statements in this certification are true. I understand that a false statement made herein is punishable as Class “A” misdemeanor, pursuant to Section 210.45 of the Penal Law.

__________________________ ____________ ______________________

New York State Professional Engineer # Date Signature

It is a violation of Article 130 of New York State Education Law for any person to alter this document in any way without the express written verification of adoption by any New York State licensed engineer in accordance with Section 7209(2), Article 130, New York State Education Law.

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LIST OF ACRONYMS

Acronym	Definition
AOC	Area of Concern
AS	Air Sparging
ASP	Analytical Service Protocol
AS/SVE	Air Sparging/Soil Vapor Extraction
BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
bgs	below grade surface
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
C&D	Construction and Demolition
CAMP	Community Air Monitoring Plan
cfm	cubic feet per minute
CQAP	Construction Quality Assurance Plan
CY	Cubic Yards
DNAPL	Dense Non-Aqueous Phase Liquid
DOT	Department of Transportation
DRO	Diesel Range Organics
DUSR	Data Usability Summary Report
EC/ICs	Engineering and Institutional Controls
ECL	Environmental Conservation Law
ELAP	Environmental Laboratory Accreditation Program
EM	Electromagnetic
EPA	Environmental Protection Agency
ESA	Environmental Site Assessment
ESI	Environmental Site Investigation
FER	Final Engineering Report
FID	Flame Ionization Detector
GC	Gas Chromatograph
GPR	Ground Penetrating Radar
GRO	Gasoline Range Organics
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
I/R/C	Ignitability, Reactivity, and Corrosivity
IRM	Interim Remedial Measures
LIRR	Long Island Rail Road
NAPL	Non-Aqueous Phase Liquid
NYCRR	NY State Codes, Rules, and Regulations
NYSDEC	New York State Department of Environmental Conservation

LIST OF ACRONYMS
(CONTINUED)

Acronym	Definition
NYCDEP	New York City Department of Environmental Protection
NYSDOH	New York State Department of Health
NYSDOT	New York State Department of Transportation
OSHA	Occupational Safety and Health Administration
PAH	Polycyclic Aromatic Hydrocarbons
PBS	Petroleum Bulk Storage
PCB	Polychlorinated Biphenyls
PCE	Tetrachloroethene
PID	Photoionization detector
ppb	parts per billion
PPE	Personal Protective Equipment
ppm	parts per million
PUL	Precision Utility Locator
PVC	Polyvinyl Chloride
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RAO	Remedial Action Objective
RAWP	Remedial Action Work Plan
RCA	Recycled Concrete Aggregate
RCRA	Resource, Conservation, and Recovery Act
RI	Remedial Investigation
ROI	Radius of Influence
ROW	Right-of-Way
RSCOs	Recommended Soil Cleanup Objectives
scfm	standard cubic feet per minute
SCG	Standards, Criteria, and Guidelines
SCO	Soil Cleanup Objective
SMP	Site Management Plan
SOP	Site Operations Plan
SRI	Supplemental Remedial Investigation
SSD	Sub-slab Depressurization
STARS	Spill Technology and Remediation Series Guidance
SVOC	Semi-Volatile Organic Compound

LIST OF ACRONYMS (CONTINUED)

Acronym	Definition
TAGM	Technical Administrative Guidance Memorandum 4046
TAL	Target Analyte List
TCE	Trichloroethene
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure
TOX	Total Organic Halogens
TPH	Total Petroleum Hydrocarbons
TSDF	Treatment, Storage, and Disposal Facility
USACE	United States Army Corps of Engineers
USGS	United States Geological Survey
UST	Underground Storage Tank
VGAC	Vapor-phase Granular Activated Carbon
VOC	Volatile Organic Compound

1.0 INTRODUCTION

Atlas Park LLC (Atlas), the Developer, entered into a Brownfield Cleanup Agreement (BCA) with the New York State Department of Environmental Conservation (NYSDEC) in January 2004, to investigate and, where necessary, remediate a 12-acre, subdivided portion of a larger 80-year old, 20-acre industrial park, Atlas Terminals, located in Glendale, Queens, New York. A United States Geological Survey (USGS) topographical quadrangle map (Figure 1) shows the site location. 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. Refer to the Brownfield Cleanup Program (BCP) application for development details. A boundary map is attached to the BCA Amendment (December 28, 2006) to satisfy the requirements of Environmental Conservation Law (ECL) Title 14 Section 27-1419.

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 "Interim Remedial Measure [IRM] Area") and Parcel B (formerly known as the "Remedial Investigation [RI] Area") as 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 3.506-acre portion. With concurrence from NYSDEC during a meeting on April 18, 2005, the Developer completed the administrative process of separating Parcels A and B into separate BCAs. The approximately 3.506-acre Parcel B is more fully described in Appendix A – Metes and Bounds.

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; Parcel A received a Certificate of Completion from NYSDEC dated December 31, 2005. On October 11, 2005, Parcel B was designated as BCA Index No. W2-1070-05-06 Site No. C241088. On December 28, 2006, an Amendment to the Brownfield Site Cleanup Agreement was issued and Parcel B was further designated as BCA Index No. W2-1101-06-12 Site No. C241088. The Metes & Bounds description can be found in Appendix A.

The Site was investigated in accordance with the scope of work presented in the NYSDEC-approved IRM/RI Work Plan dated January 2004 and Supplemental RI Work Plan dated July 2005. Prior investigations at the Site uncovered a discontinuous layer of fill ranging in thickness from approximately 6 to 15 feet. Portions of the upper zone of fill were found to contain elevated levels of several semi-volatile organic compounds (SVOCs) and metals above the New York State Recommended Soil Cleanup Objectives (RSCOs) contained within the NYSDEC Technical and Administrative Guidance Memorandum (TAGM) HWR-4046

(January 1994). These contaminants are associated with ash and cinders present in the fill as localized pockets or otherwise mixed in with the fill and were generally present within the upper 4 feet of fill but as deep as 7 feet below grade surface (bgs).

The Site also contained several suspected areas of concern (AOCs), including underground storage tanks (USTs) for fuel oil, sub-floor vaults and drain lines, transformers, and lead-contaminated soil. In addition, investigations conducted on Parcel A and Parcel B identified areas of soil vapors in concentrations suggesting the presence of source area(s) on Parcel B. Recent guidelines published in October 2006 by the New York State Department of Health (NYSDOH) indicated that these levels of soil vapors would most likely warrant mitigation systems to prevent soil vapor intrusion into the Site buildings.

This Final Engineering Report (FER) was prepared by Langan Engineering and Environmental Services, P.C. (Langan), a New York State Professional Engineering firm. The FER documents the activities conducted on Parcel B in accordance with the Remedial Action Work Plan (RAWP).

The RAWP was implemented in conjunction with construction of the new development. The goal of implementing the RAWP was to remediate the Site to Track 4 cleanup standards for restricted commercial use. The remediation activities targeted soil, groundwater, and soil vapor present on Parcel B. All soil generated by construction and AOC activities were sampled and analyzed for waste characterization parameters prior to disposal at a permitted, pre-approved facility. All soil remaining on the Site is covered by a composite cover system (i.e., asphalt covered roads, concrete covered sidewalks, and concrete building slabs) which serve as an engineering control (EC) for the entire Site. Several engineering and institutional controls (EC/ICs), including an environmental easement, which covers the entire Parcel B Site, also were implemented. All EC/ICs, including the provisions outlined in the easement, are discussed in the Site Management Plan (SMP) prepared for the Site (Appendix B).

This FER is organized as follows:

- Section 2.0 – Provides the project background, including a description of the Site history, use, and prior environmental investigations; a summary of several investigations and remedial activities that were completed under the BCP; and the technical approach of the remedial action.

- Section 3.0 – Describes the mobilization and general Site management and controls implemented during the remedial activities.

- Section 4.0 – Presents the soil/waste management plan, including descriptions of the various categories of soil/waste and procedures for handling, stockpiling, waste characterization, transport, and disposal.

- Section 5.0 – Describes the remedial activities conducted relative to the three separate areas of construction on Parcel B.

- Section 6.0 - Describes the design, construction, and testing of the sub-slab depressurization (SSD) systems located in on-site Buildings 3, 7, and 8. Although located on Parcel A (off-site), a discussion of the SSD systems at Buildings 4 and 6 are also included.

- Section 7.0 – Describes the design, construction, and effectiveness of the Air Sparging/Soil Vapor Extraction (AS/SVE) systems located in Building 3 and at the southern Site boundary.

- Section 8.0 – Describes the design, and construction of the Site-Wide Composite Cover System.

- Section 9.0 – Describes the existing soil, groundwater, and soil vapor conditions at the Site.

- Section 10.0 – Presents a summary of the Data Usability Summary Reports (DUSRs)

- Section 11.0 – Provides a summary of the SMP.

- Section 12.0 – Presents the summary and conclusions of this FER.

2.0 PROJECT BACKGROUND

2.1 Site Description

The Parcel B Site is located in the Borough of Queens, Glendale, New York and is identified as 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 (ROW) to the south, and Parcel A to the east. Figure 1 consists of a Site Location Map and Figure 2 shows the proposed Site Development Plan.

Parcel B was originally occupied by former manufacturing Buildings 1, 7/7A, 28, 29, and 37. All of these buildings, except Building 29, are currently being renovated as part of "The Shops at Atlas Park". Building 29 will be an unoccupied storage building. Building 28 was cut into two buildings (new Building 7 is the southern half of former Building 28, and the southern half of new Building 3 is the northern half of former Building 28). A portion of Parcel A (the current 80th Drive West), which was investigated and remediated to Track 1 cleanup objectives, now lies between the new Buildings 3 and 7. Historic Building 7/7A was the former boiler house. This building and the associated boiler stack were demolished.

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 BCP documents issued previously. The building locations and new numbers are also shown on figures accompanying this FER.

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 remedial activities conducted and documented in this FER, the Site is presented as three separate areas: Building 3, Building 7, and Building 8/Service Corridor, as illustrated on Figures 4, 5, and 6, respectively. Figure 3 is an index map showing the division of the Site into the three areas.

2.2 Summary of Site History and Use

The Site history was compiled and presented in a Phase I Environmental Site Assessment (ESA), completed by Ambient Group, Inc. (Ambient) in March 2001. The report was provided as an attachment in the BCP Application submitted on December 11, 2003 to NYSDEC. According to the report, in 1867, the Site was owned by the Folk family and consisted primarily of farmland. Based on a review of Sanborn maps as part of the Ambient report, several buildings occupied the Site prior to 1922, although their usage was unknown. In 1922, the property was sold to the Hemmerdinger Corporation, and the Site became Atlas Terminals. The Hemmerdinger Corporation leased portions of the Site to various manufacturing and processing companies during the period of usage and continues to remain a tenant at the Atlas Terminals portion of the property in the textile industry. In 2002, a 12-acre portion of the Atlas Terminals property was transferred to the Developer with the intent to redevelop the 12-acre parcel into the proposed "The Shops at Atlas Park" development project. The 12-acre parcel was subdivided into two distinct areas: Parcel A, which was substantially excavated for subsurface parking, utilities, and foundations of new buildings; and Parcel B, which housed pre-existing buildings that were substantially renovated. Both parcels combined form a mixed-use retail facility that includes retail stores, restaurants, and an open landscaped area known as "The Green".

2.3 Adjoining Property Description

The areas surrounding Atlas Park are zoned mixed residential and manufacturing. Atlas Park is located directly south of Cooper Avenue, which is 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. The LIRR Montauk Branch line ROW lies to the south of the majority of the Site; additional industrial property lies to the south/southeast of the property where the LIRR ROW diverges from the property boundary. The areas immediately south of the LIRR ROW are primarily residential. Parcel A lies due east of the Site; the area further to the east consists of the remainder of the Atlas Terminals industrial park.

A number of additional commercial/industrial sites, both active and inactive, are present in the community around Atlas Park including the following:

- An active t-shirt manufacturing and silk screening plant, is currently located approximately 200-ft to the east of the Site. Former uses in this building included the assembly of Christmas novelties, the same use as a source identified in Building 3 on the Site; and

- A former historic dry cleaning establishment was located just southwest of Building 8 on the west side of 80th Street, less than 200 feet southwest, from the Site.

2.4 Relevant Historical Reports

A Phase I ESA, completed by Ambient in March 2001, and a Limited Phase II Environmental Site Investigation (ESI), completed by Metcalf & Eddy in March 2002, were previously completed for the Atlas Terminals property. The pertinent findings of the two investigations relating to the Site are discussed below.

2.4.1 Ambient Phase I ESA

A Phase I ESA was conducted in March 2001 for the entire 20-acre Atlas Terminals property and identified areas of environmental concern within the Site as follows:

- Underground Storage Tanks: Two 20,000-gallon No. 6 fuel oil USTs were observed in the vicinity of Building 8.

- Chemical Storage: Chemicals were identified on-site and stored in a manner that posed a material threat of release in current Building 7 and former Building 7/7A.

- Presumed Asbestos Containing Material and Lead Based Paint: Potential asbestos containing material and lead-based paint were identified in most buildings. These materials were abated and documentation was provided to NYSDEC under separate cover.

2.4.2 Metcalf & Eddy Phase II ESI

A Phase II ESI was completed for the entire Atlas Terminals property in March 2002. Investigation activities on the Atlas Park property included completion of 29 borings, 16 of which were completed within Atlas Park. The findings of the Metcalf & Eddy Phase II relative to Parcel B are summarized as follows:

- Groundwater lies at a depth greater than 40 feet bgs, the maximum drilled depth, with no groundwater encountered at any boring locations.

- Two 20,000-gallon fuel oil USTs were located east of Building 7.

- No evidence of petroleum or chemical spills was observed in any soil samples collected from the Site.

- No VOCs were detected above the NYSDEC TAGM 4046 criteria.

- A fill stratum with an average depth of 3 to 4 feet underlies most of the Site. Distinct ash/cinder or mixed ash/cinder/soil fill layers were present in 11 of the 29 borings with thicknesses ranging from 0.1 to 3 feet.

- Portions of the ash/cinder component found within the fill contained one or more of the following SVOCs at concentrations greater than the NYSDEC RSCOs and Groundwater Protection Criteria contained in TAGM 4046: benzo(a)anthracene, chrysene, bis (2-ethylexyl) phthalate, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, and dibenz(a,h)anthracene. SVOCs were generally below method detection limits or were detected below the TAGM levels in fill not containing visible ash or cinders.

- One or more of the following metals were detected at concentrations exceeding the TAGM criteria: aluminum, mercury, magnesium, cadmium, copper, and zinc. However, the exceedances were for the most part marginally above the criteria. It was concluded that the exceedances could not be readily attributed to the presence of the ash/cinders/fill since: 1) similar exceedances occurred at depths in the native glacial material; 2) they were not representative of metal compounds typically associated with ash, such as arsenic, cadmium, chromium, lead, and nickel; and 3) they were primarily major-element types such as aluminum, magnesium, and zinc. Since most of the elevated metals only marginally exceed average background levels for Eastern United States (from TAGM 4046), it is likely that they are naturally occurring concentrations.

2.5 Description of Remedial Investigation Findings

2.5.1 Summary of Remedial Investigation Findings

Langan conducted numerous subsurface investigations throughout the Site from January 2004 to December 2006. The findings of these investigations are contained in the Remedial Investigation (RI) Report (January 2005), the Supplemental Remedial Investigation (SRI) Report (September 2006), and SRI Addendum #1 – Offsite Vapor Report (December 2006). Below is a summary of the investigation findings.

Soil

Below is a summary of the soil results from numerous soil samples collected throughout the Site.

- Two small, localized pockets of soil containing PCE and TCE concentrations exceeding the NYSDEC RSCOs were located beneath cracked segments of the former combined sanitary/roof drainage-piping system in Building 3. Langan concluded that waste drainage from the former manufacturing operations is a 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. The soils were delineated, removed, and disposed of accordingly.

- A deep-lying layer of VOC-impacted soil (9 to10 feet below the floor slab) was located and delineated, laterally and vertically, beneath the south end of Building 7. No evidence of vapor intrusion or leaching.

- Lead-impacted soil beneath Building 7, were delineated beneath the south-central and east-central portions of this building. The lead-contaminated soil is covered by an existing building, and therefore, lead is not leaching into groundwater.

- TAGM exceedances occurred throughout the historic fill for the various metals (i.e., mercury, arsenic, barium, cadmium, copper, and lead).

- TAGM exceedances occurred in the historic fill for individual semi-volatile organic compounds (SVOCs), primarily the poly-aromatic hydrocarbon (PAH) list of SVOCs.

Site-Wide and Off-Site Groundwater

Groundwater samples were collected from a network of sixteen monitoring wells during the investigation phase, five of which are located in the surrounding community to the south and southwest of the Site. (See Figure 7). The findings are summarized as follows:

- PCE and TCE in groundwater exceed their respective NYSDEC groundwater standards for on-site groundwater and the configuration of the on-site plume was delineated.

- On-site groundwater contamination exists as coincident PCE and TCE plumes oriented in a general north-south alignment, originating in the southeast corner of Building 3 (See Figure 4).

- The groundwater data did not suggest the presence of a non-aqueous phase liquid (NAPL) PCE or TCE.

- The historic, regional groundwater flow direction at the Site was to the south-southwest; however, locally, the direction of groundwater flow was augmented by the Parcel A construction and operation of the storm water detention basin. Because of the combined effects of these Site conditions, the north end of the PCE/TCE plume deflects towards the west and possibly north-west.

- Off-site migration of contaminants in groundwater exceeding the NYSDEC drinking water standards was revealed. PCE was projected to naturally attenuate to concentrations below the groundwater standard within one-quarter mile of the Site.

- Based on the off-site monitoring well installation and sampling activities, it was evident that PCE and TCE concentrations have naturally attenuated at a rate of 50% within approximately 150 linear feet of the Site boundary. One additional off-site well (OSW-5 - sentinel well) was installed approximately 500 feet from the Site boundary in order to complete the network of wells that will be utilized to monitor the plume as it is remediated.

Soil Vapor

Numerous on-site sub-slab and soil vapor samples were collected during the investigation phase. The analytical findings are summarized as follows:

- VOCs, including TCE and PCE, were detected in the sub-slab vapor samples collected under Building 8 and Building 3 (on-site) and occupied buildings on Parcel A (off-site), at concentrations that warranted mitigation.

- The low concentrations of VOCs in soil vapors detected beneath Building 7 do not pose a significant future exposure risk, however a mitigation system was installed in this Building.

- Additional soil vapor sampling conducted to the south of Building 8 along the Parcel B property boundary adjacent to the railroad right-of-way, resulted in either non-detect or minor detections of TCE and PCE in soil vapors.

Underground Storage Tanks

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

Off-Site Vapor Investigation

Sub-slab, indoor air, and ambient air sampling was performed and in-home survey information was gathered in twelve homes from December 4-6, 2006, to assess whether soil gas is present beneath the residences at concentrations requiring mitigation or monitoring. A supplemental report documenting the results of the off-site residential soil-vapor sampling program was submitted to the NYSDEC and NYSDOH on December 19 [[?]], 2006. Based on a review and evaluation of the analytical data set generated from the sub-slab and indoor air sampling conducted in the twelve residences near Parcel B, re-sampling of two homes will be conducted as part of the Site Management Plan for the Site.

2.6 Summary of Remedial Action Approach

As described in the RAWP, three remedial alternatives were developed, and a remedial alternatives assessment of three potential remedies, was completed for the remediation of Parcel B. Due to such factors as implementability, cost, and long and short-term effectiveness, Alternative 2 was chosen as the most feasible remedial action for Parcel B. Alternative 2 is described as follows:

- Excavation/removal of soil exceeding the NYSDEC approved Track 4 Soil Cleanup Objectives (SCOs), and as needed for Site redevelopment, installation of AS/SVE systems beneath the south half of Building 3 and at the southern property boundary, and implementation of IC/ECs, including physical barriers over the entire site, and SSD systems beneath on-site buildings (Buildings 3, 7, and 8), and off-site buildings at Parcel A (Buildings 4 and 6).

The following Remedial Action Objectives (RAO) were defined:

- Protect on-site workers and the surrounding community from exposure to Site-related contaminants during the planned remedial excavation and construction work that is part of the Site remedy.

- Establish guidelines for the proper management and disposal of soil, water, and other wastes generated during implementation of the proposed remedy.

- Achieve NYSDEC's Track 4 restricted use criteria such that, pursuant to Title 14 of Article 27 of the New York State ECL, ICs or ECs will be required.

- Provide procedures, integrated into the new and existing construction that will address potential future exposure of Site workers, employees, and visitors to soil vapors.

The remedial program for the Site was selected after due consideration of the following factors listed in the BCP law and presented in detail relative to the Site in the Engineering Evaluation of the Remedy section of the Work Plan:

- Protection of human health and the environment;

- Compliance with standards, criteria, and guidelines (SCGs);

- Short-term effectiveness and impacts;

- Long-term effectiveness and permanence;

- Reduction of toxicity, mobility, or volume of contaminated material;

- Implementability;

- Cost effectiveness;

- Community Acceptance; and

- Land use.

A summary of the primary constituents of the remedial action (RA) implemented on the Site are presented in Section 2.6.1.

In addition to those activities presented in section 2.6.1, the following remedy was added by the NYSDEC and NYSDOH after a round of off-site residential vapor sampling, to address off-site vapors. The off-site vapor remedy consists of in-home vapor monitoring (sub-slab, indoor air, ambient outdoor air). The details of the sampling program including procedures to be followed will be defined in the SMP. Homes to be sampled will be approved by NYSDOH and NYSDEC. Pending evaluation of further monitoring results obtained under the SMP, further monitoring of soil vapor and/or mitigation of soil vapor under homes may be required and will be determined by NYSDOH and NYSDEC.

2.6.1 Soil Excavation

2.6.1.1 Excavation

Based on construction plans, excavation was required for construction of building foundations, utilities, and other sub-grade structures in the open, outdoor areas adjacent to, and between the existing buildings. Some interior excavations for new Site utilities, for future tenant build-out plans, were also necessary. Required excavations ranged from approximately 3 to 12 feet bgs, entirely within the historic fill layer. While this excavation removed some of the fill material, some soil would remain on-site under the pre-existing slabs of buildings preserved during renovation. Therefore, precautions are also be implemented to prevent potential future exposure of construction workers and the general public to excavated material.

VOC contaminated soil and sediment encountered in a floor drain in Building 3 was removed, along with three VOC source areas identified under an existing stormwater/sanitary piping network. These areas are a source of PCE and TCE contamination in soil vapor and groundwater beneath Building 3. The stormwater/sanitary piping network was also removed.

2.6.1.2 Backfill

Backfill of the excavations was accomplished by using the excavated soil, provided it was not grossly contaminated (ie. exhibited odors, PID readings, or visible staining). Samples were collected from the stockpiled soil, and analyzed for various waste characterization parameters prior to re-use.

2.6.1.3 Worker Protection

During construction excavation, a minimum 6-inch thick layer of recycled concrete aggregate (RCA) (or TAGM-clean soil) or a layer of 8-mill poly sheeting was placed on top of exposed soil to prevent exposure to construction workers working in the excavations.

2.6.1.4 Dust Control

The potential for generation of dust existed during implementation of this alternative and, as a result, implementation of appropriate controls was necessary. Air monitoring was conducted during construction activities in accordance with NYSDEC and NYSDOH requirements to protect the health and safety of on-site workers and the surrounding community. Dust controls were implemented in conformance with the construction contractor's Health and Safety Plan (HASP) and Community Air Monitoring Plan (CAMP). Standard emission control techniques include:

- Installing gravel pads at vehicle egress points;
- Application of water spray to soil;
- Tarping/covering containers;
- Restricting vehicle speeds to 10 miles per hour on-site; and
- Covering of stockpiled soil and inactive excavations.

2.6.2 Engineering Controls (ECs)

The Controlled Property has three primary ECs. A map illustrating the ECs for the Site is provided in Figure 7 of the SMP (Appendix B). The ECs for the Site are: (1) a composite cover system consisting of asphalt covered roads, concrete covered sidewalks, and concrete building slabs; (2) a soil vapor mitigation system consisting of a sub-slab depressurization system under all building structures (including Buildings 4 and 6 on the adjacent Parcel A); and (3) two groundwater air-sparging/soil vapor extraction systems. This RA includes the use of ECs on the Site to prevent future exposure to soil exceeding TAGM 4046 RSCOs left in place, prevent the off-site migration of contaminants above the SCGs in groundwater, and mitigate the potential exposure to soil vapors under the Site. Descriptions of the three ECs follow.

2.6.2.1 Composite Cover System

Existing building slabs, which are at least 4 inches thick, will act as a cover over contaminated historic fill and soil hot spots containing lead and VOCs (Building 7) and SVOCs (Building 8). In open, outdoor areas, placement of asphalt covered roads, and concrete covered sidewalks, respectively, will also serve as physical barriers. This composite cover system will cover the entire Site leaving no exposed soil. Section 8.0 describes the composite cover system in further detail.

2.6.2.2 Soil Vapor Mitigation System

This RA includes the installation and operation of SSD systems beneath the floor slabs of on-site Buildings 3, 7, and 8 and Parcel A Buildings 4 and 6 (off-site). The primary objective of these systems is to create a negative pressure under the floor slab and draw any adverse soil vapors to a blower system on the roof of each building, where they would be discharged to the atmosphere. These systems do not treat the contamination, but merely mitigate the exposure potential to accumulated adverse soil vapor concentrations. Section 6.0 describes these systems in detail.

2.6.2.3 Groundwater Air Sparging/Soil Vapor Extraction Systems

This RA includes installation and operation of an AS/SVE system beneath the south half of Building 3 centered on the core of the PCE/TCE plume in the groundwater and an AS/SVE system at the southern property boundary. The primary objective of the AS/SVE systems is to substantially reduce the concentrations of constituents of concern in the contaminated zone until either NYSDEC levels or asymptotic contaminant concentrations are achieved at the Site. Additional objectives of the AS/SVE system would be to:

- Reduce the VOC mass contributing to sub-slab vapors, thereby reducing the required time of operation of the SSD systems;
- Reduce the potential for incidental soil vapor migration from the vadose zone into the underlying groundwater via vapor-to-liquid phase diffusion;
- To prevent future off-site migration of contamination in groundwater in contravention of groundwater standards; and
- (In the case of the Building 3 AS/SVE system) Supplement the SSD system beneath Building 3 to maintain a negative pressure below the building floor slab, to prevent soil vapor intrusion.

The groundwater concentrations do not indicate the presence of dense, non-aqueous phase liquid (DNAPL). Therefore, AS/SVE is feasible and is, in fact, a presumptive remedy under these Site conditions. Section 7.0 describes these systems in detail.

2.6.3 Institutional Controls (ICs)

Since residual contaminated soil remains on the Site, ICs are required to prevent future exposures to soil exceeding the TAGM levels by workers conducting intrusive activities relative to Site improvements or maintenance work. The ICs are detailed in the SMP located in Appendix B.

A series of ICs are required to implement, maintain and monitor the above ECs, as defined in the SMP. Adherence to these ICs is required under the environmental easement. A filed copy of the environmental easement is provided in Appendix D. These ICs are:

a) all ECs must be operated and maintained as specified in the SMP;

b) all engineering controls on the Controlled Property must be inspected and certified at a frequency and in a manner defined in the SMP;

c) groundwater, soil vapor and other environmental or public health monitoring must be performed as defined in the SMP;

d) data and information pertinent to site management for the Controlled Property must be reported at the frequency and in a manner defined in the SMP; and

e) on-site environmental monitoring devices, including but not limited to, groundwater monitor wells and soil vapor probes, must be protected and replaced as necessary to ensure continued functioning in the manner specified in the SMP.

The Controlled Property also has a series of ICs in the form of site restrictions. Adherence to these institutional controls is required under the environmental easement (See Appendix D). Site restrictions that apply to the Controlled Property are:

a) The Controlled Property may be used for restricted commercial use only;

b) The Controlled Property may be used for restricted commercial use as long as the following long-term EC/ICs included in the SMP are employed;

c) vegetable gardens and farming on the Controlled Property are prohibited;

d) The use of the groundwater underlying the Controlled Property is prohibited without treatment rendering it safe for intended purpose; and

e) All future activities on the Controlled Property that will disturb residual contaminated material protected under the environmental easement are prohibited unless they are conducted in accordance with the soil management provisions in the SMP.

3.0 MOBILIZATION, GENERAL SITE MANAGEMENT, AND SITE CONTROL

The mobilization/site preparation, general Site management, and Site control activities completed prior to and during the remedial activities are described in this section. This discussion is preceded by a brief description of the pre-mobilization activities that were completed prior to the construction/remedial activities conducted on Parcel B.

3.1 Mobilization/Site Preparation Activities

Mobilization and Site preparation activities for the Site began in October 2004 with the mobilization for the Parcel A remedial action. The remedial activities were completed in December 2006. The activities completed prior to the remedial activities at the Site included:

- Preparation/review of pre-remediation contractor submittals;
- General mobilization activities;
- Construction of entrance/exit roadways, truck wash, and truck scale;
- Construction of soil stockpile areas;
- Installation of erosion control measures and perimeter security fencing; and
- Setup of air monitoring stations.

A description of each of these activities is presented below.

3.1.1 Pre-Remedial Action Submittals

With assistance from their Construction Manager (Plaza Construction Corp. [Plaza]) and Remediation Engineer (Joel B. Landes, P.E.), Earth Technology, Inc. (ETI), a qualified, experienced Remediation Contractor with experience at contaminated urban sites, was selected to implement the remedial activities at the Site (mainly the soil excavation work). The Remedial Contractor maintained a full staff and complement of equipment to conduct not only the excavation activities, but also remediation of the AOCs as they were encountered.

As the Remediation Engineer, Joel Landes, P.E. reviewed and approved the contractor submittals required under the BCP project and, thereby, was responsible for ensuring that the contractor documents for remedial work conformed to the RAWP. The initial required submittals included:

- Site Operations Plan (SOP);
- Site Specific HASP;
- Construction Quality Assurance Plan (CQAP);
- Soil Management Plan;
- Stormwater Pollution Prevention Plan; and
- Documentation for proposed waste disposal facilities, testing requirements, permits/approvals, and commitments from the facilities to receive the waste generated during the remedial activities.

3.1.2 General Mobilization Activities

General mobilization activities included:

- Identifying aboveground and underground utilities (e.g., power, gas, water, sewer, telephone, etc.), equipment, and structures;
- Mobilizing necessary remediation personnel, equipment, and material to the Site;
- Clearing the areas that could obstruct/limit the soil excavation activities; and
- Kick-off health and safety training briefings with the Developer's representatives, the Remediation Contractor, and the Remediation Engineer, Joel B. Landes, P.E.

3.1.3 Stabilized Construction Entrance/Exit and Truck Wash

Under the supervision of the Remediation Engineer, Joel B. Landes, P.E., the Remediation Contractor constructed a stabilized construction entrance and exit area, comprised of a clean gravel roadway, at the southern access point off 80th Street. The public roadways surrounding the Site were cleaned periodically, and on an as needed basis with a street sweeper and water truck. An engineered truck wash/decontamination pad was constructed at this access area in the southwest portion of the Site near the truck exit roadway from the Site. For the majority of the project, trucks entering and leaving the Site in this area were driving over a paved parking lot, and not tracking soil/material off the Site. Upon removal of asphalt from the service corridor, a truck wash pad was constructed. The pad consisted of a 1-foot thick layer of RCA and clean gravel overlying existing soil. The tires and undercarriages of the trucks along with equipment departing the Site were pressure washed on the pad, and rinse waters were allowed to percolate through the RCA/gravel pad and back into the existing soil. The decontamination pad was sloped so that all wash waters remained on the Site, thus preventing exposure to the adjacent roadway. For a two to three day period, trucks were driving over subsurface soil and onto the truck pad for washing. At the recommendation of the Remediation Engineer, Joel B. Landes, P.E., the entire service corridor was covered with a 6-inch layer 3/4 –inch crushed stone (asphalt sub base) to ensure that truck traffic was not coming in contact with the subsurface soil. After this was implemented, truck washing was no longer needed and therefore ceased.

Erosion and sedimentation control measures were constructed and maintained in the decontamination area in accordance with the provisions of the Soil Erosion and Stormwater Pollution Prevention Plan presented in the RAWP (see also Section 3.2.5).

3.1.4 Construction of Soil Stockpile Areas

Under the supervision of the Remediation Engineer, Joel B. Landes, P.E., the Remediation Contractor constructed and maintained a primary stockpile area for the staging of excess excavated soil. As the remedial activities progressed, several additional stockpile areas were created for the temporary storage of excavated material to prevent mixing of characterized and non-characterized material. Figure 3 illustrates the configuration of the primary stockpile area located south of Building 8 as well as the location of the temporary stockpile areas in and around Buildings 3 and 7. Each stockpile conformed to the following criteria:

- The base consisted of a double layer of 8 mil (0.008 inch) polyethylene/plastic sheeting;
- Equipment and procedures to minimize the potential for tearing the liner were used to place and remove the soil;
- Stockpiles were covered, when not in use, with minimum 8-mil plastic sheeting or tarps that were securely anchored to the ground. Stockpiles were routinely inspected and broken sheeting were promptly replaced;
- Stockpiles were securely covered upon reaching their capacity of approximately 1,500 cubic yards (CY) until ready for loading. Stockpiles that had not reached their capacity were covered at the end of each work day; and
- The stockpile areas were inspected daily and noted deficiencies were promptly addressed.

3.1.5 Erosion Control Measures and Site Perimeter Security Fencing

Stormwater pollution prevention and erosion control measures were implemented in conformance with the RAWP, and included:

- Frequent watering of the roadways, excavation, and fill areas;
- Maintenance of the perimeter security fencing;
- Excavation of temporary ditches and sediment basins and construction of berms to divert stormwater away from the perimeter; and
- Construction and maintenance of stabilized construction entrance/exit pads.

Stormwater runoff was contained on the Site. The stabilized construction entrance and exit to the Site was inspected on a daily basis for evidence of off-site sediment tracking. The existing conditions of the adjacent city streets were maintained and cleaned with a street sweeper and water truck as needed.

3.1.6 Air Monitoring Stations

As part of the CAMP, fixed air monitoring stations were established at two locations along the perimeter to monitor for particulates (dust) using direct-reading and recordable instruments. The air monitoring stations were operational during all remedial activities. The locations were adjusted as wind conditions changed to monitor both the upwind and downwind perimeters. See Figure 3 for monitoring station locations and Appendix E for the raw CAMP data. A number of exceedances of the action levels for the Site (0.15 mg/m3) occurred throughout the duration of the project. The exceedances are discussed in more detail in Section 3.2.3 of this FER.

3.2 GENERAL SITE MANAGEMENT AND CONTROL ACTIVITIES

The general Site management and controls conducted during the remedial activities included:

- Truck traffic control;
- Maintenance of Site security;
- Air monitoring;
- Dust suppression; and

- Equipment decontamination and residual waste management.

A description of each of the activities listed is presented below.

3.2.1 Truck Traffic Control

The truck route between the Site and the nearest major highway (Long Island Expressway) as presented in the RAWP was followed. Due to the relatively large size of the Site and coordinated sequencing of excavation, soil loading, and hauling, the Construction Manager avoided the need to queue trucks along the adjacent public roadways.

3.2.2 Site Security

The Site was secured during the remedial activities with the use of:

- Perimeter security fencing and access gates with locks installed at the boundary of the Site to prevent access by unauthorized persons;
- Warning tape and/or barricades placed around open excavations, hot spots/AOCs in the process of remediation, and other potentially dangerous areas as determined by the Remediation Engineer, Joel B. Landes, P.E.; and
- Safe work practices, which included:
    - Parking heavy equipment in a designated area each night and removing keys;
    - Maintaining an organized work area, including the proper storage of tools, equipment, and fuels;
    - Conducting regular health and safety meetings; and
    - Maintaining on-site access roads, covers on staging areas, and stormwater collection sumps.

3.2.3 Air Monitoring

Langan implemented an air-monitoring program for the duration of remedial activities to protect the health and safety of Site workers and the surrounding community and to address potential nuisance dust and/or odors. Monitoring was conducted within and around the work areas using PIDs for total organic vapor monitoring and visible monitoring for dust. Perimeter monitoring was accomplished using hand-held PIDs for total organic vapors and fixed stations for dust monitoring (see Section 3.1.6). The dust monitoring station data are provided in Appendix E. As presented in Appendix E, summary tables of the CAMP data are included with the RAW data, indicating exceedances and explanations. The majority of the CAMP exceedances are attributed to general construction activities, and monitoring stations being set inside buildings during interior, intrusive site work. The majority of intrusive Site work was completed inside enclosed/semi-enclosed structures.

3.2.4 Dust Suppression

Langan and the Construction Manager monitored the remediation and construction activities for dust generation and the need for dust suppression. Nuisance dust was controlled with ECs as required (e.g., use of water trucks and tarping of stockpiled soil). Preventative measures for dust generation included maintenance of the stabilized construction entrance and truck wash area, covering soil stockpiles, and limiting vehicle speeds.

3.2.5 Equipment Decontamination and Waste Management

3.2.5.1 Equipment Decontamination

If a vehicle or equipment came in contact with Parcel B soil, each was cleaned on the decontamination pad in the truck wash area and inspected prior to leaving the Site.

3.2.5.2 Miscellaneous Wastes

Miscellaneous wastes generated during remedial activities were managed and disposed as non-hazardous solid waste. This included general refuse, used construction equipment and excess material, perimeter and temporary fencing, used disposable sampling equipment, and personal protective equipment (PPE).

3.2.5.3 Unanticipated Subsurface Structures/Conditions

Unanticipated subsurface structures/conditions such as USTs, vaults, and concrete debris were handled in accordance with applicable federal, state, and local ordinances and regulations. Visually clean concrete and metal was transported per 6 New York State Codes, Rules, and Regulations (NYCRR) Part 360-7 to a licensed construction and demolition (C&D) facility. For a more detailed description of the structures and conditions encountered during remedial activities, please refer to Section 5.0.

3.3 Schedule

The RAWP was submitted to NYSDEC on August 26, 2006. This report and draft stipulations were released for 45-day public review on November 10, 2006. The RAWP was approved by

NYSDEC on December 28, 2006. Implementation of the remedial activities commenced in February 2005, and they were completed in September 2006. Remediation of Parcel B was completed sporadically over a 20 month time period. Potential impacts to the community were minimized.

3.4 Progress Reports

Daily progress reports were submitted to NYSDEC and NYSDOH by electronic media during most of the remedial activities. The progress reports generally included a description of the following:

- Specific remedial activities conducted during the reporting period and those anticipated for the next reporting period;
- Description of approved modifications to the work scope and/or schedule;
- Sampling results received following internal data review and validation, as applicable; and
- Update of schedule including percentage of project completion, unresolved delays encountered or anticipated that could affect the future schedule, and efforts made to mitigate such delays.

In all cases, any unanticipated conditions at the Site were promptly communicated to NYSDEC and NYSDOH project managers. Necessary modifications to the work scope and additional remedial plans developed to address specific conditions encountered at the Site were communicated verbally and via e-mail with NYSDEC, and NYSDEC concurrence was obtained as appropriate. In addition, during implementation of the remedial actions, several on-Site meetings were held and attended by NYSDEC, the Developer, and Langan, and numerous project status meetings were held at NYSDEC's office in Long Island City. Both daily and monthly progress reports are included in Appendix V.

4.0 SOIL/WASTE MANAGEMENT

This section presents the general soil and waste management methodologies followed during Site remediation, including field screening, handling, stockpiling, characterization, transportation, and final disposal of the excavated material. Section 5.0 presents this information in specific detail for the three separate areas of construction on the Site (see Figure 3). Langan provided representatives for full-time oversight of all remedial activities performed in accordance with the RAWP.

4.1 Soil/Waste Categories

The Remediation Contractor divided the excavated material into two categories (Category 1 and Category 2) depending on known or suspected levels of the contaminants of concern. The categories of material were separately managed and stockpiled to 1) avoid co-mingling of contaminated and potentially contaminated material with clean soil, and 2) handle, characterize, and off-load the contaminated material.

Based on the results of the RI and SRI (and confirmed by waste characterization sampling), it was determined that most excavated soil across Parcel B contained concentrations of SVOCs and metals that marginally exceeded the TAGM 4046 SCOs. This material was categorized as Category 1. In addition, the SRI revealed several localized areas of soil containing lead and VOCs in Building 7, a localized area containing SVOCs in Building 8, and localized sources of the VOC soil vapor and groundwater plumes beneath Building 3. All unknown contaminated material that did not conform to the Category 1 criteria was deemed Category 2. The categories are more fully described below.

- Category 1 – Contaminated Fill is defined as soil containing historic fill material with concentrations of SVOCs and metals that marginally exceed the TAGM 4046 SCOs. In most cases, the contaminated fill was associated with ash and cinders, mixed in with the sand fill or present as discrete, thin layers. The Category 1 layer was assumed to exist throughout Parcel B based on the findings during the Parcel A remediation, and Parcel B RI and SRI data. During the remedial excavation, the actual thickness of this layer was found to vary from 6 to 15 feet bgs.

- Category 2 – Other Contaminated Soil/Material: Category 2 was a holder category for suspected contaminated material with characteristics that could not be disposed at Category 1 disposal facilities. The Category 2 material generally required additional testing, in addition to the TAGM 4046 list, to determine disposal requirements. Several Category 2 waste streams were uncovered, handled, and disposed appropriately.

4.2 Soil Excavation and On-Site Reuse

Two distinct excavation activities occurred on the Site during implementation of the RAWP. Construction related excavation and AOC/hot spot excavation of both known and newly encountered of environmental concern.

4.2.1 Construction Related Excavation

During the excavation of subsurface soil for on-going construction/development activities, Langan inspected the exposed soil for visual evidence of contamination and/or the presence of structures such as former floor drains, sumps, drywells, etc.

Under Langan's supervision, the following construction related activities were conducted:

- Footing and foundation excavation and installation (January to February 2006)
- Various utility trenching activities around the Site (February 2005 to November 2006)
- Excavation for the footings of a new Con Ed Electrical Building, south of Building 8 (February 2005)
- Loading dock and service corridor excavation and grading activities (April 2005)
- Sub-slab depressurization system trenching (Remedial Construction) (August 2005 to September 2006)
- Air Sparging/Soil Vapor Extraction System trenching (Remedial Construction) (August 2006 to December 2006)

Soil was generated from these various activities, with excavations reaching depths of 1 to 8 feet bgs using conventional hydraulic excavation equipment (excavators, backhoes, etc.). Soil was excavated and transported to the appropriate stockpile area for waste characterization and final disposal. Figures 9, 10, and 11 illustrate the areas where excavation activities commenced to facilitate construction.

4.2.2 Remedial Excavation Activities (Hot Spots/Associated AOCs)

Several known and unknown hot spot/AOC areas were excavated during the implementation of the RAWP. Excavations reached depths of 1 to 9 feet bgs using conventional hydraulic excavation equipment (excavators, backhoes, etc.). The specific AOCs identified at the Site were as follows:

Building 3

- Floor drain at southwest corner of Building 3
- Pipe run in floor in southern portion of Building 3
- AOC Pits 1 and 2 (10 feet by 10 feet by 4 feet deep excavations centered on soil samples B3-Pipe3-0.5 and B3-Pipe2-1)
- Con Ed Vault and Electrical room structure

Building 7

- Process tanks and vaults
- Process piping in western portion of Building 7
- Lead- and VOC-contaminated soil area

Building 8/Service Corridor

- Heating Oil USTs 1 and 2
- Boiler stack
- Southwest vault
- Old Con Ed transformer pad

When a specific hot spot/AOC was uncovered, the contaminated material was removed, characterized, and disposed in a controlled manner under direction of the Remediation Engineer, Joel B. Landes, P.E. The remedial excavation was considered complete after post-excavation (bottom and sidewall) endpoint samples were collected andTrack 4 SCOs were met. A number of areas could not be excavated due to preservation of existing buildings, and/or potential structural dangers. These areas of residual contaminants left in place, are illustrated on Figures 12, 13, and 14.

Each of these hot spot/AOCs is discussed in detail in Section 5.0. Site plans of Buildings 3, 7, and 8/Service Corridor and their associated AOCs are presented in Figures 4, 5, and 6.

The majority of the excavation work conducted on Parcel B was completed by ETI, the Remedial Contractor. However, there were instances when general construction contractors were involved in excavation activities. These personnel were required to obtain the Occupational Safety and Health Administration (OSHA) 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training prior to conducting the intrusive work.

4.2.3 On-site Soil Reuse

The strategy for reuse of excavated material was consistent with the future land use (e.g., restricted commercial) and use of EC/ICs to prevent future exposure of workers and the public to the residual contaminated soil. Soil was reused in the same location from which it was excavated. Any reused material was inspected both visually and with a PID, and in most cases, it was sampled prior to reuse. If the soil was not grossly contaminated based on visual and PID observations, then it was reused. Additionally, stockpiled material was sampled prior to off-site disposal. Waste characterization analyses are documented in Tables 3D and 3I. In some cases, the stockpiled material was reused on the Site. Table 1 provides an inventory of the soil that was reused on the Site. Table 2 provides an inventory of waste characterization samples and the specific analyses conducted.

4.3 Subsurface Screening

Field screening was conducted during all invasive soil excavation work and during the removal of all subsurface structures. Langan continuously inspected and field screened excavated soil for ash, cinders, odors, and staining. In addition, the exposed soil was continuously inspected for chemical or petroleum odors or staining and field screened for VOCs using a PID on an approximate 10 feet by 10 feet grid or 10-foot intervals for linear cuts/excavations. The PID readings were obtained either from soil contained within the excavator bucket and/or directly off the excavation sidewalls or bottom. If positive PID readings (i.e., above background levels) were detected, the affected area was then covered with plastic sheeting, anchored, and flagged with stakes and caution tape to avoid disruption until the area was further investigated and/or remediated. Based on the results of this screening, excavated material was handled as designed in the RAWP and described in this document.

4.4 Soil/Waste Management and Stockpiling

In general, small quantities of excess soil were generated during the remedial and construction activities conducted across the Site. Excess soil consisted primarily of soil from excavations for building footings and utilities and during grading activities to facilitate ongoing construction. When the soil was not reused for backfill, it was stockpiled on plastic sheeting, sampled for waste characterization, and covered as described in Section 3.1.4.

Langan provided oversight for the handling and transport of any regulated material that required removal from the Site by the Remedial Contractor to an approved disposal facility. Langan provided direction to the contractors in identifying contaminated material during remedy implementation, selection of samples for waste characterization, and determining the proper off-site disposal facility if not currently identified.

All proposed disposal facilities were reviewed by Langan before any material left the Site. Suitable facilities included permitted landfills, treatment facilities, and Resource, Conservation, and Recovery Act (RCRA) treatment, storage, and disposal facilities (TSDFs). In general, all excavated material were staged in the main stockpile area pending scheduling of trucks, additional waste characterization, or other reasons preventing the direct loading of the waste for off-site transport. See Table 5 for the soil disposal summary table.

4.5 Waste Characterization

4.5.1 Soil

Langan performed the appropriate waste characterization sampling and analysis according to the permit requirements of the disposal facility(ies). Samples were collected as five-point composite and grab samples from either test pits, roll off containers, or from stockpiled material. The analytical tests typically included the following parameters:

- Total petroleum hydrocarbons (TPH) by gas chromatograph (GC) and FID fingerprinting;
- VOCs by Method 8260;
- SVOCs by Method 8270;
- PCBs by Method 8082;
- Metals by Method 6010B/7161;
- Ignitability, reactivity, and corrosivity (I/R/C);
- Toxic Characteristics Leaching Procedure (TCLP) VOCs, SVOCs, metals, and/or pesticides and herbicides; and

- Diesel Range Organics (DRO) or Gasoline Range Organics (GRO).

Langan submitted the waste characterization samples to an Environmental Laboratory Accreditation Program (ELAP)-approved laboratory for quantitative analyses. The laboratory results are available in CD-ROM format, accompanying this report for reference (see Appendix F). See Table 2 for a sample inventory table that summarizes the waste characterization sample identification numbers, sampling dates, sampling analyses, and the final disposal facility used for the material. See Tables 3A to 3I for a summary of all waste characterization results.

Samples were collected into clean, laboratory-supplied glassware using disposable sampling tools. Sampling personnel donned appropriate PPE per the Site Specific HASP.

4.5.2 Liquids

Various liquids that required specialized handling and disposal were encountered during the remediation of Parcel B. These included: 1) well purge water generated during well development and sampling and 2) contaminated liquids and sludge found in USTs located south of Building 8 and in the tanks and vaults located in Buildings 7 and 3. Samples of liquids and sludge encountered within the vaults and tanks located within Building 7, the USTs south of Building 8, and the Con Ed vault in Building 3 were collected by Langan and submitted to the laboratory for waste characterization and GC/flame ionization detector (FID) fingerprint analysis. See Table 4A and 4B for a disposed liquid inventory.

4.6 SOIL/WASTE TRANSPORTATION AND DISPOSAL

Under Langan's supervision, the Remedial Contractor arranged for transportation of Category 1 and 2 soil, and miscellaneous liquids for off-site disposal in accordance with applicable federal, state, and local regulations. Only 6 NYCRR Part 364-permitted transporters were used to haul the excavated soil to the designated treatment/disposal facilities. Copies of the facility approval letters, transporter permits, disposal facility permits, and waste manifests are included in Appendix G.

Langan inspected the load-out of all excavated material. Once the loading of any container, dump truck, or trailer was completed, the material was immediately transported to the off-site disposal facility, with the exception of roll-off containers that were stored on-site, sampled, and disposed at an approved disposal facility. Transport of material was performed by licensed haulers in accordance with appropriate local, state, and federal regulations. Loaded vehicles leaving the Site were securely covered, manifested, and placarded in accordance with appropriate federal, state, local, and New York State DOT

(NYSDOT) requirements. For the most part, egress points for truck and equipment transport from the Site were kept clean of dirt and other material during remediation and development of the Site. During a Site visit by NYSDEC Project Managers, it was noted that the southern Site egress was not being properly maintained. This was immediately rectified by the Remedial Engineer, with street sweeping, and truck washing. The entire area behind Building 8 was covered with clean stone, followed by asphalt, to eliminate the contact between on-site soils and construction vehicles.

Measures to mitigate dust during loading and transport are summarized in Section 3.1.3 and 3.2.4 of this FER. Langan was responsible for ensuring that the trucks coming in contact with Site soil were pressure washed at the truck wash to remove contaminated soil from the tires and undercarriage, prior to leaving the Site.

<u>4.6.1 Category 1 - Contaminated Fill</u>

Category 1 material was transported off-site by permitted haulers to one of two end use disposal facilities approved to accept the material, specifically (See Appendix G for the facility documentation):

- Recycle Technology, located at 17 Griffin Road, Charlton, Massachusetts, used exclusively from January 30, 2006 to February 3, 2006; and

- South Hadley Landfill, South Hadley, Massachusetts, used exclusively from March 10, 2006 to December 15, 2005.

As shown on Table 5, 3580 tons of Category 1 material was disposed off the Site: approximately 970 tons at the Recycle Technology facility and 2608.46, tons at the South Hadley Landfill. The Category 1 facility permits, load summaries, representative manifests, and approval letters are included in Appendix G.

All non-hazardous historic fill taken off the Site was handled as solid waste as per 6 NYCRR Part 360-1.2 and treated as contaminated material. As shown on Table 1, approximately 125 tons of Category 1 material was used to fill the heating oil UST graves after excavation, pursuant to Langan's April 14, 2005 *Building 7 Underground Storage Tank Closure Plan* (see Appendix H).

<u>4.6.2 Category 2 - Other Contaminated Soil/Material</u>

Under Langan's supervision, the Remediation Contractor arranged for transportation and off-site disposal of Category 2 material to one of three permitted, approved facilities, specifically:

- Clean Earth of North Jersey in Kearny, New Jersey, used on January 28, 2005.
- Clean Earth of Philadelphia, Pennsylvania, used from November 28, 2005 to December 11, 2006.
- Modern Landfill, York Pennsylvania, used on April 14, 2006.

979.8 tons of Category 2 material was removed from the Site. Table 5 presents the quantity of Category 2 material disposed off the Site and the facilities utilized. The Category 2 facility permits, load summaries, manifests, and approval letters are included in Appendix G.

4.6.3 Liquids Disposal

All purge water was contained within 55-gallon drums, labeled, and stored on-site in a drum staging area located south of Building 3 near the north access entrance off 80th Street. The drums were removed from the Site by Capitol Environmental Services and disposed at VEXOR Technology, Inc facility in Medina, Ohio. Forty-five drums of purge water were disposed at this facility. Disposal manifests and material disposal quantities are located in Appendix G.

All other liquid wastes were transported by ETI to the Bridgeport Recycling facility in Bridgeport, Connecticut, under a uniform waste manifest, for final treatment/disposal. The Bridgeport facility conducted additional testing of the UST liquids upon entry to their facility. 24,458 gallons were disposed at this facility (See Table 4A & 4B).

4.7 Post-Excavation Endpoint Sampling Methodologies

Post-excavation endpoint samples were collected for each AOC to demonstrate concentrations of contaminants left in place (see Tables 6A to 6L). Post-excavation samples were collected at the base of excavation sidewalls and/or bottom endpoints at a frequency consistent with DER-10. Post-excavation endpoint sample inventories, broken down by construction areas and AOCs, can be found in Table 7. This table lists the sample identification numbers, sampling dates, and the tabulated data, cross-referenced with the appendices that contain the laboratory analytical reports. The samples were tested predominantly for the complete TAGM parameter list of analytes, specifically the Target Compound List (TCL) VOCs, SVOCs, and pesticides/herbicides, Target Analyte List (TAL) metals, and PCBs.

Appropriate field and laboratory quality assurance (QA) procedures were observed and maintained as outlined in the Quality Assurance Project Plan (QAPP) (See RAWP), with the exception that rinse blanks were not collected because only dedicated, disposable sampling tools were used to transfer the samples into clean, laboratory-supplied glassware. Sampling personnel donned appropriate PPE, as per the HASP. The Data Usability Summary Reports are contained in Appendix S and further discussed in Section 10.0.

4.8 Import of Material for Roadways and Trenches

Two types of construction aggregate were imported onto the Site and were used as roadway, sidewalk, building floor slab sub-grade, and SSD system trenching. The material consisted of:

- Virgin crushed #4 quarry stone was used for road and building slab sub-base material, for stabilizing soil that failed compaction testing, and as a porous medium for use in some of the SSD system trenching. Approximately 500 CY of this stone were imported onto the Site.

- RCA was utilized as road base throughout the Site. Approximately 570 CY were imported to the Site.

Appendix G contains weight tickets and documentation of Langan's due diligence on the imported material facilities and TAGM 4046 results on the soil utilized for backfill purposes.

5.0 DESCRIPTION OF INTRUSIVE REMEDIAL ACTIVITIES BY CONSTRUCTION AREA

Preceding Section 4.0 described the general soil excavation, management, characterization, stockpiling, transportation, and disposal procedures that were followed during the implementation of remedial activities. To facilitate presentation and discussion of the remedial activities in this FER, the Site is discussed as three separate construction areas as illustrated on Figure 3. Individual construction areas are illustrated on Figures 4 through 6.

This section describes the specific intrusive remedial activities that were completed within each of the three separate construction areas. Included in this discussion are the general progression of site activities, hot spot/AOC remediation, intrusive construction activities, and post-excavation endpoint sampling conducted to document residual contamination left in place. Table 8 contains an inventory of the various AOCs encountered across the Site including a summary of waste characterization findings. The raw analytical data reports are located in Appendix F on CD.

Langan provided representatives for full-time oversight of all remedial activities performed in accordance with the RAWP. Remedial work commenced in February 2005 in the Building 7 area (Figure 5), and was completed in December 2006 with the installation of two AS/SVE systems.

5.1 Building 3 Area

5.1.1 General Progression and Summary of Excavation/Remediation

Intrusive construction activities began in the Building 3 area in October 2005 with light excavation for utility work (See Figures 9). Invasive construction related activities within the area included utility trenching, and excavation for new footings and foundations. The remedial work began in November 2005 and ran concurrent with construction activities associated with development. Remedial activities in the Building 3 area were completed in December 2006.

Three facilities were utilized for the disposal of Category 1 and Category 2 material excavated from this area. South Hadley Landfill in Massachusetts was used for the Category 1 material, and Modern Landfill and Clean Earth of Philadelphia (CEP) were used to dispose Category 2 material. Liquids generated in this area were disposed at VEXOR Technology in Medina, Ohio and United Oil Recovery in Bridgeport, CT. The liquid disposal inventory is provided in Tables 4A and 4B.

Four discrete AOCs were encountered in the Building 3 area, and they were addressed as discussed in Section 5.1.2. In all, forty-six endpoint samples and eight sidewall samples were collected from these four AOCs and twenty-one endpoint samples were collected from invasive construction related activities. A single exceedance of the Site Specific Track 4 SCOs was left in place (See Figure 12), and it will be addressed by the implementation of the SMP and EC/ICs. For detailed discussions on the EC/ICs, see Sections 6.0, 7.0, and 8.0.

Category 1 material was excavated from the Building 3 area and disposed at the South Hadley, disposal facility. Category 2 material was disposed at the Modern Landfill and Clean Earth of Philadelphia (CEP) facilities. See Appendix G for the tabulated load summaries.

In conjunction with the remediation of a sub-slab piping network within this area, two discrete areas of concern (AOC 1 and AOC 2) were discovered and remediated as work progressed across the Site. AOCs 1 and 2 are a likely source of PCE and TCE contamination in the groundwater as discussed below.

5.1.2 Hot Spot/AOC Remedial Activities

5.1.2.1 Building 3 Floor Drain Investigation/Remediation

On November 10, 2005 during Geoprobe soil sampling, a 2-foot-by-2-foot concrete drain structure was discovered in the southwest corner of Building 3 (See Figure 15). The drain was investigated during the SRI and found to contain a mixture of soil, organic material, and a grey/black viscous glue-like material that exhibited elevated PID readings (<1,000 parts per million [ppm]). Samples of the drain contents were collected and analyzed for TCL VOC analyses. Elevated concentrations of TCE, PCE, benzene, and other detected VOCs were identified (See Table 3A).

The drain structure and its contents were subsequently excavated and placed into two 15-CY lined, roll-off containers. On January 20, 2006, the material in the two roll-off containers was sampled for waste characterization for final disposition. See Table 3A for waste characterization results. The waste characterization results were accepted by Modern Landfill in York, PA and the material was subsequently disposed at the facility. See Appendix G for the waste disposal documentation.

Upon removal of the structure, two endpoint soil samples were collected and analyzed. The results indicated that the impacted material was removed, and Track 4 SCOs were achieved. The endpoint sample results are summarized in Table 6A, and the raw analytical data is provided in Appendix F.

5.1.2.2 Building 3 Sub-slab Piping Investigation/Remediation

Upon investigation of the Building 3 floor drain, it was noted that the drain was connected to a piping network beneath the floor slab of the building (See Figure 15). A geophysical survey, which was conducted by Hager-Richter Geoscience Inc. of Salem, New Hampshire (Hager-Richter), confirmed the extensive configuration of the sub-slab piping network (See Appendix I for the geophysical report).

In March 2006, the entire sub-slab piping network was inspected and excavated, and endpoint samples were collected every 20 feet along the piping at a depth of approximately 6 inches below the pipe invert (See Figure 15). Two sub-pipe soil samples contained elevated levels of PCE and TCE that corresponded to cracks in the piping. These two soil samples were deemed as AOCs, and as concluded in the SRI Report, the piping network served as an origin and conduit for VOC source material to the subsurface that resulted in soil vapor and groundwater contamination on the Site. Remediation of these AOCs is discussed in Section 5.1.2.3.

The excavated piping was placed in the two roll-offs containing the Building 3 Floor Drain material, and sent to the Modern Landfill facility in York, PA. See Appendix G for the waste disposal documentation and Table 5 for the disposal summaries.

Upon removal of the piping, 40 endpoint soil samples were collected and analyzed for TCL VOCs. The results indicated that there were no exceedances for Track 4 SCOs with respect to VOCs. The results of these endpoint samples are included in Table 6B, and the raw data is provided in Appendix F).

5.1.2.3 Remediation of Hot Spots: AOC 1 and 2

As stated in the previous section, two AOCs were identified in the soil underlying the sub-slab piping network in Building 3 (See Figure 15). These two areas were identified as source areas for the PCE and TCE contamination found in groundwater and soil vapor under the Site. Soil sample results indicated elevated levels of PCE and TCE, along with other detected VOCs. Table 3B contains the waste characterization results.

Remedial excavation commenced shortly after discovery of the sub-slab piping network on March 10, 2006. A 10 square-foot area around each AOC was excavated to a depth of 4 feet to remove all VOC contamination. The excavated soil was stockpiled on 8-mil plastic sheeting and sampled for waste characterization analyses. The excavated soil was properly characterized, accepted by the facility, and disposed at the South Hadley Landfill. See Appendix G for the Waste Disposal documentation and Table 5 for the disposal summaries.

Upon removal of the contaminated fill material, endpoint samples were collected per DER-10 and in accordance with the RAWP. A total of two bottom endpoint samples, and eight (8) sidewall samples were collected between the two excavations and analyzed for TCL VOCs. Sample results are summarized in Table 6C.

The open excavations were backfilled with Category 1 material previously excavated from the Building 3 trenching operations. Table 1 indicates the sample IDs of the soil that was reused in Building 3. The reused soil did not exceed any of the Track 4 SCOs.

5.1.2.4 Con Ed Transformer Vault and Electrical Room

In March 2006, a sub-slab electrical room and associated concrete transformer vault were discovered in the southwestern corner of Building 3 as illustrated on Figure 4.

A preliminary walk through of the electrical room revealed several pieces of electrical equipment, some of which were still in service, and an open, 2-foot by 6-foot sump pit to the underlying soil. A sample was collected from the open sump and analyzed for the full TAGM 4046 list of compounds. The metals copper, chromium, and zinc exceeded the Track 4 SCOs in this area. See Table 6D for the samples results. The decision was made to leave these soils in-place since excavation within this structure may have compromised the existing building. Also, EC/ICs implemented over the entire area, will prevent leaching and provide sufficient protection for future exposure to these contaminants.

Upon discovery, the transformer vault area was inundated with approximately 2 feet of stormwater runoff. The liquid was sampled for PCBs and VOCs, pumped out by ETI, and placed in drums pending waste characterization sampling and off-site disposal. Further inspection revealed two inactive transformers located to the west of the electrical room. In August 2006, Con Ed removed the transformers from the vault revealing two sump pit drains as illustrated on Figure 4.

Five waste characterization samples, both soil and concrete, were collected from the vault and two sump pits. These results did not indicate any exceedances of TAGM 4046. See Table 3C for a summary of the analytical results. An initial sample of the soil/sludge mixture revealed elevated levels (4,240 micrograms per kilogram [ug/kg]) of PCBs (Aroclor-1254 and Aroclor-1260). This material was excavated, and four endpoint samples were collected and analyzed for TAGM 4046. Table 6D presents the results of the endpoint sampling, and Figure 4 shows the sample locations and depths below the sump pits. Endpoint samples did not exceed the Track 4 SCOs or TAGMs.

The drummed water from the vault was subsequently disposed at the previously approved facility, VEXOR Technology. The residual water/sludge mixture was pumped out by ETI using a vacuum truck, and it was disposed at the United Oil Recovery facility in Bridgeport, Connecticut. Waste manifests for both the drummed water and vacuumed material are located in Appendix G.

Demolition of the vault and electrical room posed a serious structural hazard because of its close proximity to 80th Street. Supported by the low concentrations in endpoint sample data, the material was left in place. The two areas were subsequently backfilled with previously excavated Building 3 soil. Table 1 indicates the sample IDs of the soil reused in Building 3. The soil that was reused did not exceed the Track 4 SCOs.

5.1.3 Intrusive Construction Activities

5.1.3.1 Building 3 Foundation Excavations

On January 24, 2006, the foundation contractor, Ruttura Construction (Ruttura), began excavating for foundations and footings in the outdoor portion of the south half of Building 3. Figure 9 illustrates the remedial construction activities in the Building 3 area. Langan provided oversight and screened the soil 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, 21 endpoint soil samples were collected at a frequency of one per 20 feet of trench, and submitted to the laboratory for TAGM 4046 analyses. Sampling locations are shown on Figure 15. Refer to Table 6E for the endpoint sample results. None of these samples exceeded the Track 4 SCOs.

5.1.4 Residual Contamination Above the Track 4 and TAGM 4046 SCOs Left In-Place

With respect to the samples collected within the Building 3 area, there was only one exceedance (benzene = 87.6 ug/m3) above the Track 4 SCOs. A total of 20 sample locations contained exceedances of the TAGM 4046 SCOs for metals and SVOCs. The material remains in-place under the Site. These results are summarized in Table 9 and Figure 12. The implementation of the EC/ICs and SMP, provide sufficient protection against exposure to this exceedance.

5.1.5 Installation of Engineering Controls (ECs)

Three ECs were installed within the Building 3 area:

- An Active Sub-Slab Depressurization (SSD) System

- An Air Sparging/Soil Vapor Extraction (AS/SVE) System

- Site-Wide Composite Cover System comprised of asphalt covered roads, and concrete covered sidewalks, concrete building slabs

A detailed discussion of each of these engineered systems is provided in Sections 6.0, 7.0, and 8.0, respectively.

5.2 Building 7 Area

5.2.1 General Progression and Summary of Excavation/Remedial Activities

Intrusive construction activities began in the Building 7 area in January 2005 with building foundations and utility work (See Figures 5, and 10). The remedial work was conducted in conjunction with construction activities for Site development. Remedial activities in the Building 7 area concluded in July 2006.

Two facilities were utilized for the disposal of Category 1 and Category 2 material excavated from this area. South Hadley Landfill in Massachusetts for Category 1 material, and Clean Earth of Philadelphia (CEP) was used for the disposal of Category 2 material. Liquid and sludge were disposed at United Oil Recovery in Bridgeport, CT. The disposal inventory summaries are presented in Tables 4A and 4B.

Three discrete AOCs were identified in the Building 7 area, and they were addressed as discussed in Section 5.2.2. Forty-six endpoint soil samples were collected from these three AOCs. Ten locations that exceeded the Site Specific Track 4 SCOs were left in place (See Figure 13). These areas will be addressed by the implementation of the SMP and the EC/ICs. For detailed discussions on each, refer to Sections 6.0, 7.0, 8.0, and 11.0.

Category 1 material was excavated from the Building 7 area and disposed at the South Hadley, disposal facility. Category 2 material was disposed at the Modern Landfill CEP facilities. Approximately 5,866 gallons of liquid and 22 tons of sludge generated from the AOCs in the Building 7 area were disposed at the United Oil Recovery facility. See Tables 4A and 4B for liquid/sludge disposal summaries, and Appendix G for waste disposal documentation.

5.2.2 Hot Spot/AOC Remedial Activities

5.2.2.1 Process Tanks and Vaults

In January 2005, during trenching for new utilities inside the southwest corner of Building 7, five USTs, and two underground metal vaults were discovered (See Figure 5). The USTs were approximately 10,000 gallons in capacity. The vaults measured approximately 10 feet wide by 50 feet long by 4 feet deep and were located below the building floor slab separated by a cinder block wall. The structures were used by the former building tenant, Interstate Container Corporation, to store glues and adhesives. Upon opening the structures, they contained a hardened white solid residue and/or a white liquid. While screening the tanks, vaults, and their contents, no PID readings were detected and no odors were present.

A plan to close out the structures was prepared and submitted to NYSDEC (*Building 28 Process Tanks/Vaults Closures*, dated March 16, 2005) on which NYSDEC provided comments (See Appendix J).

Eleven waste characterization samples were collected from the liquids and solids within the USTs and vaults, and analyzed for the parameters indicated on Table 2. The results indicated elevated levels of TPH-DRO at 49,000 mg/kg, and metals, specifically sodium at concentrations exceeding 600,000 mg/kg. There were no exceedances of TAGM 4046 SCOs for VOCs. The results of the waste characterization sampling are indicated on Table 3E and 3F.

All waste streams generated from the USTs and vaults, were accepted into, and disposed at United Oil Recovery, in Bridgeport, CT. for disposal. Approximately 22 tons of sludge and 5,866 gallons of liquid were removed. The sample summary tables are presented in Table 4A. The raw lab data is located in Appendix F.

In March 2005, the five USTs were cleaned, demolished, and removed from the Site to make room for foundations. The two vaults did not impede development. Therefore, these were closed in place by cleaning them out and backfilling with concrete. Five endpoint soil samples were collected from the centerline of each UST, and five Geoprobe borings were advanced between the vaults to a depth of 1 to 2 feet below the bottom. The data indicated elevated levels of various metals. Endpoint sample results are presented in Tables 6F.

The void left by the removal of these five large tanks was filled with "TAGM Clean" sand brought to the Parcel A site during its remediation. Imported material documentation is included in Appendix K.

5.2.2.2 Process Tank/Vault Piping

In April 2004 while excavating for new utilities on the west side of new Building 7, a 3-inch diameter, steel pipe terminating in a fill-type port with threaded cover was discovered (See Figure 13). There were no odors or PID readings from the pipe when the cover was removed. Upon further investigation of this piping, it was confirmed to be connected to the former process tank and vault operations discussed in Section 5.2.2.1.

There was no evidence of contamination (i.e., no staining, no PID readings, and no odors) in the soil beneath the pipe. Three endpoint soil samples were collected directly beneath the pipe to investigate soil conditions. The samples were analyzed for TCL VOCs and the target metals that were detected in the process tank and vault residuals (See Table 3F). There were no VOCs and no exceedances of the Track 4 SCOs for the analyzed metals (See Table 6K).

The piping was not removed and excavated material was not generated that would have required disposal. Therefore, waste characterization sampling was not warranted and no material was generated for disposal.

5.2.3 Invasive Construction Activities

Invasive construction activities in the Building 7 area were consistent with other areas on the Site. The majority of the invasive work was related to utilities, new foundations and footings, with other minor construction related excavations. Langan maintained a full-time presence at the Site to observe these activities.

The majority of the soil excavated in the Building 7 area was reused as backfill. Approximately 50 CY of item #4 virgin stone was used to backfill some of utility trenches. Appendix K contains the imported material documentation.

5.2.4 Residual Contamination above the Track 4 and TAGM 4046 SCOs Left in Place

5.2.4.1 Remedial Investigation (RI) Activities – Miscellaneous "Hot Spots"

While conducting the original RI activities on the Site, two soil samples collected from soil boring B48 resulted in concentrations that exceeded the Track 4 SCOs for metals and SVOCs . The boring location is indicated on Figure 13. See Table 6G for the sample results. The EC/ICs being implemented on the Site will prevent future exposure to these contaminants and therefore the impacted soils were not removed.

5.2.4.2 Potential Hazardous Lead Area

In October 2004 during the remediation of adjacent Parcel A, a layer of material containing lead at hazardous concentrations was discovered on the eastern edge of Building 7, and the lead-impacted soil appeared to continue under the building. SRI sampling conducted in November 2006 confirmed the presence of this material under the building. Table 9 presents the SRI sample results that exceed the Track 4 SCOs for lead. The highest concentration of lead was encountered in sample B7-1-9.5-10-110805 at a concentration of 1,230 mg/kg. Figures 5 and 13 illustrate the extent of the lead-impacted layer.

5.2.4.3 VOC Hot Spot

While conducting the SRI activities in November 2005, a VOC "hot spot" was encountered in the southeastern portion of Building 7 as illustrated on Figures 5 and 13. A series of Geoprobe borings were conducted in February 2006 to delineate the extent of the VOC hot spot. Concentrations of chloroform, and trichloroethene were detected in sample, B7-5E-9-9.5-110905, at 19,300 ug/kg, and 1,370 ug/kg. See Table 6G for the endpoint sample results with respect to the delineation of the VOC hot spot.

5.2.4.4 Process Tanks and Vaults

Three of the five endpoint samples that were collected between the two vaults showed exceedances of the Track 4 SCOs for arsenic and zinc. The residual metals left in place are illustrated on Figure 13 and are summarized in Table 9.

Excavation of these soils would have required the demolition of a large portion of the building floor slab. This was not favorable since the building was slated for removation and not demolition. The EC/ICs and SMP are designed to minimize the risk of exposure to the "hot spot" areas that remain in place under Building 7. The cover system provides protection from leaching of the materials, while the SSD prevents future vapor intrusion.

5.2.5 Installation of Engineering Controls (ECs)

Two ECs were installed within the Building 7 area:

- An Active Sub-Slab Depressurization (SSD) System
- Site-Wide Composite Cover System comprised of asphalt covered roads, concrete covered sidewalks, and concrete building slabs

A detailed discussion of each of these engineered systems can be found in Section 6.0 and 8.0 of this FER.

5.3 Building 8/Service Corridor

5.3.1 General Progression and Summary of Excavation/Remedial Activities

Intrusive construction activities began in the Building 8 area in January 2005 with preparations for the new Con Ed building foundations and Service Corridor utility work (See Figure 6). The remedial work was conducted concurrent with the construction activities associated with Site development. Remedial activities in the Building 8 area concluded in July 2006.

Two facilities were utilized for the disposal of Category 1 and Category 2 material excavated from this area. South Hadley Landfill in Massachusetts for Category 1 fill, and Clean Earth of Philadelphia (CEP) was used for the disposal of Category 2 material. Liquid and sludge were disposed at United Oil Recovery in Bridgeport, CT. The disposal inventory summaries are presented in Table 5.

Three discrete AOCs were encountered in the Building 8 area: Southwest Vault, Con Ed Transformer Building, and Heating Oil USTs. Section 5.3.2 discusses these in detail. Twenty-six endpoint soil samples were collected from these three AOCs. Three AOC locations and two investigation/construction related sample locations that exceeded the Site Specific Track 4 SCOs were left in place (See Figure 14). These will be addressed by the implementation of the SMP and EC/ICs, mainly the Site-Wide Composite Cover System and Environmental Easement. For detailed discussions on each, refer to Sections 6.0, and 11.0.

Category 1 material was excavated from the Building 8 area and disposed at the South Hadley disposal facility. Category 2 material was disposed at the Recycle Technology CEP facilities. Approximately 16,667 gallons of liquid were generated from the heating oil USTs and disposed at the United Oil Recovery facility. See Table 4A for liquid/sludge disposal summaries, and Appendix G for waste disposal documentation.

5.3.2 Hot Spot/AOC Remedial Activities

5.3.2.1 Heating Oil USTs Removal and Closure

In February and March 2005 as part of the Site renovation, two 20,000-gallon heating oil USTs, located south of the former boiler house (Building 7/7A - demolished), were removed in accordance with DER-10, NYSDEC's tank closure regulations, and the approved IRM/RI Work Plan (See Figure 6). The NYSDEC was notified of the pending tank removals by letter correspondence dated January 7, 2005. A closure plan was submitted to NYSDEC proposing a plan to terminate active excavation and to backfill the tank pits. A copy of the closure plan

(*Building 8 Underground Storage Tanks/Vaults Closures*) is provided in Appendix H.

Petroleum-impacted soil and free product removed from inside the tanks and vaults were characterized and disposed off the Site at Clean Earth of Philadelphia (See Tables 4A, 4B and 5). Free product was pumped directly into a vacuum truck and disposed at the United Oil Recovery facility in Bridgeport. Soil from the tank removals was temporarily stockpiled adjacent to the tank pits as AOC 2K, and waste characterization samples were collected for final disposition (see Table 3G).

The remaining supply, return, and vent piping leading from UST-1 to former Building 7/7A to the north was removed (See Figure 6). Petroleum-impacted soil was encountered and stockpiled with the SP-2K material. No piping was found leading from UST-2 to Building 7/7A. Copies of this data and the piping endpoint soil data are included in Table 6H.

Figure 6 illustrates the tank, vault, piping locations, and post-excavation soil sampling locations. Tables 3G and 6H contain waste characterization and endpoint sampling results. Endpoint sample results do not exceed the Track 4 SCOs for the Site.

A spill closure report was submitted to the NYSDEC Project Manager in January 2006. A spill closure letter was issued on February 22, 2006. Please refer to Appendix H for the complete closure report.

5.3.2.2 Boiler House Stack Demolition

In April 2005, the boiler and associated smoke stack south of Building 8 were decommissioned and subsequently demolished to facilitate new construction (See Figures 6 and 11). Prior to demolition of the brick boiler stack, a sample of the ash and material at the base of the stack was collected and submitted for to the laboratory for waste characterization analyses. Analytical results for this sample can be found in Table 10. The sample contained several SVOCs that exceeded their respective Track 4 SCOs. The ash and material was removed from the stack, combined with on-site stockpiled soil, and disposed at Clean Earth of Philadelphia (See Appendix G for the disposal documentation).

5.3.2.3 Old Transformer Building/Pad Investigation

On January 18, 2006, the old Con Edison transformer was removed from the transformer building located in the southwest corner of the Site. On this same date, the associated building, which consisted of a brick and wooden structure constructed 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 6).

Upon removal of the transformer and building, the concrete pad was inspected for staining and screened for VOCs with a PID. Nine concrete core samples were collected and analyzed for PCBs. 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 soil was 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 United States Environmental Protection Agency (USEPA) guidance documents for sampling for PCBs around transformer pads and the DER-10 guidance document for sampling around concrete slabs. The sample results showed no significant detections of the contaminants of concern including PCBs (See Table 6I). These sample results did not exceed the Track 4 SCOs for the Site.

5.3.2.4 South West Vault

In September 2005 while trenching to bring in new Con Edison electrical service, a concrete vault that measured approximately 6 feet wide by 15 feet long by 4 feet deep, was discovered on the south end of the Site (See Figure 6). The vault contained white and gray, clay-like material in a dark brown soil matrix. The material exhibited odors and PID readings up to 75 ppm at the surface.

The material was entirely excavated from the vault to allow inspection of the vault interior. The material was temporarily stockpiled south of Building 8 on a double layer of plastic sheeting, sampled for waste characterization, and covered with plastic sheeting pending waste characterization results. Waste characterization samples were collected on September 27 and 28 and on October 6, 2005. The results revealed elevated levels of acetone and aluminum. The waste characterization results are presented in Table 3H.

The contents of the vault were disposed at the previously approved Clean Earth of Philadelphia facility. See Table 5 for the material disposal inventory. The concrete was stockpiled on plastic sheeting separately from the soil, and it was disposed at the CEP facility.

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 endpoint soil samples from beneath the slab. Two endpoint soil samples were collected from beneath the slab and analyzed for the TAGM 4046 parameters. There was no evidence of contamination in the exposed soil, and there were no exceedances of the TAGM 4046 or Track 4 SCOs. The endpoint soil sample results are presented in Table 6J and 9, and on Figure 14.

5.3.3 Invasive Construction Activities

Invasive construction activities in the Building 8 area were extensive due to the high volume of utilities in the Service Corridor south of Building 8. The majority of the invasive work was related to utilities and grading. Langan maintained a full-time presence on the Site to observe these activities. During a NYSDEC Site visit, it was noted that a stockpile inside of Building 8 was not properly covered, and non-OSHA 40 hour trained workers were conducting utility excavation activities. The Remedial Engineer acted immediately by having the soil stockpile removed from the interior of the building and placed in the main stockpile area south of Building 8. Also, the non-OSHA trained workers were replaced with OSHA 40 hr certified workers for the duration of the invasive activities.

The majority of the soil excavated in the Building 8 area was reused as backfill and/or re-worked into the service corridor.

5.3.3.1 New Con Edison Building 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 in February 2005 as an addition to the south side of Building 8 (see Figure 6). The structure, a slab on grade construction with strip footings, required soil excavation to a depth of about 4 feet bgs. The excavation was deepened in the northeast corner to remove unsuitable material for foundation construction. The excavated soil was continuously inspected and screened by Langan. Only typical historic fill was observed throughout the excavation activities. Soil excavated from this area was mixed with the SP-2K stockpile and sent to the CEP facility.

Four endpoint samples were collected from the bottom and sidewalls of this building footprint. One endpoint soil sample exceeded the Track 4 SCOs for PAHs. The Track 4 SCO exceedance for Building 8 is summarized on Table 6L and 9, and illustrated in Figure 14.

There are EC/ICs and an SMP for the Site that minimize the risk of exposure to these contaminants. See Appendix B for more details on the SMP and Sections 6.0, 7.0, and 8.0 for the EC/ICs implemented at the Site.

5.3.3.2 Loading Dock and Service Corridor Excavation and Grading

Langan was present on the Site to screen soil during all excavation activities in the service corridor. All excavated soil was inspected for visual or olfactory evidence of contamination as well as screened with a PID for VOCs. All excavated soil was placed in the primary stockpile area south of Building 3, sampled for waste characterization parameters, removed from the Site, and taken to a pre-approved disposal facility. Refer to Figure 11 for a more detailed depiction of these excavation areas. During the remediation of Parcel A and the construction of the loading docks, soil under the loading dock, and under the corridor between Buildings 7 and 8 was excavated to Track 1 Cleanup Standards. Figure 6 illustrates the area remediated to Track 1 standards.

5.3.4 Residual Contamination Above the Track 4 SCOs on the Site

With respect to the samples collected within the Building 8 area, three samples exceeded the Track 4 SCOs for the Site: TB5-0.5 for dichloromethane at 101 ug/mg, and two depths at RI boring location B-51 for SVOCs and metals. These are illustrated on Figure 14 and are summarized in Table 9. The implementation of the EC/ICs and SMP provide sufficient protection against exposure to these residual contaminants left in the subsurface soil.

5.3.5 Installation of Engineering Controls (ECs)

Three ECs were installed within the Building 8 area:

- An Active Sub-Slab Depressurization (SSD) System
- Site-Wide Composite Cover System comprised of asphalt covered roads, concrete covered sidewalks, and concrete building slabs
- An Air Sparging/Soil Vapor Extraction System at the southern property boundary

A detailed discussion of each of these engineered systems is contained in Sections 6.0, 7.0 and 8.0 of this FER.

6.0 SUB-SLAB DEPRESSURIZATION SYSTEMS

Since VOCs (primarily PCE and TCE) were detected in the soil vapor beneath the floor slabs of several buildings at the Site and on Parcel A, five active SSD systems were constructed as engineering controls to mitigate the potential exposure hazard associated with these compounds. The SSD systems were installed in Buildings 4 and 6 on Parcel A and in Buildings 3, 7, and 8 on Parcel B as engineering controls. The design was based on Environmental Protection Agency (EPA) Draft Guidance Document EPA/6251R-92 concerning sub-slab depressurization of large buildings and schools and the NYSDOH document entitled "Guidance for Evaluating Soil Vapor Intrusion in the State of New York" (October 2006).

6.1 Conceptual Design and Process

The SSD systems create a low vacuum field beneath the existing building slabs by extracting the sub-slab air using a vacuum blower mounted to the roof of each building. This low vacuum field under the slab prevents potentially impacted vapors from entering the building. General calculations for each SSD system are based on the volume of sub-slab soil pore space that is affected, an assumed depth of influence of 3.5 feet below the building slab, and four air changes of the pore space volume per day.

6.2 Building Systems

The SSD systems are generally comprised of a series of suction pits and suction trenches to draw soil vapor to the roof mounted blowers where the vapor is discharged to the atmosphere. Each suction pit is comprised of 4 inch black steel piping covered by galvanized wire mesh placed in a 2 feet by 2 feet by 2 feet deep pit, which is filled with 1 inch gravel and sealed with concrete. The preliminary design of these systems was submitted to the NYSDEC and the NYSDOH for their information. Details of each individual system are discussed below

<u>6.2.1 Building 4 SSD System (Parcel A)</u>

The Building 4 system was installed between August 2005 and May 2006, and consists of one strategically located suction pit in the center of the building, connected to a roof mounted blower to cover the building footprint of 21,000 square feet. This system was incorporated into the new construction of the building. The calculation for the required vacuum for this system is based on a required sub-slab vent inlet vacuum pressure of 5 inches WC, piping losses of 10 inches WC, valve losses of 7 inches WC, pre-filter losses of 7 inches WC, and silencer losses of 6 inches WC, for a combined required vacuum at the blower system inlet of 35 inches WC. Given these design requirements, the roof-mounted blower system provides a minimum flow rate of 120 cubic feet per minute (cfm) at and a vacuum of 35 inches WC (see Appendix L).

6.2.2 Building 6 SSD System (Parcel A)

The Building 6 system was installed between March 2005 and May 2006 and consists of three strategically located suction pits connected to two roof mounted blowers to cover the building footprint of 57,000 square feet. This system was incorporated in the new construction of the building. The calculation for the required vacuum for the system is based on the total pressure losses through the system. The calculation for this system is based on a required sub-slab vent inlet vacuum pressure of 5 inches of water column (WC), piping losses of 10 inches WC, valve losses of 7 inches WC, pre-filter losses of 7 inches WC, and silencer losses of 6 inches WC, for a combined required vacuum at the blower system inlet of 35 inches WC. Given these design requirements, the roof-mounted blower system for Suction Pits #6-1 and #6-2 (combined with a manifold system to the roof) will provide a minimum flow rate of 180 cfm at 35 inches WC. The blower system for Suction Pit #6-3 will provide a minimum of 65 cfm at 35 inches WC (see Appendix M).

6.2.3 Building 3 SSD System (Parcel B)

The Building 3 system, which was installed between July 2006 and September 2006, consists of four strategically located suction pits connected to two roof mounted blowers to cover the building footprint of 57,000 square feet. This system was retrofitted to the existing building. The calculation for the required vacuum for this system is based on a required sub-slab vent inlet vacuum pressure of 20 inches WC) piping losses of 10 inches WC, valve losses of 7 inches WC, pre-filter losses of 7 inches WC, and silencer losses of 6 inches WC, for a combined required vacuum at the blower system inlet of 50 inches WC. Given these design requirements, the roof-mounted blower system for Suction Pits #3-1 and #3-2 (combined with a manifold system to the roof) will provide a minimum of 100 cfm at 50 inches WC. The blower system for Suction Pits #3-3 and #3-4 (combined with a manifold system) will also provide a minimum of 100 cfm at 50 inches WC (see Appendix N).

6.2.4 Building 7 SSD System (Parcel B)

The Building 7 system, which was installed between September 2005 and April 2006, consists of three strategically located suction pits connected to three roof mounted blowers to cover the building footprint of 34,000 square feet. This system was retrofitted to the existing building. The calculation for the required vacuum for this system is based on a required sub-slab vent inlet vacuum pressure of 20 inches WC, piping losses of 5 inches WC, valve losses of 7 inches WC, pre-filter losses of 7 inches WC, and silencer losses of 6 inches WC, for a combined required vacuum at the blower system inlet of 50 inches WC. Given these design requirements, the roof-mounted blower systems for Suction Pits #7-1 and #7-2 (combined with a manifold system to the roof) will provide a minimum of 50 cfm at 50 inches WC. The blower system for Suction Pit #7-3 will provide a minimum of 100 cfm at 50 inches WC (See Appendix O).

6.2.5 Building 8 SSD System (Parcel B)

The Building 8 system, which was installed between March 2006 and July 2006, consists of five strategically located suction pits powered by two roof-mounted blowers to cover the building footprint of 30,500 square feet. This system was retrofitted to the existing building. The calculation for the required vacuum is based on a required sub-slab vent inlet vacuum pressure of 20 inches WC, piping losses of 10 inches WC, valve losses of 7 inches WC, pre-filter losses of 7 inches WC, and silencer losses of 6 inches WC, for a combined required vacuum at the blower system inlet of 50 inches WC. Given these design requirements, the roof-mounted blower system for Suction Pits #8-1, #8-2, and #8-3 (combined with a manifold system to the roof) provides a minimum of 70 cfm at 50 inches WC. The blower system for Suction Pits #8-4 and #8-5 (combined with a manifold system) provides a minimum of 50 cfm at 50 inches WC (See Appendix P).

6.3 SSD System Installation

The installation of the SSD systems included the following tasks:

- Filling of existing utility trenches (or building base) with 1 inch stone to create pore space;
- Sealing concrete slab joints to maximize suction;
- Sealing conduit and pipe penetrations through the slab and sub-grade walls;
- Installation of suction pits connected to rooftop blower systems via 4 inch steel piping; and
- Installation of electric roof-mounted blower systems to generate the required sub-slab vacuum.

6.4 Testing of SSD Systems

Following installation of the SSD systems, the following tests were performed:

1. While the depressurization system was in operation, smoke tubes were used to check for leaks through concrete cracks, floor joints, and at the suction points. Any leaks identified were then properly sealed.

2. In buildings where natural draft combustion appliances exist, the building was tested for backdrafting of the appliances. If necessary, the backdrafting condition was corrected before the SSD system was placed in operation.

3. The sub-slab pressure field was tested by operating the SSD system while observing the movement of smoke downward into small holes (e.g., 3/8 inch) drilled through the slab at sufficient locations to demonstrate that a vacuum is created beneath the entire slab. In addition, an evaluation was performed by using a manometer to ensure that at least 0.001 inches WC of vacuum is being created throughout the building footprint. When conditions of inadequate depressurization were observed, the source or cause (e.g., improper fan operation) was identified and corrected.

4. The warning device indicating blower malfunction was tested to confirm proper operation.

5. Thirty to ninety days after installation of the system and completion of building construction, indoor and outdoor air sampling was performed. Samples were analyzed for the constituents of concern (i.e. TCE and PCE) to confirm that concentrations were below the air guidance values derived by the NYSDOH. If the sampling results indicated a concentration above the air guidance values, the source or cause (e.g., indoor or outdoor sources, improper operation of the SSD system, etc.) was identified and corrected as necessary.

Results of this testing for each building system are included in Appendix L to P.

6.5 Operation, Maintenance, and Monitoring

The procedures for operating, maintaining, and monitoring the SSD systems are documented in the SMP, included as Appendix B of this FER. The SMP addresses the annual inspection and certification requirements for the on-site SSD systems. Generally, the SSD systems will be in continuous operation. General equipment monitoring will consist of visual inspection of all components of the system at a frequency determined by the minimum schedules required for routine maintenance activities. As necessary, system components that are worn, damaged, or do not adequately perform the task for which they were designed will be replaced. The SMP also addresses severe condition inspections in the event a suspected failure of the SSD system is reported or an emergency occurs that is deemed likely to affect the operation of the system.

6.6 System Objective

SSD systems were installed at occupied buildings to mitigate potential soil vapor intrusion issues related to the on-site vapor plume. The SSD systems will remain in operation until NYSDEC and NYSDOH receives and has had the opportunity to comment on a proposal to shut down the systems. Systems will remain in place and operational until approval to discontinue operation has been granted by NYSDEC in writing. The criteria for termination of the SSD systems are detailed in the SMP for the Site (See Appendix B). These criteria are subject to revision by NYSDEC.

7.0 AIR SPARGING/SOIL VAPOR EXTRACTION SYSTEM

Elevated concentrations of VOCs were detected in previously collected soil vapor and sub-slab vapor samples in and around Building 3. Based on previous investigations at the Site, a VOC source area was located at the eastern portion of the building. A Site-wide investigation of the groundwater resulted in the discovery of a PCE/ TCE plume present under the Site (See Figure 7).

AS/SVE in-situ remediation technology was selected as an engineering control to treat the impacted soil and groundwater (located approximately 35 feet to 70 feet bgs) on the Site (groundwater is encountered at approximately 60 feet bgs). One AS/SVE system was installed at Building 3 to remediate the impacted soil and groundwater at the core of the plume and an additional AS/SVE system was installed near the southern property boundary. Both systems were designed to prevent future off-site migration of constituents off-site.. The AS/SVE system designs are based on the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006), United States Army Corps of Engineers (USACE) In-Situ Air Sparging Engineer Manual (September 1997), and USACE Soil Vapor Extraction and Bioventing Engineer Manual (June 2002).

7.1 Conceptual Remedial Design and Process

The mechanism of contaminant removal by this technology consists of stripping (induced volatilization by sub-surface air injection) and vapor capture via a vacuum throughout the contaminated zone. During air sparging, air is released into the saturated zone through a series of air sparging wells. The released air causes bubbles to form, which allows VOCs in the groundwater to diffuse into the rising bubbles. When the bubbles reach the vadose zone, the contaminants are removed via vapor extraction wells installed in the unsaturated zone. The location and distribution of sparging and extraction wells were determined based on a 34-foot radius of influence (ROI) per air sparging well and 70 foot ROI per soil vapor extraction well. ROIs were determined upon completion of an AS/SVE pilot test study conducted at the Site. Please refer to Appendix Q for the results of the pilot test.

7.2 General System Components and Layout

7.2.1 Building 3 AS/SVE System (AS/SVE #1)

The main system components include:

- Four air sparging injection wells constructed of 2-inch diameter schedule 80 poly-vinyl chloride (PVC), with a 10-slot screen, 3 feet in length, set approximately 82 feet bgs;
- Three vapor extraction wells constructed of 2-inch diameter schedule 40 PVC, with a 20-slot screen, 10 feet in length, set approximately 45 feet bgs;
- Four air sparging monitoring wells constructed of 2-inch diameter schedule 80 PVC, with a 10-slot screen, 2 feet in length, set approximately 82 feet bgs;
- Four vapor extraction monitoring wells constructed of 2-inch diameter schedule 40 PVC, with a 20-slot screen, 10 feet in length, set approximately 45 feet bgs;
- An air sparging system that includes a compressor rated for a flow of 120 standard cubic feet per minute (scfm) at a pressure of 25 pounds per square inch (psi); and
- A soil vapor extraction system that will include:
  - A vacuum blower rated for a flow of 180 scfm at 150 inches WC vacuum;
  - A moisture separator to protect the vacuum blower from moisture damage; and
  - Two vapor-phase granular activated carbon (VGAC) vessels connected in series.

The air sparging, soil vapor extraction, and monitoring wells are located along the eastern and southern portions of the south half of Building 3 (over the apparent core of the VOC plume). The AS/SVE blower, compressor, and treatment system are located on the roof of Building 3 and are connected to the AS/SVE wells via 2- and 4-inch, black steel piping. The well array, compressor selection, and vacuum blower selection were designed based on the results of the AS/SVE pilot test conducted at the Site. Well logs and As-Built drawings are presented in Appendix Q.

7.2.2 Southern AS/SVE System

The main system components include:

- Six air sparging injection wells constructed of 2-inch diameter schedule 80 PVC, with a 10-slot screen, 10 feet in length, set approximately 80 feet bgs;
- Four vapor extraction wells constructed of 2-inch diameter schedule 40 PVC, with a 20-slot screen, 10 feet in length, set approximately 35 feet bgs;
- Three air sparging monitor wells constructed of 2-inch diameter schedule 80 PVC, with a 10-slot screen, 10 feet in length, set approximately 80 feet bgs;
- Three vapor extraction monitoring wells constructed of 2-inch diameter schedule 40 PVC, with a 20-slot screen, 10 feet in length, set approximately 35 feet bgs;
- An air sparging system that will include a compressor rated for a flow of 180 scfm at a pressure of 25 psi; and
- A soil vapor extraction system that will include a:
    - Vacuum blower rated for a flow of 240 scfm at 150 inches WC vacuum;
    - A moisture separator to protect the vacuum blower from moisture damage; and
    - Two VGAC vessels connected in series.

The air sparging, soil vapor extraction, and monitoring wells and AS/SVE blower, compressor, and treatment system are located along the southern boundary. The blower, compressor, and treatment system are connected to the AS/SVE wells via 2- and 4-inch PVC piping encased in concrete. The well array, compressor selection, and vacuum blower selection were designed based on the results of the AS/SVE pilot test conducted at the Site. Well logs and As-Built drawings are presented in Appendix R.

7.3 Operation, Maintenance, and Monitoring

The procedures for operating, maintaining, and monitoring the AS/SVE systems are documented in the SMP, included as Appendix B of this FER. The SMP addresses the annual inspection and certification requirements for the on-site AS/SVE systems. Generally, the AS/SVE systems will be in continuous operation. General equipment monitoring will consist of visual inspection of all components of the system at a frequency determined by the minimum schedules required for routine maintenance activities and sampling activities. Sampling of on-site ground water and soil vapor will also be conducted as part of the AS/SVE monitoring activities. As necessary, system components that are worn, damaged, or do not adequately perform the task for which they were designed will be replaced. The SMP also addresses severe condition inspections in the event a suspected failure of the AS/SVE system is reported or an emergency occurs that is deemed likely to affect the operation of the system.

7.4 Remedial Goal

The overall remedial goal for the project is to reduce the concentrations of constituents of concern in the contaminated zone until either NYSDEC levels or asymptotic contaminant concentrations are achieved at the Site. Only following written approval by NYSDEC will the AS/SVE system be discontinued or dismantledThe criteria for termination of the AS/SVE systems are detailed in the SMP.

8.0 SITE-WIDE COMPOSITE COVER SYSTEM

Since the inception of the Atlas Park project, numerous subsurface soil investigations were completed throughout the Site. Based on the extensive analytical database generated for the Site, Category 1 – Contaminated Fill remains on the Site above TAGM 4046 values (with the exception of the area between Buildings 7 and 8 as illustrated on Figure 6).

Installation of a composite cover system at the Site comprised of asphalt covered roads, concrete covered sidewalks, and concrete building slabs is a sound engineering control for the protection of human health by establishing an incomplete exposure pathway to subsurface soil that may be impacted.

8.1 Composite Cover System Design

The composite cover system for the Parcel B Site at Atlas Park consists of asphalt covered roads, concrete covered sidewalks, and concrete building slabs. No exposed soil (i.e., topsoil, tree planters) on the Site is in contact with subsurface soil. The design is illustrated on Figure 16. The various covers are shown as they exist on the Site. In addition, typical details of each type of cover are illustrated on the drawing.

8.2 Operation and Maintenance

The procedures for operating, maintaining, and monitoring the site-wide composite cover system are documented in the SMP, which is included as Appendix B of this FER. The SMP addresses the annual inspection and certification requirements for the site-wide composite cover system. The annual inspection and certification requirements will consist of checking the integrity of the cover, and making repairs when necessary. Monitoring of the composite cover system will consist of visual inspection of all composite cover at a frequency of once every month. As necessary, any portion of the composite cover system that is damaged will be replaced or repaired. The SMP also addresses severe condition inspections in the event an emergency occurs that is deemed likely to affect the composite cover system.

8.3 Remedial Goal

The overall remedial goal for the composite cover system is to minimize the risk of human health exposure to contaminated material under the cover. The composite cover system will be maintained for the life of the project.

9.0 EXISTING POST-REMEDIAL SITE CONDITIONS

9.1 Soil

The Site remains underlain by a layer of fill material that contains ash/cinders with elevated levels of metals and SVOCs above the TAGM 4046 SCOs. This layer varies in thickness across the Site but generally exists to a depth of approximately 8 feet bgs. In addition, certain isolated hot spot areas also remain under portions of the Site. These areas contain elevated concentrations of VOCs, SVOCs, lead, and arsenic that exceed the Track 4 SCOs for the Site (See Figures 12 to 14). These areas include the following:

- Localized area of significantly elevated lead in soil at a depth of approximately 9 to 10 feet bgs and centered on SRI soil borings B7-1, B7-5, and B7-5E beneath the south side of Building 7 (see Table 9 and Figure 13);
- Localized area of elevated barium and SVOCs in soil at RI boring B-48 near the center of Building 7 (see Table 6G and Figure 13);
- Localized area of elevated arsenic below the former process vault/tank area and adjacent pipe trench area in the northern portion of Building 7 (see Tables 6F, 9, and Figure 13)
- Localized area of significantly elevated SVOCs in a shallow layer of ash/cinders within the historic fill layer at RI soil borings B-51, B-48, B-55, and B-57 beneath the east side of Building 8 (see Table 9 and Figure 14); and
- Localized area of elevated benzo(a)pyrene near the former heating oil UST #1 and below the new Con Ed building in the service corridor adjacent to Building 8 (see Table 9 and Figure 14).

As stated in the RAWP, these hot spot areas were left in place to ensure the structural integrity of the original buildings retained on-site (excavation of these areas would require demolition of existing floor slabs and column footings which might jeopardize the buildings' structural integrity). Appendix U contains the residual contaminant survey coordinates. In addition, the composite cover system in place at the Site (e.g., asphalt covered roads, concrete covered sidewalks, and concrete building slabs) will prevent human exposure to impacted soil as well as prevent contaminant leaching into groundwater.

9.2 Groundwater

PCE and TCE in groundwater at the Site, exceed their respective NYSDEC groundwater standards. The plumes are oriented in a general north-south alignment, and originate in the southeast corner of Building 3. The historic, regional groundwater flow direction at the Site was to the south-southwest, but locally, the direction of groundwater flow was modified by the ongoing Parcel A construction and operation of the storm water detention basin (See Figure 17). Because of the combined effects of these Site conditions, the north end of the PCE/TCE plume deflects towards the west. Please refer to Figures 7 and 17 for a detailed depiction of both groundwater flow direction and plume location.

There is also off-site migration of groundwater contaminants exceeding the NYSDEC standards originating at the Site. However, based on the off-site monitoring well installation and sampling activities, it is evident that PCE and TCE concentrations have naturally attenuated at a rate of 50% within approximately 150 linear feet of the Parcel B property boundary. Moreover, a suspected source area on the Site that contributed to groundwater impacts has been excavated and removed from the Site.

The groundwater contamination at the Site is being addressed by the two AS/SVE systems discussed in the Section 7.0. As discussed above, operation, maintenance, and monitoring of these systems, which will include periodic groundwater sampling, and will be conducted in accordance with the SMP, which is provided in Appendix B. In addition, there are 11 on-site monitoring wells and 5 off-site monitoring wells that will be used to monitor the natural attenuation of the plume both on and off the Site. Maintenance and monitoring of the groundwater monitoring well network is discussed in the SMP (Appendix B).

9.3 Soil Vapor

Soil vapor plumes consisting of PCE and TCE were identified beneath Buildings 3 and 8. To mitigate potential onsite soil vapor intrusion, SSD systems were installed at these buildings. Additionally, although previous investigations did not detect soil vapor concentrations at levels that warranted mitigation, SSD systems were also installed at Building 7. The migration of soil vapors from the Site onto the adjacent Parcel A has resulted in the requirement for SSD systems in Buildings 4 and 6. The AS/SVE systems installed at Building 3 and on the southern property boundary will also serve to remediate residual soil vapor contamination at the Site. As discussed above in Sections 6.5 and 7.3, operation, maintenance, and monitoring of these systems, which will include periodic soil vapor sampling, will be conducted in accordance with the SMP provided in Appendix B.

10.0 DATA VALIDATION

Severn Trent Laboratories, Inc. of Shelton, Connecticut and Spectrum Analytical Inc. of Agawam, Massachusetts conducted laboratory analyses of soil, groundwater, and soil vapor samples. Laboratory analyses were conducted in accordance with USEPA SW-846 methods and NYSDEC analytical services protocol (ASP) Category B deliverable format.

Data validation reviews were preformed by Alpha Environmental Consultants, Inc. of Clifton Park, New York; Data Validation Services of North Creek, New York; and Environmental Data Quality, Inc. of Exton, Pennsylvania. AOC-specific bottom and sidewall endpoint soil samples, groundwater samples, and soil vapor samples were reviewed by a data validator in accordance with the USEPA validation and NYSDEC data usability guidelines. Validation included the following:

- Verification of 100% of all QC sample results;
- Verification of the identification of 100% of all sample results (both positive hits and non-detects); and
- Recalculation of 10% of all investigative sample results.

DUSRs were prepared for each sample delivery group that the data validator reviewed and are provided in Appendix S. The tabulated data provided in this report includes the data qualifiers added by the data validator.

11.0 SITE MANAGEMENT PLAN (SMP)

Site management is the last phase of remediation that begins with the approval of the final remedial report and/or issuing of the certificate of completion and continues until the remedial action objectives for the Site are satisfied and the Site is closed out. The remedial party is responsible to ensure that all Site management responsibilities are performed. Implementation of the SMP is the responsibility of the owner(s) and all future owner(s) of the Site.

The SMP, which is provided in Appendix B, presents a detailed description of the procedures required to properly manage residual contamination left in place at the Site following completion of the remedial action in accordance with the BCA with the NYSDEC, including (1) development, implementation, and management of all EC/ICs; (2) development and implementation of monitoring systems and a monitoring plan; (3) development of a plan to operate and maintain any treatment, collection, containment or recovery systems (including, where appropriate, preparation of an operation and maintenance manual); (4) submittal of Site management reports, performance of inspections and certification of results and insurance of proper communication of Site information to the NYSDEC and NYSDOH; and (5) defining criteria for termination of treatment system operation.

These objectives are accomplished via the four plans included in the SMP: the Engineering and Institutional Control Plan for implementation and management of EC/ICs; a Monitoring Plan for implementation of Site monitoring; an Operation and Maintenance Plan for implementation of remedial system components, containment, treatment, and recovery systems; and a Site Management Reporting Plan for submittal of data, information, recommendations, and certifications. The requirements outlined in the SMP will be in place in perpetuity, or until extinguishment of the environmental easement according to an approval by the NYSDEC, or until otherwise approved in writing by the NYSDEC.

12.0 CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations are based on the remedial activities conducted at the Site (Parcel B of The Shops at Atlas Park):

- The post-excavation endpoint sampling conducted during the implementation of the remedial activities confirms and documents the quality of soil left in place under Parcel B.
- All soil that remains on-site is currently confined by a composite cover system, which is comprised of asphalt covered roads, concrete covered sidewalks, and concrete building slabs. The composite cover system serves as an EC to prevent exposure to the subsurface soil.
- Endpoint sample results clearly document the residual contamination left in-place in the subsurface at the Site.
- The Building 3 AS/SVE System will remediate the core of the TCE/PCE groundwater plume underlying the Site. Both AS/SVE systems are intended to prevent the off-site migration of the groundwater plume to the south of the Site.
- Potential exposure to soil vapor will be mitigated by the SSD systems located on-site at Buildings 3, 7, and 8 and off-site at Buildings 4 and 6 on the adjacent Parcel A.
- Total costs of Remedial Activities for Parcel B were approximately $4,864,911. See Appendix T for the Cost Summary.
- PCE was detected in every outdoor off-site soil vapor sample collected to the south and northwest of the Site.

Langan recommends no further action with respect to the subsurface conditions at the Site. The post-excavation endpoint sample results document the subsurface conditions of the Site. EC/ICs were implemented to properly manage the environmental contaminants left in place on Parcel B and minimize the exposure for future building tenants the public and employees.

The off-site vapor remedy consists of in-home vapor monitoring (sub-slab, indoor air, ambient outdoor air). The details of the sampling program including procedures to be followed will be defined in the SMP. Homes to be sampled will be approved by NYSDOH and NYSDEC. Pending evaluation of further monitoring results obtained under the SMP, further monitoring of soil vapor and/or mitigation of soil vapor under homes may be required and will be determined by NYSDOH and NYSDEC.

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