SITE MANAGEMENT PLAN
FINAL ENGINEERING REPORT: APPENDIX B
ATLAS PARK SITE – PARCEL B
GLENDALE, QUEENS
NYSDEC BCP Site No. C241088

Volume 1 of 2

Prepared For:

ATLAS PARK LLC
8000 Cooper Avenue
Glendale, NY 11385

Prepared By:

Langan Engineering and Environmental Services, P.C.
360 West 31st Street
New York, New York 10001

Joel B. Landes, P.E.

December 29, 2006
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ENGINEERING & ENVIRONMENTAL SERVICES

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I. SITE MANAGEMENT PLAN

1.0 INTRODUCTION

This document is prepared as a requirement for fulfillment of remedial action at Atlas Park-Parcel B Site (hereafter referred to as the "Site") under the New York State (NYS) Brownfield Cleanup Program (BCP) administered by New York State Department of Environmental Conservation (NYSDEC). The Site was remediated in accordance with the Brownfield Cleanup Agreement (BCA) Index# W2-1070-05-06, Site # C241088, which was issued on October 11, 2005, and in accordance with BCA Amendment Index No. W2-1101-06-12 Site No. C241088, which was issued on December 28, 2006.

1.1 General

Atlas Park LLC entered into a BCA (Index No. W2-0984-04-02, Site No. C241045) with the NYSDEC on March 5, 2004 to develop a 12-acre portion of the former Atlas Terminals industrial park, which is located in Glendale, Queens County, New York, into a mixed-use development known as "The Shops at Atlas Park" ("Atlas Park"). This BCA required Atlas Park LLC to investigate and remediate contaminated media, which at this time was defined as soil and groundwater at the Atlas Park Site (Figure 1). The 12-acre Atlas Park Site was subsequently divided into two distinct Parcels, each with separate BCAs. Parcel A consists of an 8.474-acre portion of the 12-acre parcel, and Parcel B 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 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 approximately 3.506-acre Parcel B is more fully described in Appendix A – Metes and Bounds.

This Site Management Plan (SMP) was prepared to manage residual contamination remaining at the Site in perpetuity or until removal of the environmental easement with written approval by the Department. Work on the Site began in February 2005, was completed in December 2006, and the COC was issued in December 2006. All reports associated with the Site are available for viewing at the Glendale, New York Public Library and the Region 2 NYSDEC offices in Long Island City, New York.

This SMP was prepared by Langan Engineering and Environmental Services, P.C. (Langan), on behalf of Atlas Park LLC (Owner), in accordance with the requirements in NYSDEC Draft DER-10 Technical Guidance for Site Investigation and Remediation, dated December 2002, and the guidelines provided by NYSDEC. This SMP addresses the means for implementation of institutional controls (ICs) and engineering controls (ECs) implemented at the Site.

1.2 Purpose

The Site has residual contamination that has been left after completion of the remedial action that has been performed under the BCP. ECs have been incorporated in the remedy for the Site to render the residual contamination protective of public health and the environment. An environmental easement has been recorded for the Site that provides an enforceable means of ensuring the continued protection of the Site in the future, and requires adherence by the grantor and grantor's successors and assigns to the engineering controls and a series of institutional controls that provide restrictions on Site usage and mandate operation, maintenance, monitoring and reporting measures for those engineering and institutional controls. The SMP is a document that ensures compliance with engineering and institutional controls (EC/ICs) for residual contamination at the Site. The SMP has been approved by the NYSDEC, and compliance with this Plan is required by the Grantor of the environmental easement and Grantor's successors and assigns.

Site management is the last phase of remediation, which begins with the approval of the final remedial/engineering report and/or issuing of the COC and continues in perpetuity or until released by NYSDEC or NYSDOH. The property owner is responsible to ensure that all Site management responsibilities are performed.

The SMP is intended to provide a detailed description of the procedures required to manage residual contamination left in place at the Site following completion of the remedial action in accordance with the NYS BCA with the NYSDEC. This includes (1) development, implementation, and management of all engineering and institutional controls; (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 demonstration of proper communication of Site information to NYSDEC; and (5) defining criteria for termination of treatment system operation.

This SMP includes four plans: an 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 collection, containment, treatment, and recovery systems; and a Site Management Reporting Plan for submittal of data, information, recommendations, and certifications to NYSDEC.

Where the Remedial Action Objectives (RAOs) call for residual contaminants to be retained and managed on-site, the requirements outlined in this SMP are to be in place in perpetuity, or until removal of the environmental easement according to written approval by NYSDEC, or until otherwise approved by NYSDEC.

Site management activities, reporting, and institutional & engineering control certification will be scheduled on a certification period basis. The certification period will be annually.

Important notes regarding this SMP are as follows:

- The penalty for failure to implement the SMP is revocation of the COC;
- The SMP and all Site documents are stored at the NYSDEC Region 2 offices (or successor agency). At the time of SMP submission (December 2006), the Site documents can be found in the repositories that were identified in all the Fact Sheets including:

Glendale Public Library

78-60 73rd Place

Glendale, New York 11385

Telephone: (718) 821-4980

Monday: 1 to 8 PM

Tuesday: 1 to 6 PM

Wednesday: 10 AM to 6 PM

Thursday: 1 to 6 PM

Friday: 10 AM to 6 PM

NYSDEC Region 2 Office

47-40 21st Street

Long Island City, NY 11101

(call in advance) (718) 482-4891

Hours: Mon. To Fri. 9 a.m. to 5 p.m.

Community Board 5

61-23 Myrtle Avenue

Glendale, New York 11385

718-366-1834

- The Brownfield Cleanup Agreement (Index #W2-1070-05-06; Site #C241088) and the Brownfield Cleanup Agreement Amendment Index No. W2-1101-06-12 Site No. C241088 for the Site require an Operation, Maintenance and Monitoring [OM&M] Work Plan), which was renamed the SMP, and therefore, serves as contractual binding authority under which this SMP is to be implemented. The BCP law itself, also requires the preparation of an OM&M Work Plan (n/k/a SMP) in ECL 27-1415 and 27-1419. Therefore, the BCA is a binding contract and the BCP law is statutory authority under which this SMP is to be implemented.
- If the SMP is not properly implemented, the Certification of Completion/Declaration of Covenant is subject to revocation; and
- This SMP defines the means for implementation of easement requirements for the Site.
- Unless otherwise specifically noted, "the Site" refers only to Parcel B.

2.0 SITE BACKGROUND

2.1 Site Location and Description

The Site is located in the Borough of Queens, New York City, New York and is identified as Block 3810 and Lot 350 on the New York City Tax Map. The Site is situated on an approximately 3.506-acre area bounded by Cooper Avenue to the north, the Long Island Rail Road (LIRR) Right-of-Way to the south, Atlas Park Parcel A to the east, and 80th Street to the west (see Figure 1). The approximately 3.506-acre Parcel B is more fully described in Appendix A – Metes and Bounds.

The Site was originally occupied by former manufacturing Buildings 1, 7/7A, 28, 29, and 37. Building 7/7A was the former boiler house. This building and the associated boiler stack were demolished. The remaining buildings, except Building 29, were renovated. Building 29 will be used as an unoccupied storage shed. Building 28 was divided into two sections by a strip of land that belongs to Parcel A; the southern half of the building has become new Building number 7 and the northern half of the building has become a part of the new Building number 3. The portion of the former Building 28 on the strip of Parcel A land was demolished and the area was investigated and remediated to Track 1 cleanup objectives as part of the Interim Remedial Measure (IRM) for Parcel A. Table 1 below relates the new building numbers designated for the renovation project to the original building numbers that were used in the January 2005 Remedial Investigation (RI) Report and other previously-issued BCP documents. The building locations and numbers are also shown on Figure 2.

Table 1: Old and New Building Numbers

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

2.2 Site History

According to a previous Phase I Environmental Site Assessment (ESA) report prepared by Ambient Group, Inc. (Ambient) in March 2001, the Atlas Terminals property (which includes the Site) was owned by the Folk family and consisted primarily of farmland in 1867. Sanborn maps indicate that several buildings occupied the property prior to 1922 but their use was unknown. In 1922, the property was sold to the Hemmerdinger Corporation and the property became Atlas Terminals. The Hemmerdinger Corporation leased portions of the property to various manufacturing and processing companies during the period of usage and continues to remain a tenant at the Atlas Terminals property in the textile industry. In 2002, a 12-acre portion of the property, which includes the Site and Parcel A, was transferred to Atlas Park LLC. Based on the extensive site historical use investigation performed and the subsurface investigation conducted, a source of on-site soil gas and groundwater contamination was linked to a tenant(s) that used chlorinated solvents to wash parts or equipment. This contamination was linked to a series of pipes in Building 3 that contained some residual solvent in the sediment, and the piping network was subsequently removed. Sub-slab vaults containing glue were also found in Building 7, and the vaults were opened and cleaned. Finally, soil gas contamination was found under the slab in Building 8, but a specific source was not identified. Historical fill is located under most of the Site, and pockets of soil that tested positive, as characteristic hazardous waste is present under Building 7.

2.3 Groundwater Flow Conditions

Based on water level measurements collected during the initial RI, the depth to groundwater ranged from approximately 55 to 67 feet below ground surface (bgs) and, consequently, groundwater elevation ranged from approximately 14 to 15 feet Queens Borough Datum (QBD). Based on these measurements, the water table lies within the Upper Glacial Aquifer. Groundwater flow direction beneath the Site is west-southwest to southwest. This groundwater flow direction is generally consistent with regional maps published by the United States Geological Survey (USGS).

After the installation of additional on- and off-site wells installed as part of the Supplemental Remedial Investigation (SRI), numerous synoptic rounds of water level measurements were collected from the new and existing wells to update the groundwater elevations and flow direction. Groundwater elevation ranged from 14.22 to 15.51 feet QBD.

Currently, there is an apparent groundwater mounding effect in the middle of the Site, resulting in a northwest to northerly groundwater flow direction on the north half of the Site and a southwest to southerly groundwater flow direction on the south half of the Site. A groundwater sampling event conducted in October 2004 (just after demolition of the Parcel A buildings), covering both Parcel A and the Site, showed an apparent water table high point present in the center-east side of Parcel A, resulting in a radial flow pattern, in a southwesterly to northwesterly groundwater flow direction.

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

Groundwater flow (prior to start of Site development) is believed to have been consistent with the regional flow direction to the south-southwest. The recent, combined effects of the Site construction and storm water detention basin on local groundwater flow patterns are evident in the deflection of the north end of the plume isoconcentration lines towards the west (see Figures 3A and 4).

2.4 Geological Conditions

In all, during the implementation of the RI and SRI activities at the Parcel B site, 102 soil borings were installed, including the collection more than 243 soil samples. Based on the lithology encountered, the Site is directly underlain by fill, followed by a native, glacial sand, and gravel.

The top layer of fill consists primarily of brown fine to coarse-grained sand with varying amounts of gravel, silt, rock fragments, construction debris, etc. The fill ranges in thickness

from 0 feet, where the foundations of existing structures are bearing on natural soil, to about 16 feet. The average thickness of the fill is 5 feet.

The glacial outwash extends at least 90 feet below the fill material, and is composed predominantly of coarse- to fine-grained sand with varying amounts of clay, silt, and gravel. Cobbles and boulders are also present in areas. A silt layer was encountered in four borings at depths ranging from 4 feet to 13.5 feet bgs. The thickness of the silt ranged between 1.5 feet and 12 feet thick. The outwash grades into a more uniform, fine- to medium-grained sand with increasing depth.

3.0 DESCRIPTION OF REMEDIAL INVESTIGATION FINDINGS

The SMP and all Site documents are stored at the NYSDEC Region 2 offices (or successor agency). At the time of SMP submission, each of the reports discussed in this section can be found at the Region 2 NYSDEC offices in Long Island City, New York, and the Glendale Public Library in Glendale, New York.

3.1 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 RI Report (January, 2005), the SRI Report (September, 2006), and SRI Addendum #1 – Offsite Vapor Report (December, 2006). Below is a summary of the investigation findings.

3.1.1 Soil

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

- Two small, localized pockets of soil containing tetrachloroethene (PCE) and trichloroethene (TCE) concentrations exceeding the NYSDEC Recommended Soil Cleanup Objective (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 volatile organic compound (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.
- Technical and Administrative Guidance Memorandum 4046 (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.

3.1.2 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 3B). 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 altered 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 northwest.
- Off-site migration of contaminants in groundwater slightly 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 (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.

3.1.3 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, 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.

3.1.4 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.

3.1.5 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. The results of the sampling event did not suggest the need for mitigation. However, off-site vapor monitoring, including in-home monitoring, is incorporated into the ongoing remedy as part of this SMP.

4.0 DESCRIPTION OF REMEDIAL ACTIONS

Below is a summary of the remedial actions implemented on the Site:

4.1 Removal of Impacted Materials from the Site

Soils were excavated for construction purposes as well as removal of known VOC source areas in the Building 3 footprint. Approximately 2,000 tons of contaminated soil was removed from the Site for remedial purposes. Residual contamination in soil, soil vapor, and groundwater contamination was left in place as described in Section 5.0 and is addressed by the EC/ICs implemented on the Site (see Section 6.0 and the Engineering and Institutional Control Plan). Removal of identified "hot spot" areas, or areas of concern (AOCs), included excavation activities at the following areas:

- Process tanks and vaults located in Building 7;
- USTs located south of Building 8;
- A concrete vault south of Building 8;
- A floor drain and piping network located beneath Building 3;
- Excavation of two VOC "hot spots" in Building 3; and
- A transformer vault and electrical room located beneath Building 3.

4.2 Engineering and Institutional Controls

The Controlled Property has three primary engineering controls. These 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; and (3) two groundwater air-sparge/soil vapor extraction systems. Off-site engineering controls required to be maintained under this SMP include maintenance of sub-slab depressurization systems in buildings on adjacent Parcel A. A series of institutional controls are required to implement, maintain and monitor these engineering controls, as defined in this SMP. Adherence to these institutional controls is required under this environmental easement. These institutional controls are:

a) All engineering controls must be operated and maintained as specified in this SMP;

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

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

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 this SMP.

The Controlled Property has a series of institutional controls in the form of site restrictions. Adherence to these institutional controls is required under this environmental easement. 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 engineering and institutional controls 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;

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

These EC/ICs should:

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards;
- Prevent contact with or inhalation of volatiles from contaminated groundwater;
- Restore groundwater to pre-disposal/pre-release conditions, to the extent practicable;
- Prevent the discharge of contaminants to surface water;
- Remove the source of ground or surface water contamination;
- Prevent contaminated groundwater from migrating off-site;
- Prevent ingestion/direct contact with contaminated soil;
- Prevent inhalation of or exposure from contaminants volatilizing from contaminants in soil; and
- Prevent migration of contaminants that would result in off-site groundwater or surface water contamination.

4.3 Groundwater Monitoring (Monitored Natural Attenuation)

As described in the previous section, air sparge/soil vapor extraction (AS/SVE) systems are being operated to remediate the source of groundwater contamination and to prevent off-site migration of soil vapor contaminants and contaminants in groundwater in contravention of standards. To address the residual impacts in the groundwater migrating off the Site, a groundwater-monitoring plan will be implemented to monitor the natural attenuation (degradation) of the contaminants as they migrate away from the Site. Monitoring will be conducted at a frequency as described in the Monitoring Plan section within this SMP.

4.4 Off-Site Vapor Monitoring

The off-site vapor remedy consists of in-home vapor monitoring (i.e., sub-slab, indoor air, and ambient outdoor air sampling). The details of the sampling program including procedures to be followed are defined in the Monitoring Plan section of this 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 required and will be determined by NYSDOH and NYSDEC. Monitoring will be conducted at a frequency determined by NYSDOH and NYSDEC.

5.0 DESCRIPTION OF RESIDUAL CONTAMINATION

Many of the structures located on Parcel B were preserved to facilitate future commercial use of the Site. Developmental, engineering, and geological factors inhibited the excavation of some impacted soils from various areas of the Site.

Impacted soils remain under Buildings 3, 7, and 8, and a VOC impacted groundwater plume exists under the Site. Figure 5 illustrates the locations of residual soil contamination left in place. Each of these locations is being addressed by the operation of EC/ICs and the implementation of this SMP. Figure 4 illustrates the TCE/PCE groundwater plume existing under the Site, which is being actively remediated by the AS/SVE systems on the Site.

6.0 PROVISIONS IN ENVIRONMENTAL EASEMENT

6.1 Management of In-place Residual Contamination

Residual impacted soil under Buildings 3, 7, and 8 will be managed through the operation, maintenance and monitoring of the EC/ICs approved as part of the remedial action. The EC/ICs are briefly described above and more fully described in the Engineering and Institutional Control Plan, starting on page 35 of this SMP. Prior to any invasive work at the Site, the NYSDEC will be notified, and the comprehensive Soil Management Plan (Appendix P) and Health and Safety Plan (Appendix Q) implemented. On-site workers will be notified, prior to beginning the work, that they may encounter residual contaminated soil.

6.2 Site Restrictions

The Controlled Property has a series of institutional controls in the form of site restrictions. Adherence to these institutional controls is required under this environmental easement. 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 engineering and institutional controls 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;

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

6.3 Engineering and Institutional Controls

The Controlled Property has three primary engineering controls. These 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 (SSD) system under all building structures; and (3) two groundwater AS/SVE systems. Off-site engineering controls required to be maintained under this SMP include maintenance of sub-slab depressurization systems in buildings on adjacent Parcel A. A series of institutional controls are required to implement, maintain and monitor these engineering controls, as defined in this NYSDEC-approved SMP. Adherence to these ICs is required under this environmental easement. These ICs are:

a) All engineering controls must be operated and maintained as specified in this SMP;

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

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

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 this SMP;

Since not all contaminated soil was removed from the Site, EC/ICs will be implemented to prevent future exposure to soil exceeding TAGM levels, by on-site workers conducting intrusive activities related to renovation or maintenance work. These ICs primarily involve establishing an environmental easement to ensure appropriate future use/control of the Site and to protect human health and the environment. The ECs at the Site include the barriers to soil via asphalt covered roads, concrete covered sidewalks, and concrete building slabs, and proper operation, maintenance, and monitoring of the SSD systems and AS/SVE

systems installed at the Site. The environmental easement identifies the EC/ICs that were implemented and will continue to be implemented as part of the overall Site remedy. These controls are binding upon all current and subsequent Owners and occupants of the property and are subject to an annual certification program requiring the Owner to provide Professional Engineer certification that the ICs and/or ECs are in place, were not altered, and are still effective. EC/ICs for the Site are more fully discussed in the Engineering and Institutional Control Plan.

II. ENGINEERING AND INSTITUTIONAL CONTROL PLAN

7.0 INTRODUCTION

7.1 General

Remedial activities completed at the Site were conducted in accordance with the NYSDEC-approved RAWP for Parcel B (Langan, September 2006). The remedial goal was to reduce on-site contamination to Track 4 soil cleanup objectives (SCOs) for restricted commercial use, was implemented through a variety of remedial methodologies including treatment; removal; encapsulation; and mitigation of impacted soil, groundwater, and soil vapor (see Appendix B). The Track 4 SCOs were approved by NYSDEC. A summary of the remedial strategies and EC/ICs implemented at the Site are as follows:

- Excavation of soils exceeding Track 4 SCOs;
- Installation and operation of two AS/SVE systems to remediate the contaminated groundwater and soil vapor plumes present on-Site, and to prevent migration of contaminated groundwater off-site;
- Installation of SSD systems in all occupied buildings at the Site (Buildings 3, 7 and 8), as well as all occupied buildings on the adjacent property known as Atlas Park-Parcel A (Buildings 4 and 6), to prevent vapor migration into such buildings throughout The Shops at Atlas Park;
- Maintenance of an engineered cover to prevent human exposure to residual contaminated soils remaining under the Site; and
- Creation of an environmental easement, including institutional controls, to prevent future exposure to any contamination remaining at the Site (a copy of the environmental easement is provided in Appendix C).

As post-remediation residual contaminated soil, groundwater, and soil vapor exist beneath the Site, the EC/ICs are required to both eliminate and mitigate the potential human health exposure to adverse environmental conditions existing under the Site. All procedures necessary to assure that these controls remain in place are documented in this SMP.

This Engineering and Institutional Control Plan will discuss protocol for the implementation and management of EC/ICs at the Site. This Plan is not to be used as a stand-alone document, but as a component document of the SMP. The Engineering and Institutional Control Plan is subject to NYSDEC revision.

7.2 Purpose

The purpose of this Plan is to provide:

- A description of all EC/ICs on the Site
- The basic operation and intended role of each implemented EC/IC;
- The key components of the ICs created as stated in the environmental easement;
- The issues that should be evaluated during each annual inspection and compliance certification period;
- Appropriate plans for implementation of EC/ICs, such as the maintenance of the environmental easement, and the implementation of the Soil Management Plan for the safe handling of residual contaminated soils that may have to be removed during maintenance or redevelopment work on the Site; and
- Any other provisions necessary to identify or establish methods for implementing the EC/ICs required by the Site remedy, as determined by the NYSDEC.

8.0 ENGINEERING CONTROL COMPONENTS

The engineering control components are being implemented to minimize the potential human health exposure risk to contaminated media existing under the Site. Residual contaminated fill and/or soil (i.e., Category 1 – Contaminated Fill) remains in place throughout the Site. Soil vapor concentrations, including principally the chlorinated VOCs, PCE and TCE, exist beneath the Site. In addition, a groundwater plume, also containing PCE and TCE, extends in the southerly, westerly and possibly northerly direction, from below the eastern portion of Building 3. ECs were implemented to remedy, and/or prevent potential exposure of Site occupants and the public, to sub-surface soil, soil vapor, and groundwater contamination. The ECs established at the Site are discussed below (i.e., SSD systems, AS/SVE systems, and a composite cover system). Although not a true engineering control by definition, groundwater Monitored Natural Attenuation (MNA) will also be discussed in Section 8.4 of this EC/IC Plan.

8.1 Sub-slab Depressurization Systems

Since VOCs (primarily PCE and TCE) attributed to Parcel B have been detected in the soil vapor beneath the floor slabs of several buildings at the Site and on Parcel A, five SSD systems were constructed and placed into operation to mitigate the potential human health exposure hazard associated with these compounds. Two SSD systems were installed in Buildings 4 and 6 on Parcel A, and three SSD systems were installed in Buildings 3, 7, and 8 on Parcel B (see Figure 7). Refer to Appendices D through H for SSD system as-built drawings and Appendix I for system component manuals.

Portions of the Engineering and Institutional Control Plan related to the SSD systems are based on the NYSDOH Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006).

8.1.1 Conceptual Remedial Process

SSD systems create a low vacuum field beneath the existing building basement floor slabs, and extracting the sub-slab air using a vacuum blower mounted to the roof of each building. This low vacuum field diverts potentially impacted vapors from the subsurface of buildings, to the atmosphere at the building rooftop level. This reduces the potential for intrusion into the building.

8.1.2 Design of Building Systems

The SSD systems are comprised of a series of suction pits and trenches used as conduits 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′ x 2′ x 2′ pit; the pit is filled with 1 inch gravel and sealed with concrete. General calculations for each SSD system are based on the volume of sub-slab soil pore space to be 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. Details of each individual system are discussed below.

8.1.2.1 Building 4 SSD System (Parcel A)

The Building 4 system, which was installed from August 2005 through January 2006, consists of one strategically located suction pit, connected to a roof-mounted blower, to cover the 21,000 square feet building footprint. This system was incorporated in the new construction of the building. The roof-mounted blower system was selected to provide a minimum flow rate of 120 cubic feet per minute (CFM) and a vacuum of 35 inches water column (WC) (see Appendix D for the system as-builts).

8.1.2.2 Building 6 SSD System (Parcel A)

The Building 6 system, which was installed from March 2005 through January 2006, consists of three strategically located suction pits connected to two roof mounted blowers to cover the 57,000 square feet building footprint. This system was incorporated into the new construction of the building. The roof-mounted blower system for two of the suction pits (combined with a manifold system to the roof) was selected to provide a minimum flow rate of 180 CFM at 35 inches WC. The blower system for the third suction pit was selected to provide a minimum of 65 CFM at 35 inches WC (see Appendix E for the system as-builts).

8.1.2.3 Building 3 SSD System (Parcel B)

The Building 3 system, which was installed from July 2006 through October 2006, consists of four strategically located suction pits connected to two roof mounted blowers to cover the 57,000 square feet building footprint. This system was retrofitted to the existing building. The roof-mounted blower system for two of the suction pits (combined with a manifold system to the roof) was selected to provide a minimum of 100 CFM at 50 inches WC. The blower system for the other two suction pits (combined with a manifold system) provides a minimum of 100 CFM at 50 inches WC (see Appendix F for the system as-builts).

8.1.2.4 Building 7 SSD System (Parcel B)

The Building 7 system, which was installed from September 2005 through April 2006, consists of three strategically located suction pits connected to two roof mounted blowers to cover the 34,000 square feet building footprint. This system was retrofitted to the existing building. The roof-mounted blower system for two of the suction pits (combined with a manifold system to the roof) was selected to provide a minimum of 50 CFM at 50 inches WC. The blower system for the third suction pit provides a minimum of 100 CFM at 50 inches WC (see Appendix G for the system as-builts).

8.1.2.5 Building 8 SSD System (Parcel B)

The Building 8 system, which was installed from March 2006 through July 2006, consists of five strategically located suction pits serviced by two roof-mounted blowers to cover the building footprint of 30,500 square feet. This system was retrofitted to the existing building. The roof-mounted blower system for three of the suction pits (combined with a manifold system to the roof) was selected to provide a minimum of 70 CFM at 50 inches WC. The blower system for the two remaining suction pits (combined with a manifold system) provides a minimum of 50 CFM at 50 inches WC (see Appendix H for the system as-builts).

8.1.3 System Installation

The installation of the SSD systems included the following tasks:

- Filling of selected utility trenches (or the building sub-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 black steel piping; and,
- Installation of electric roof-mounted blower systems to generate the required sub-slab vacuum.
- Confirmatory testing of the systems, as outlined in the Operation and Maintenance Plan, was completed to confirm the systems functioned as designed, prior to being placed into full operation. The confirmatory testing of all five SSD systems was successful. See Appendix J for the testing reports.

8.1.4 Operation, Maintenance, and Monitoring

The procedures for operating and maintaining the SSD systems are documented in the Operation and Maintenance Plan (a separate Plan section within the SMP). The procedures for monitoring the systems are included in the Monitoring Plan (a separate Plan section within the SMP). These Plans address the annual inspection and certification requirements for these systems (i.e., that ECs continue to perform as designed, that the appropriate media are sampled and analyzed, etc.).

8.2 Air Sparging/Soil Vapor Extraction Systems

AS/SVE in-situ remediation technology was selected to treat the impacted groundwater (located approximately 60 feet below grade) on the Site. One AS/SVE system was installed at Building 3 to remediate the impacted groundwater at the core of the VOC plume. The second AS/SVE system was installed along the southern property boundary of the Site, to minimize off-site migration of the VOC groundwater plume and any soil vapors that could potentially leave the site downgradient of the VOC source area. Additional ECs approved by

NYSDEC may be required by NYSDEC pending results of monitoring performed under the Monitoring Plan of the SMP. Portions of the Engineering and Institutional Control Plan related to the AS/SVE system are based on the Final 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).

8.2.1 Conceptual Remedial Process

The mechanism of contaminant removal by AS/SVE consists of stripping (induced volatilization by sub-surface air injection) of the groundwater, and vapor capture throughout the vadose zone. During air sparging, air is released into the saturated zone through a series of air sparge wells. The released air causes bubbles to form, which allow VOCs in the groundwater to diffuse into the rising bubbles. When the bubbles reach the vadose zone, the contaminants are removed via soil-vapor extraction wells installed in the overlying, unsaturated soils. The location and distribution of sparging and extraction wells were determined based on a 34-foot radius of influence (ROI) per air sparge well and 70-foot ROI per soil vapor extraction well for the Building 3 system, and a 34-foot ROI per air sparge well and 70-foot ROI per soil vapor extraction well for the system south of Building 8 along the southern property boundary. ROIs were determined upon completion of an AS/SVE pilot test study conducted at the Site. Please refer to Appendix K for the results of the pilot test.

8.2.2 General System Components and Layout

8.2.2.1 Building 3 AS/SVE System

The main system components include:

- Four air sparge 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 below grade;
- 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 below grade;

- Four air sparge monitor wells constructed of 2-inch diameter schedule 80 PVC, with a 10-slot screen, 2 feet in length, set approximately 82 feet below grade;
- 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 below grade;
- An air sparge 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 sparge, 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 L. The mechanical system component manufacturer documentation is located in Appendix M.

8.2.2.2 Southern AS/SVE System

The main system components include:

- Six air sparge injection wells constructed of 2-inch diameter schedule 80 PVC, with a 10-slot screen, 10 feet in length, set approximately 80 feet below grade;
- 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 below grade;
- Three air sparge monitor wells constructed of 2-inch diameter schedule 80 PVC, with a 10-slot screen, 10 feet in length, set approximately 80 feet below grade;

- 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 below grade;
- An air sparge 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 500–lb. Granular Activated Carbon vessels connected in series.

The air sparge, 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 N. The mechanical system component documentation is located in Appendix O.

8.2.3 Operation, Maintenance, and Monitoring

The procedures for operating and maintaining the AS/SVE systems are documented in the Operation and Maintenance Plan (a separate section within the SMP). The procedures for monitoring the systems are included in the Monitoring Plan (a separate section within the SMP). These plans address the annual inspection and certification requirements (e.g., that ECs continue to perform as designed, that the appropriate media is sampled and analyzed, etc.). The Monitoring Plan also addresses severe condition inspections in the event a severe condition has taken place that may affect controls at the Site.

8.3 Composite Cover System

The majority of the Site remains underlain by a layer of urban fill material (i.e., Category 1 – Contaminated Fill) containing ash/cinders with elevated levels of SVOCs and metals. Isolated "hot spot" areas with elevated concentrations of VOCs, SVOCs, lead, and arsenic were left in place under building slabs at the Site. Exposure to these residual contaminated

soils is restricted by the composite cover system that exists across the Site. No portion of the Site provides direct exposure to subsurface soils. This composite cover system is comprised of asphalt covered roads, concrete covered sidewalks, and concrete building slabs. Issues related to maintenance and monitoring of this cover are provided in the Monitoring Plan included in the SMP. Please refer to Figure 6 for the locations of particular cover media. A Soil Management Plan is included in Appendix P, which outlines the procedures required in the event the composite cover system is breached. The Soil Management Plan is also discussed in Section 9.2 of this Engineering and Institutional Control Plan.

8.4 Groundwater Monitored Natural Attenuation

PCE and TCE in groundwater exceed their respective NYSDEC groundwater standards in on-site and off-site groundwater. The PCE and TCE plume is oriented in a general north-south alignment, originating near the southwest corner of Building 3 (see Figure 4). However, groundwater flow patterns have recently changed and flow now ranges from south to northwest. There is also off-site migration of groundwater contaminants exceeding the NYSDEC standards.

Based on several calculations using the current Site-specific data, PCE will naturally attenuate to a concentration below the groundwater standard within one-quarter mile of the Site. 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. This loss has been attributed to natural product degradation at the Site.

There are currently 12 on-site monitoring wells and 5 off-site monitoring wells, which will be used to monitor the attenuation of the plume both on- and off-site (see Figure 3B for monitoring well locations). These wells will be sampled per the Monitoring Plan and the data reported per the Site Management Reporting Plan.

8.5 Off-Site Vapor Monitoring

Part of 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 are defined in the Monitoring Plan section of this 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. Monitoring will be conducted at a frequency as described in the Monitoring Plan section within the SMP.

8.6 Criteria for Completion of Remediation/Termination of Remedial Systems

8.6.1 SSD Systems

The SSD systems will not be turned off without NYSDEC and NYSDOH approval in writing. A proposal to turn them off based on confirmatory data justifying such a request may be made by property owner in accordance with the NYSDOH Final October 2006 Guidance document. Systems will remain in place and operational until permission to discontinue their use is granted by NYSDEC and NYSDOH in writing.

A proposal for termination of the SSD systems will be based on post-remediation contaminant levels in sub-slab soil vapor, indoor air (as appropriate) collected from soil vapor probes, and building interiors located throughout the Site. These sampling/monitoring activities will adhere to stipulations outlined in the Monitoring Plan section of the SMP. The proposal will be based upon several factors, including:

- Residual contamination effects on indoor air quality;
- Residual contamination effects on indoor air quality when active mitigation systems are turned off; and
- "Rebound" effects observed on system pilot shut-down.

8.6.2 AS/SVE Systems

The AS/SVE systems will not be turned off without NYSDEC and NYSDOH approval in writing. A proposal to turn off the systems may be offered by property owner after residual contaminant concentrations in groundwater are cleaned up to levels below NYSDEC standards, have become asymptotic over an extended period of time to be mandated by the NYSDEC and the NYSDOH, or until NYSDEC has determined that the AS/SVE system has reached the limit of its effectiveness. This assessment will be based in part on post-

remediation contaminant levels in groundwater collected from monitoring wells located throughout the Site. These sampling/monitoring activities will adhere to stipulations outlined in the Monitoring Plan section of the SMP.

8.6.3 Composite Cover System

The composite cover system is a permanent control and the quality and integrity of this system will be inspected at defined, regular intervals in perpetuity.

8.6.4 Monitored Natural Attenuation

Groundwater monitoring activities to monitor natural attenuation at the Site will continue, as determined by NYSDOH and NYSDEC, until residual groundwater concentrations are found to be below NYSDEC standards or have become asymptotic over an extended period. This will be mandated by the NYSDEC and the NYSDOH. These activities are outlined in the Monitoring Plan of the SMP.

8.6.5 Off-Site Vapor Monitoring

Off-site vapor monitoring activities to the south of the Site will continue until vapor concentrations in the sub-slab and indoor air of the sampled residences are below the NYSDOH guidance document, decision matrices, and these concentrations show no sign of rebounding. These monitoring activities are outlined in the Monitoring Plan of the SMP.

9.0 INSTITUTIONAL CONTROL COMPONENTS

Since not all contaminated material was removed from the Site or remediated, ICs are required to prevent future exposure to contamination and ensure the viability, reliability, and effectiveness of the ECs by restricting the use of the property, controlling disturbances of the subsurface soil, and restricting the use of the Site to commercial uses only. The institutional controls imposed at the Site, made binding in the Environmental Easement, accomplish the following:

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards;
- Prevent contact with or inhalation of volatiles from contaminated groundwater;
- Restore groundwater to pre-disposal/pre-release conditions, to the extent practicable;
- Prevent the discharge of contaminants to surface water;
- Remove the source of ground or surface water contamination;
- Prevent contaminated groundwater from migrating off-site;
- Prevent ingestion/direct contact with contaminated soil;
- Prevent inhalation of or exposure from contaminants volatilizing from contaminants in soil; and
- Prevent migration of contaminants that would result in groundwater or surface water contamination.

ICs will be implemented through the environmental easement document and the Soil Management Plan prepared for the Site (see Appendix P).

9.1 Environmental Easement

The environmental easement (1) applies to the controls implemented at the Site and the allowed use of the Site; (2) are binding on the Owner, the successors to the Owner, and Owner's assigns; and (3) are enforceable in law or equity against any Owner of the Site, any

lessees, and any person using the Site. See Appendix C for a copy of the easement. The EC/ICs documented in the environmental easement are as follows:

- The Site (called the "Controlled Property" in the easement) may be used for commercial use as long as the following long-term engineering controls are employed:
    - compliance by the Grantor and the Grantor's successors and assigns with all elements of this SMP is required;
    - a composite cover system consisting of asphalt covered roads, concrete covered sidewalks, and concrete building slabs must be inspected, certified and maintained as required in the SMP;
    - a soil vapor mitigation system consisting of a sub-slab depressurization system under all building structures must be inspected, certified, operated and maintained as required in the SMP;
    - groundwater air-sparge/soil vapor extraction systems must be inspected, certified, operated and maintained as required in the SMP;
    - 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;
    - vegetable gardens and farming on the Controlled Property are prohibited;
    - the use of the groundwater underlying the Controlled Property is prohibited without treatment rendering it safe for intended purpose;
    - all future activities on the Controlled Property that will disturb residual contaminated material protected under this environmental easement, including any proposed soil excavation, are prohibited unless they are conducted in accordance with the soil management provisions in the SMP.

- The Controlled Property may not be used for a higher level of use, such as restricted residential or unrestricted use, and the above-stated engineering

controls may not be discontinued without an amendment or extinguishment of this Environmental Easement.

- Grantor covenants and agrees that until such time as the Environmental Easement is extinguished in accordance with the requirements of Article 71, Title 36 of the ECL, the property deed and all subsequent instruments of conveyance relating to the Controlled Property shall state in at least fifteen-point bold-faced type:

  This property is subject to an environmental easement held by the New York State Department of Environmental Conservation pursuant of Title 36 to Article 71 of the Environmental Conservation Law.

- Grantor covenants and agrees that this Environmental Easement shall be incorporated in full or by reference in any leases, licenses, or other instruments granting a right to use the Controlled Property.

- Grantor covenants and agrees that it shall annually, or such time as NYSDEC may allow, submit to NYSDEC a written statement by an expert the NYSDEC may find acceptable certifying under penalty of perjury that the controls employed at the Controlled Property are unchanged from the previous certification or that any changes to the controls employed at the Controlled Property were approved by the NYSDEC, and that nothing has occurred that would impair the ability of such control to protect the public health and environment or constitute a violation or failure to comply with any SMP for such controls and giving access to such Controlled Property to evaluate continued maintenance of such controls.

As noted in the Easement, the above-stated EC/ICs may not be discontinued without an amendment or extinguishment of the Environmental Easement.

9.2 Soil Management Plan

The Site has been fully developed for commercial use, including shopping, dining, and general services. Any future intrusive construction work at the Site is expected to consist of trenching and localized excavation, including some soil/fill removal and replacement for installation of tenant specific subsurface structures such as base building utility services, new plumbing, piping, etc., required by tenant operations. Any future intrusive work, including modifications or repairs to the existing composite cover system, will be covered under the Soil Management Plan in this document. These procedures assist in the long-term management of residual contamination in subsurface soils. Any intrusive construction work must be conducted in accordance with the procedures and considerations presented in the Soil Management Plan, Health and Safety Plan (HASP), and Community Air Monitoring Plan (CAMP) prepared for the Site. The Soil Management Plan is presented in Appendix P; the HASP and CAMP are presented in Appendix Q of the SMP. Any intrusive construction work must be certified as compliant with the SMP and included in the periodic Inspection and Annual Certification Report.

A summary of key points of the Soil Management Plan are as follows:

- Notification:
    - NYSDEC and NYSDOH will be notified a minimum of 10 days prior to the beginning of any intrusive activities through a written letter. The agencies will be informed, at a minimum, of the description of work to be performed, the duration of the work, and certifications of the contractor to perform the work.
- Pre-Intrusion Activities:
    - Intrusive construction activities will be completed by properly trained and certified equipment operators and laborers (i.e., 40-hour HAZWOPER training). The contractor must provide qualifications and/or resumes of the personnel to be performing work.
    - Each party performing work will comply with the HASP previously prepared for the Site and may, at its discretion, prepare its own task-specific HASP for its organization, which will be consistent with the overall Site-specific HASP. Each task-specific HASP must meet the minimum requirements established in the

site-specific HASP and 29 CFR 1910 and 1926. Each party will also agree in writing to abide by requirements set forth in the Site-specific HASP.

- Record Keeping and Reporting
    - A logbook will be maintained, documenting all invasive activities on-site.
    - Materials flow (i.e., source and destination of materials), characterization and end-point data of excavation pits, CAMP data, and as-built data will be recorded.
- Excavation, Grading, and Other Intrusive Work:
    - Intrusive work will be conducted in accordance with all applicable local, state, and federal regulations.
    - Exposed sub-slab soil will be inspected for visual evidence of contamination.
    - During excavation, soil will be continuously inspected for chemical or petroleum odors or staining, and field screened with a PID.
    - Stockpiling:
        - Excavated soil will be placed onto double layers of a minimum 8-mil low-permeability liner of sufficient strength and thickness to prevent puncture during use.
        - Active stockpiles will be covered at the end of each workday.
        - Stockpile areas will be inspected daily, and if there are any breaches in the cover, such deficiency(ies) will be promptly addressed.
    - Odor, Dust, and Nuisance Control
    - Stormwater and Erosion Control
    - Stabilization Practices
    - Dewatering and Fluids Management
    - Soil/Fill Characterization
    - Off-site Disposal
        - Proposed disposal facility(ies) and/or re-use site(s) will be reviewed by the Remedial Engineer for conformance with the Soil Management Plan and

compliance with all applicable laws and regulations before any materials leave the Site.

- All excavated soil, fill, and solid waste will be handled, transported, and disposed in accordance with Part 360 and Part 371 regulations and all other applicable local, state, and federal regulations.
- As appropriate, soil will be excavated and loaded directly to trucks for transport to a permitted landfill, Resource Conservation and Recovery Act Treatment, Storage, and Disposal (RCRA TSD) facility, or beneficial re-use approved by NYSDEC in writing. Soils may be temporarily stockpiled, if appropriately handled, pending waste characterization required by the facility, or other reasons preventing the direct loading for off-site transport.
- Laboratory tests will be determined by the receiving facility's permit requirements.

- Backfill and Cover Soils:
  - Soils imported to the site for use as backfill or for cover soils will meet the new unrestricted use soil standards in 6 NYCRR 375-6.8(a).
- Contingency Plan
  - Contingency Plan will address unanticipated "hot spot" locations, USTs, or other unanticipated subsurface structures.
  - USTs or structures will be decommissioned in accordance with all applicable NYSDEC closure requirements.
  - Waste characterization testing will be conducted as required by the disposal facility.

The HASP includes, but is not limited to, the components described below:

- Site Description, Location, and Background
- Description of Potential Site Hazards
- Health and Safety Training Requirements

- Medical Surveillance
- Creation of Work Zones (i.e., Exclusion Zones, Contamination Reduction Zones, and Support Zones)
- Personal Safety Equipment and Protective Clothing (included will be a respiratory protection program that meets the requirements of 29 CFR 1910.134)
- Air Monitoring Plan
- Equipment Cleaning Protocol
- Confined Space Entry and Training (in accordance with Occupational Safety and Health Administration [OSHA] Permit-Required Confined Space Standard [29 CFR 1910.146])
- Material Safety Data Sheets (MSDSs) for all materials to be brought on-site and constituents expected to be encountered in the course of excavation
- Excavation Safety (as specified in 29 CFR 1926 Subpart P including, but not limited to soil classification, excavation inspections, protective systems, and designated competent persons)
- Standard Operating Procedures and Safety Programs (as required by applicable sections of Section 1910 of 29 CFR 1910 and 29 CFR 1926)
- Contingency Plan
    - To be implemented in the event of various emergency or non-routine events.
    - To set forth procedures for addressing spill prevention and emergency response procedures, odor control, emergency vehicular access/egress, evacuation, emergency notification and contacts, and emergency medical procedures.

In the event of outdoor invasive excavation, the CAMP, which is included as part of the HASP (Appendix Q), will be implemented and will provide real-time air monitoring procedures for VOCs and particulates. The CAMP provides monitoring and protection for the community from organic vapors and dust, and it was prepared in conformance with NYSDEC and NYSDOH requirements. The CAMP includes:

- Identification of potential off-site receptors adjacent to the Site.
- Location of perimeter sampling stations.
- Real time perimeter VOC monitoring field methods.
- Real-time perimeter particulate monitoring field methods.
- VOC and particulate action levels.
- Contingency procedures if action levels are exceeded.
- Documentation procedures.
- Community complaints and how they will be addressed.

10.0 INSPECTIONS AND NOTIFICATIONS

10.1 Inspections

Inspections of the various systems installed on-site will be conducted at the frequency specified in the schedules provided in the Monitoring Plan of the SMP. A comprehensive Site-wide inspection will be conducted annually. The inspections will determine and document:

- Whether engineering controls (SSD systems, AS/SVE systems, and the composite cover system [i.e., asphalt covered roads, concrete covered sidewalks, and concrete building slabs]) continue to perform as designed;
- If these controls continue to be protective of human health and the environment;
- Compliance with requirements of the environmental easement document;
- Achievement of remedial performance criteria;
- Sampling and analysis of appropriate media during Monitoring Events;
- If site records are complete and up to date; and
- Changes, or needed changes, to the remedial or monitoring system;

Inspections will be conducted in accordance with the procedures set forth in the Monitoring Plan of the SMP. The reporting requirements are outlined in the Reporting Plan.

If an emergency such as the result of a natural disaster or an unforeseen failure of any of the ECs occurs, an inspection of the Site will be conducted by either Langan Engineering or an alternate Remedial Engineer selected by the Owner and approved by NYSDEC to verify the effectiveness of the EC/ICs implemented at the Site.

10.2 Notifications

10.2.1 NYSDEC-acceptable Computer Database

The Owner, or Owner-approved representative, will provide, in a computer database format acceptable to the NYSDEC, the following information for any environmental easement or other IC approved by NYSDEC, the following data, including but not limited to the following:

- A Site summary;
- Name of current Site owner and/or the remedial party implementing the SMP for the Site;
- The location of the Site;
- The current status of Site remedial activity;
- A copy of the environmental easement; and
- A contact name and phone number of a person knowledgeable about the Easement's requirements, in order for NYSDEC to obtain additional information.

Should the Environmental Easement be modified or extinguished, the copy of the Environmental Easement contained in the database will be updated accordingly.

10.2.2 Non-routine Notifications

Non-routine notifications to be submitted by the property owners to the NYSDEC on an as-needed basis include the following:

- 60-day advance notice of any proposed changes in the use of the Site consistent with the terms in the Brownfield Cleanup Agreement[1].
- 10-day advance notice of any proposed ground-intrusive activities.
- Notice within 48-hours of any damage or defect to the foundations structures that reduces or has the potential to reduce the effectiveness of the SSD systems and any action taken to mitigate the damage or defect.
- Notice within 48-hours of any emergency, such as a fire, flood, or earthquake that reduces or has the potential to reduce the effectiveness of the engineering controls in place at the Site, including a summary of action taken and the impact to the environment and the public.

[1] For this purpose, a change in use is as defined in NYCRR Part 375.

- Follow-up status reports on actions taken to respond to any emergency event requiring ongoing responsive action shall be submitted to the NYSDEC within 45 days and shall describe and document actions taken to restore the effectiveness of the ECs.

III. MONITORING PLAN

11.0 INTRODUCTION

11.1 General

The Monitoring Plan describes the measures for evaluating the performance and effectiveness of the implemented ECs in reducing contamination at the Site. ECs at the Site include several SSD systems, two AS/SVE systems, and a composite cover system. A secondary component of the Site remedy is MNA, which is also discussed in this Plan. This Monitoring Plan is not to be used as a stand-alone document, but as a component document of the SMP. This Monitoring Plan is subject to NYSDEC revision.

11.2 Purpose

This Monitoring Plan details the steps necessary to achieve the aforementioned objectives, both short- and long-term, by addressing the following issues:

- Compliance with actual or equivalent NYSDEC groundwater standards and TAGM for soil;
- Achievement of the remedial performance criteria;
- Sampling and analysis of appropriate media (e.g., groundwater, indoor air, soil vapor, soils);
- Evaluating Site information periodically to confirm that the remedy continues to be effective per the design; and
- Preparing the necessary reports for the various monitoring activities.

To adequately address the above issues, this Monitoring Plan includes information on the following:

- Sampling locations, protocol, and frequency;
- Information on all designed systems (e.g., well logs);

- Analytical sampling program requirement;
- Reporting requirements;
- Quality assurance/quality control (QA/QC) requirements;
- Inspection and maintenance requirements for monitoring wells;
- Well decommissioning procedures; and
- Annual inspection and certification information.

Quarterly monitoring of the overall reduction in contamination on- and off-site will be conducted for the first two years (frequency thereafter will be determined by NYSDEC), while the ECs and ICs (SSD, AS/SVE, and composite cover system and easement) remain in use. Trends in contaminants levels in air, soil, and/or groundwater in the affected areas, will be evaluated, to determine if the remedies continue to be effective in achieving their desired remedial goals. Monitoring programs for each component are summarized in Table 2 and outlined in detail in Sections 12.0 through 17.0 below.

Table 2: Monitoring/Inspection Schedule

Monitoring Program	Frequency*	Matrix	Analysis
SSD System Inspections	Quarterly inspections for the first year; annually thereafter pending NYSDEC approval in writing	**None**	**None**
Off-site Soil Vapor Sampling	Quarterly sampling for the first two years or at a frequency approved in writing by NYSDOH and NYSDEC following review of results	• Sub-slab vapor • Indoor air (basement) • Indoor air (first floor) • Outdoor air	USEPA Method TO-15 VOCs
AS/SVE System			
• Inspections	• Once per week for the first four weeks of operation; • Once every two weeks for the second month of operation; • Then quarterly basis for the first year; annually thereafter pending NYSDEC approval in writing	**None**	**None**
• Monitoring	Quarterly sampling for the first year; annually thereafter pending NYSDEC approval in writing	• Soil vapor (at SVE monitoring wells) • Soil vapor (prior to entry VGACs, between VGACs, and at discharge) • Groundwater (at AS monitoring wells)	• Soil vapor (USEPA Method TO-15 VOCs) • Groundwater (TCL VOCs)
Groundwater Monitoring	Quarterly sampling for the two years; annually thereafter pending NYSDEC approval in writing	Groundwater	TCL VOCs
Composite Cover System Inspections	Quarterly inspections for the first year; annually thereafter pending NYSDEC approval in writing	**None**	**None**
Site-wide Inspections	Annual inspections	**None,** other than those included in the above listed monitoring programs.	**None,** other than those included in the above listed monitoring programs.

* The frequency of events will be conducted as specified until otherwise approved by NYSDEC and NYSDOH

12.0 SUB-SLAB DEPRESSURIZATION SYSTEM MONITORING PROGRAM

Five SSD systems have been installed, including two off-site on Parcel A and three on- the Site, to mitigate possible soil vapor intrusion into occupied Buildings 3, 4, 6, 7, and 8, respectively. System designs are described in the Engineering and Institutional Control Plan, and as-built drawings are located in Appendices D through H.

12.1 Schedule

Inspection of blowers and other equipment will be conducted on a quarterly basis during the first year of implementation to establish that it is operational and performing within the design specifications. Thereafter, the frequency will be determined by NYSDEC and NYSDOH. This plan will be modified for NYSDEC approval in writing. Unscheduled inspections and/or sampling may take place when a suspected failure of the SSD system has been reported or an emergency occurs that is deemed likely to affect the operation of the system. Monitoring deliverables for the SSD systems are specified below, in Section 19.0 of this Monitoring Plan.

12.2 General System Monitoring

12.2.1 General Equipment Monitoring

A visual inspection of the complete system will be conducted during the monitoring event. SSD system components to be monitored include, but are not limited to the following:

- Vacuum blower; and,
- General system piping

A complete list of components to be checked is provided in the Inspection Checklist, presented in Appendix R. If any equipment readings are not within its typical range, any equipment is observed to be malfunctioning, or the system is not performing within specifications, applicable maintenance and repairs will be conducted per the Operation and Maintenance Plan, and the SSD system restarted.

12.2.2 System Monitoring Devices and Alarms

The SSD systems each include a warning device that indicates the system is not operating properly. In the event the warning device is activated, applicable maintenance and repairs will be conducted, as specified in the Operation and Maintenance Plan, and the SSD system restarted.

12.2.3 Discharge Permit Limit Requirements

SSD systems do not require air discharge permits, per guidance in Air Guide 1. Based on previous soil vapor samples collected at the Site, concentrations of VOCs released to the outside air will be negligible.

12.3 Sampling Event Protocol

Based on the NYSDOH *Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York* (October 2006), air monitoring is not necessary once the SSD system has been properly installed and is maintaining a vacuum underneath the entire slab. As demonstrated during SSD system testing after installation (refer to Appendix J), all SSD systems meet both criteria. However, some repairs and adjustments will be made to the SSD systems over their lifetime. In case of redesign and start-up, SSD system testing, as outlined in Section 22.2 of the Operation and Maintenance Plan, will be conducted.

13.0 RESIDENTIAL VAPOR MONITORING

After completion of the Site remedy, residential sub-slab vapor and/or indoor air sampling will be conducted on a quarterly basis for the first two years or at a lesser frequency as determined by the NYSDEC and NYSDOH following review of each quarterly round of results. Residences slated for sampling will be selected by the NYSDEC and NYSDOH, based on previous vapor sampling results. 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. The monitoring procedures are outlined below. Monitoring deliverables for the residential vapor monitoring are specified below, in Section 19.0 of this Monitoring Plan.

13.1 Sub-Slab Soil Vapor and Indoor Air Survey

13.1.1 Pre-Survey Evaluation

Running concurrently with the survey, sub-slab conditions of the residential structures that will be sampled at homes determined by NYSDOH and NYSDEC and at a frequency and schedule determined by NYSDOH. The floor plan, footing locations, presence of grade beams, floor drains, sumps, cleanouts, potential sample locations, and any other related information will be noted to the extent visible.

In addition to a visual survey of the structural elements, a product inventory will be performed. To the extent possible, solvent containing products within the residences will be noted. Each room on the floor of the building being tested and on lower floors, if possible, will be inspected for sources of potential indoor air contamination such as use or storage of petroleum products, use of petroleum-based finishes or products containing volatile chemicals, etc. A building inventory form, similar to that provided in the Appendix B of the October 2006 NYSDOH Guidance document, will be completed at the time of the survey. The survey will be conducted according to the NYSDOH Guidance document. A minimum of three samples will be collected per residence. The number of sub-slab soil vapor samples to be collected will depend on the evaluation of sub-slab conditions.

If there are basements, the number of indoor air basement samples collected will correspond to the number of sub-slab soil vapor samples collected. Indoor air samples to be collected in occupied residential spaces (on the first floor or, if there is no basement, the first and second floors). One outdoor air sample will be collected in close proximity to the residences being

sampled, for each sampling event. Sub-slab soil vapor, indoor air, and outdoor air sampling will be conducted concurrently over a 24 hour sampling period.

All sub-slab soil vapor, indoor air, and outdoor air sampling will be conducted in accordance with the October 2006 NYSDOH Guidance document. General sub-slab soil vapor, indoor air, and outdoor air sampling procedures are detailed below.

13.1.2 Sub-slab Vapor Sampling Procedure

The basement sub-slab vapor sample will be taken either from a location near a suspected vapor intrusion opening in the floor or from the center of the room. The sample will not be collected near any building footing.

The sub-slab vapor sampling procedure will follow the NYSDOH Soil Vapor Intrusion Guidance document (October 2006) and include the following:

- Time and temperature will be noted at the beginning and end of each sampling event;
- A 3/8 inch diameter hole will be advanced through the concrete slab using a hammer drill, to a depth of 3 inches into the sub-slab material;
- Tygon™ or Teflon™ tubing will be inserted into the hole and the hole will be sealed with clay to isolate the sub-slab environment and ensure representative sampling;
- The sample will be taken from the soil or aggregate material directly below the basement slab or below the slab on grade; the sampling tube should not extend further than 2 inches into the sub-slab material;
- The sampling tube should not touch groundwater. If water is found in the soil below the slab, then the sub-slab sample cannot be taken from that spot;
- After placement of the tubing, one to three volumes of air (the equivalent of the sample probe and tubing) will be purged through the system using a low flow rate vacuum pump (maximum of 200-ml per minute);
- The purge rate will be equal to the sampling rate;
- After purging, the tubing will be connected to a 3- or 6-L Summa Canister (supplied by the laboratory). A lab certified flow controller will be used to regulate the airflow for a 24 hour sampling period;
- The Summa Canister will be placed as close to the sub-slab opening as possible;

- The vapor flow into the Summa Canister will continue until the pressure gauge indicates that the pressure in the canister is 4 to 8 inches of mercury;
- All canisters will be appropriately labeled to indicate the sample locations;
- After sampling, the tubing will be removed and the slab openings will be sealed with a concrete patch to restore the integrity of the basement floor.

Details noted during the sampling events will include the use of heating or air conditioning systems, floor plan, sample locations, compass orientation, footing locations, outdoor weather conditions, ventilation conditions, and any other related information.

13.1.3 Indoor Air Sampling Procedure

For indoor air samples, similar guidelines will be followed, with some additional considerations:

- Two indoor air samples will be collected: one in the basement and one on the first floor living space;
- The basement air sample will be collected in the same general location as the sub-slab vapor sample; and
- Samples will be taken from about 3 feet above the ground.
- Sampling time will be for a period of approximately 24 hours;

13.1.4 Outdoor Air Sampling Procedure

Outdoor air samples will be collected using a 3- or 6-L Summa Canister and a lab certified flow controller to regulate the airflow for a 24 hour sampling period. The vapor flow into the Summa Canister will continue until the pressure gauge indicates that the pressure in the canister is 4 to 8 inches of mercury. All canisters will be appropriately labeled to indicate the sample locations.

13.2 Laboratory Analyses

Soil vapor, sub-slab, indoor air, and outdoor air samples will be analyzed by United States Environmental Protection Agency (USEPA) method TO-15 in accordance with the October 2006 NYSDOH Guidance document. Samples will be analyzed by an ELAP certified laboratory.

13.3 Evaluation of Air Monitoring results

Sub-slab soil vapor and indoor air results will be compared to the Decision Matrices for TCE, PCE, carbon tetrachloride (CCl4), and 1,1,1-trichloroethane (1,1,1-TCA), as specified in Section 3.4 of the NYSDOH Guidance document. Further actions will be determined by NYSDOH and NYSDEC.

14.0 AIR SPARGE/SOIL VAPOR EXTRACTION SYSTEMS MONITORING PROGRAM

One AS/SVE system was installed at Building 3 to remediate the source of the PCE and TCE contamination at the Site. An additional AS/SVE system was installed south of Building 8, along the southern property boundary, to minimize any future off-site migration of constituents of concern towards the neighboring residential community. System designs are described in the Engineering and Institutional Control Plan, and well logs and as-built drawings are located in Appendices L and N. The AS/SVE system Monitoring Program is based on the USACE In-Situ Air Sparging Engineer Manual (September 1997), and USACE Soil Vapor Extraction and Bioventing Engineer Manual (June 2002).

14.1 Schedule

A baseline monitoring and sampling event was conducted after system start-up. Following start-up testing, and the establishment of target operating ranges, the systems were put into continuous operation on December 29, 2006. The system will be monitored once per week for the first four weeks of operation. The measured operating parameters will be compared to the established acceptable ranges, and adjustments will be made as necessary as outlined in the Operation and Maintenance Plan. Following the first four weeks of operation, and assuming that the system appears to operate consistently, the monitoring schedule will be changed to once every two weeks for the second month of operation. Following the second month of operation, monitoring will be reduced to a quarterly basis during the first year of implementation. Sampling events will also be conducted quarterly until otherwise approved by NYSDEC and NYSDOH. Unscheduled inspections and/or sampling may take place when a suspected failure of the AS/SVE system has been reported or an emergency occurs that is deemed likely to affect the operation of the system. Monitoring deliverables for the AS/SVE systems are specified below, in Section 19.0 of this Monitoring Plan.

14.2 System Monitoring

14.2.1 General Equipment Monitoring

A visual inspection of the complete system will be conducted during the monitoring event. AS/SVE components to be monitored include, but are not limited to the following:

- Compressor discharge pressure, flow, and temperature;

- Vacuum blower, vacuum, flow, and temperature;
- Individual well head pressure (or vacuum, as applicable); and
- Effluent concentrations exiting the carbon canisters.

For a complete list of components to be checked, please refer to the AS/SVE Inspection Checklist in Appendix S. Based on the inspection observations, any necessary system maintenance activities will be conducted as specified in the Operation and Maintenance Plan, and the system restarted.

14.2.2 System Monitoring Devices and Alarms

The AS/SVE system will include the following system monitoring devices and associated alarm notifications:

- System monitoring device and alarm notification for failure of SVE vacuum blower;
- System monitoring device and alarm notification for failure of AS compressor; and,
- System monitoring device for low, high, and high-high water level in moisture separator and alarm notification for high-high level alarm moisture separator.

In the event of a pump failure, blower failure, or alarm condition in moisture separator, the system program logic controller (PLC) will dial out to notify the operator and other applicable persons of the alarm condition. Any necessary system maintenance activities will be conducted as specified in the Operation and Maintenance Plan, and the system restarted.

14.2.3 Discharge Permit Limit Requirements

Based on previous soil vapor samples collected at on-site locations coupled with the use of two vapor-phase granular activated carbon units (connected in series) for each system, concentrations of VOCs released to the outside air will be negligible and will meet discharge permit limit requirements, as per guidance in Air Guide 1. Sampling events of effluent air will also be conducted, as per the above schedule, to monitor breakthrough.

14.2.4 Air Sparge and Air Sparge Monitoring Wells

The precipitation of metals and/or microbial growth (i.e., biofouling) may occur at air sparge and air sparge monitoring wells. Additionally, silt and very fine sands may accumulate at the bottom of air sparge and air sparge monitoring wells. Biofouling and silt accumulation can affect the performance of the AS/SVE system.

Air sparge and air sparge monitoring wells will be monitored as needed (e.g., if decreased flow rates are identified at an air sparge monitoring wells, etc.). If biofouling and silt accumulation have occurred, applicable maintenance will be conducted as specified in the Operation and Maintenance Plan.

14.2.5 Soil Vapor Extraction Wells

A dried-out, cracked casing seal is common in certain types of grout when subjected to a vacuum. After a period, all the moisture is evacuated from the grout, forming cracks that may allow preferential vapor flow down the sides of the casing. As the cracks progress and the grout shrinks, vibrations of the well casing tend to intensify the damage. This can be detected by:

- Carefully pressurizing the well and checking for leaks using soap solution; or
- Pouring 3 to 4 liters of water onto the grout around the well casing and observing the time it takes the water to permeate the grout.

A severely damaged well seal will absorb the water in a matter of minutes, while a good seal should be capable of holding the water for upwards of an hour. If the well casing has been damaged, applicable maintenance will be conducted as specified in the Operation and Maintenance Plan.

14.3 Soil Vapor and Air Sampling Event Protocol

14.3.1 Soil Vapor Sampling Procedure

Soil vapor samples will be collected at the soil vapor extraction monitoring wells, at the SVE system prior to entry into the VGACs, between VGACs, and at the discharge point. The sampling procedure includes the following:

- Tygon™ or Teflon™ tubing will be attached to the appropriate sample port and the sample port/tubing interface will be sealed with Teflon™ tape to ensure representative sampling;
- After purging, the tubing will be connected to a 3- or 6-L Summa Canister (supplied by the laboratory). A lab certified flow controller will be used to regulate the airflow for a 1 hour sampling period;
- The vapor flow into the Summa Canister will continue until the pressure gauge indicates that the pressure in the canister is 4 to 8 inches of mercury; and
- All canisters will be appropriately labeled to indicate the sample locations.
- Details noted during the sampling events will include the use of sample locations, compass orientation, outdoor weather conditions, ventilation conditions, time and temperature (at the beginning and end of each sampling event), and any other related information.

14.3.2 Outdoor Air Sampling Procedure

An outdoor air sample will be collected using a 3- or 6-L Summa Canister and a lab certified flow controller to regulate the airflow for a one-hour sampling period. The vapor flow into the Summa Canister will continue until the pressure gauge indicates that the pressure in the canister is 4 to 8 inches of mercury. All canisters will be appropriately labeled to indicate the sample locations.

14.3.3 Laboratory Analyses

Samples will be submitted to the laboratory under proper chain of custody protocol (see Appendix T). All samples will be analyzed for VOCs by USEPA method TO-15 in accordance

with the October 2006 NYSDOH Guidance document. Additionally, soil vapor samples collected at the soil vapor extraction monitoring wells will also be analyzed for oxygen and carbon dioxide. Samples will be analyzed by a NYSDOH Environmental Laboratory Accreditation Program (ELAP) certified laboratory.

14.3.4 Sampling Evaluation

The influent soil vapor samples will help assessment of contaminant removal rates. The samples collected at the VGAC discharge will aid in assessment of system efficiency as well as estimates of time until breakthrough of the VGACs. Outdoor air samples will determine ambient air conditions at the time of the sampling event.

14.4 Air Sparge Monitoring Well Sampling Event Protocol

All air-sparge monitoring wells will be sampled quarterly, during each groundwater sampling event (see Appendices L and N for air sparge monitoring well logs and locations). All monitoring well sampling activities will be recorded in a field book and a groundwater-sampling log presented in Appendix U, or similar form. Other observations (e.g., well integrity, etc.) will be noted on the well sampling log; the well sampling log will serve as the "inspection form" for the air-sparge monitoring well network.

14.4.1 Well Gauging

Prior to sampling, the static water level will be measured to the nearest 0.01 foot from the surveyed well elevation mark on the top of the PVC casing with a decontaminated water level indicator. Water levels will be recorded and converted to elevations relative to the National Geodetic Vertical Datum (NGVD) for groundwater contouring purposes. The depth to the bottom of the well will also be recorded.

14.4.2 Purging

Quiescent well purging methods will be used to minimize suspension and mobilization of fines in the well and formation. The well will be purged using the low-flow method developed by the USEPA ("Low-Flow [Minimal Drawdown] Ground-Water Sampling Procedures," EPA/540/S-95/504, April 1996) and accepted by NYSDEC. Purging will be conducted using a

decontaminated low-flow (generally less than one gallon per minute [gpm]) submersible or peristaltic pump, fitted with dedicated, disposable tubing. The low-flow method may not be feasible or desirable for purging slow-to-recharge wells, in which case the well may be purged using disposable polyethylene bailers suspended on polypropylene rope. During purging, the turbidity, pH, temperature, conductivity, redox potential, carbon dioxide, and dissolved oxygen of the sample will be measured using a Horiba U-22 Water Quality Checker with flow-through cell, or equivalent pre-calibrated probe(s) and recorded. Purging will be considered complete after three well volumes have been purged and all parameter readings have stabilized for three successive readings. Purge water will be contained in 55-gallon drums. The drums will be labeled as investigation derived wastewater from the corresponding well and temporarily stored in a secured area pending characterization and proper disposal.

14.4.3 Groundwater Sampling

Each well will be sampled using the low-flow method developed by the USEPA (April 1996) and accepted by NYSDEC. Sampling will be conducted using a decontaminated low-flow (generally less than one gpm) submersible or peristaltic pump, fitted with dedicated, disposable tubing. Groundwater samples will be collected directly from the pump discharge line after the pump is turned off and the flow can be reversed out of the tubing into sample vials. Wells can be sampled using disposable polyethylene bailers suspended on polypropylene rope for slow-to-recharge wells. For wells that purge to dryness, samples may generally be collected after at least 50 percent recovery to the original static water level. Samples will be collected in the appropriate number of hydrochloric acid-preserved volatile organic analysis (VOA) bottles. The sample containers will then be labeled, placed in a cooler, packed on ice (to maintain a temperature of 4°C), and shipped to the laboratory under proper chain of custody protocol for analysis. Chain of custody documentation is presented in Appendix T.

14.4.4 Laboratory Analysis

All laboratory analyses of groundwater samples will be conducted by a NYSDOH ELAP-approved laboratory certified for analyses using the most recent Analytical Services Protocol (ASP). Groundwater samples will be analyzed for target compound list (TCL) VOCs.

14.5 Well Decommissioning

On an as-needed basis, Langan will perform necessary repairs and/or replacement of the wells in the AS/SVE system and associated monitoring well network. Well decommissioning may take place when:

- No contaminated soil vapor or groundwater remains above the applicable standards or guidance levels at a specific well location (with written approval by the NYSDEC and NYSDOH); or
- A well has become damaged and/or unusable.

If these situations occur, the well will be abandoned in accordance with NYSDEC's "Groundwater Monitoring Well Decommissioning Procedures." Monitoring wells that are decommissioned because they have been rendered unusable will be reinstalled in a nearby location, unless otherwise approved by the NYSDEC and NYSDOH.

15.0 GROUNDWATER MONITORING PROGRAM

Natural attenuation is the process by which the concentration of contaminants in an area decreases due to natural contaminant degradation through mineralization by chemical or physical processes. Natural attenuation is taking place at the Site and on the adjacent, off-site properties that have been affected by the plume. Regular groundwater sampling will be conducted to monitor natural attenuation at the Site. The results from the sample analysis will assist in determining the subsurface water quality, plume size, and plume migration and assist in evaluating Site-wide post-remedial performance.

15.1 Monitoring System Design

The network of monitoring wells was designed to monitor both upgradient and down-gradient groundwater conditions at the Site. The network of on-site and off-site wells is located in the following areas:

- In the source area;
- Down-gradient of the source;
- At the limit of the plume;
- At the centerline of the plume; and
- Downgradient of the plume, beyond the zone of contamination.

Well locations and the TCE and PCE groundwater isoconcentration contours as of the June 2006 groundwater-sampling event are shown on Figure 3 and Figure 4. The wells to be sampled as part of the groundwater monitoring program are summarized in Table 3.

Table 3: Monitoring Well Network

On-Site Wells
MW-6R
MW-16R
MW-38R
MW-57
MW-58
MW-60
MW-61
MW-62
MW-63R
MW-65R
MW-66
MW-UST#2
Off-Site Wells
OSW-1
OSW-2
OSW-3
OSW-4
OSW-5 (sentinel well)

15.2 Groundwater Well Construction

Drilling for the groundwater monitoring wells was accomplished using the hollow-stem auger drilling methods. Well construction logs are included in Appendix V.

15.3 Schedule

Quarterly monitoring events for on- and off-site wells began in November 2006. Continued groundwater monitoring on a quarterly basis is planned during the first two years of implementation. Thereafter, the sampling frequency will be determined by NYSDEC and NYSDOH. The SMP will be modified to reflect changes in sampling plans approved by NYSDEC and NYSDOH. Deliverables for the groundwater monitoring program are specified below, in Section 19.0 of this Monitoring Plan.

15.4 Sampling Event Protocol

All well sampling activities will be recorded in a field book and a groundwater-sampling log presented in Appendix U, or similar form. Other observations (e.g., well integrity, etc.) will be noted on the well sampling log; the well sampling log will serve as the "inspection form" for the groundwater monitoring well network.

15.4.1 Well Gauging

Well gauging activities for the groundwater monitoring well network will be conducted as outlined above in Section 14.4.1.

15.4.2 Purging

Well purging activities for the groundwater monitoring well network will be conducted as outlined above in Section 14.4.2, except that carbon dioxide readings will not be taken during purging.

15.4.3 Groundwater Sampling

Groundwater sampling activities for the groundwater monitoring well network will be conducted as outlined above in Section 14.4.3.

15.4.4 Laboratory Analysis

All laboratory analyses of groundwater samples will be conducted by a NYSDOH ELAP-approved laboratory certified for analyses using the most recent ASP. Groundwater samples will be analyzed for TCL VOCs.

15.5 Well Decommissioning

Well decommissioning activities will be conducted as described above in Section 14.5.

16.0 COMPOSITE COVER SYSTEM

A composite cover system comprised of asphalt covered roads, concrete covered sidewalks, and concrete building slabs serves as a protective barrier reducing the risk of exposure to residual contamination left in place under the Site. Inspection of the composite cover system is required during annual inspections and is subject to annual certification to NYSDEC. Conditions of the on-site building foundations, sidewalks, and private roads will be noted for quality and integrity, during inspections

17.0 SITE-WIDE INSPECTION

During the last inspection/monitoring event of the calendar year reporting period, or if some severe condition has taken place that may affect controls at the Site, a Site-wide inspection will be conducted, and the appropriate inspection form will be completed (included in Appendix W). The form will compile sufficient information to assess the following:

- Compliance with all ICs, including Site usage;
- An evaluation of the condition and continued effectiveness of ECs (e.g., SSD systems, AS/SVE systems, composite cover system);
- General Site conditions at the time of the inspection;
- The Site management activities being conducted including, where appropriate, confirmation sampling and a health and safety inspection;
- Compliance with permits and schedules included in the Operation and Maintenance Plan; and
- Confirm that Site records are up to date.

18.0 QUALITY ASSURANCE/QUALITY CONTROL

All sampling and analyses will be performed in accordance with the requirements of the Quality Assurance Project Plan (QAPP) previously prepared for the Site (see Appendix X of the SMP). Main Components of the QAPP include:

- QA/QC Objectives for Data Measurement
    - Formulated to meet the requirements of the USEPA SW-846
- Sampling Program
    - Sample containers will be properly washed, decontaminated, and appropriate preservative will be added (if applicable) prior to their use by the analytical laboratory. Containers with preservative will be tagged as such.
    - Sample holding times will be in accordance with the NYSDEC ASP requirements
    - Field QC samples (e.g., trip blanks, coded field duplicates, and matrix spike/matrix spike duplicates) will be collected as necessary
- Sample Tracking and Custody
- Calibration Procedures
    - All field analytical equipment will be calibrated immediately prior to each day's use. Calibration procedures will conform to manufacturer's standard instructions.
    - The laboratory will follow all calibration procedures and schedules as specified in the sections of the USEPA SW-846 and subsequent updates that apply to the instruments used for the analytical methods.
- Analytical Procedures
- Data Reduction and Validation
    - Data validation will be performed in accordance with the USEPA validation guidelines for organic and inorganic data review. Validation will include the following:
        - Verification of 100% of all QC sample results (both qualitative and quantitative);

- Verification of the identification of 100% of all sample results (both positive hits and non-detects);
- Recalculation of 10% of all investigative sample results; and
- A Data Usability Summary Report (DUSR) which will present the results of data validation, including a summary assessment of laboratory data packages, sample preservation and chain of custody procedures, and a summary assessment of precision, accuracy, representativeness, comparability, and completeness for each analytical method.
- Internal QC and Checks
- QA Performance and System Audits
- Preventative Maintenance Procedures and Schedules
- Corrective Action Measures

19.0 REPORTING REQUIREMENTS

Forms and any other information generated during regular monitoring events and inspections will be kept on file on-site or with the party(ies) implementing the SMP. All forms, and other relevant information generated during the monitoring/inspection events, will be (1) subject to approval by NYSDEC and NYSDOH and (2) submitted at the time of the annual Site Management Report, as specified in the Reporting Plan of the SMP.

A report or letter will be prepared for submission if required by NYSDOH and NYSDEC subsequent to each sampling event. All monitoring results will be reported to NYSDEC and NYSDOH on an annual basis in the Site Management Report. The report (or letter) will include, at a minimum:

- Date of event;
- Personnel conducting sampling;
- A short description of the activities performed;
- Type of samples collected (e.g., sub-slab vapor, indoor air, outdoor air, etc);
- Copies of all field forms completed (e.g., well sampling logs, chain-of-custody documentation, etc.);
- Sampling results in comparison to appropriate standards/criteria;
- A figure illustrating sample type and sampling locations;
- Copies of all laboratory data sheets and the required laboratory data deliverables required for all points sampled (also to be submitted electronically in the NYSDEC-identified format);
- A copy of the laboratory certification;
- Any observations, conclusions, or recommendations; and
- Determination that plume conditions have not changed since the last reporting event.

Data will be reported in hard copy or digital format as determined by NYSDEC and NYSDOH. A summary of the monitoring program deliverables are summarized in Table 4 below.

Table 4: Monitoring/Inspection Deliverables

Task	Frequency*	Quarterly Reporting Requirement	Annual Reporting Requirement
SSD System Inspections	Quarterly inspections for the first year; annually thereafter pending NYSDEC approval in writing	**No** quarterly report	Information generated included in annual report
Off-site Soil Vapor Sampling	Quarterly sampling for the first two years or at a frequency approved in writing by NYSDOH and NYSDEC following review of results	Information generated submitted in quarterly report	Information generated included in annual report
AS/SVE System			
• Inspections	• Once per week for the first four weeks of operation; • Once every two weeks for the second month of operation; • Then quarterly basis for the first year; annually thereafter pending NYSDEC approval in writing	**No** quarterly report	Information generated included in annual report
• Monitoring	Quarterly sampling for the first year annually thereafter pending NYSDEC approval in writing	Information generated submitted in quarterly report	Information generated included in annual report
Groundwater Monitoring	Quarterly sampling for the two years; annually thereafter pending NYSDEC approval in writing	Information generated submitted in quarterly report	Information generated included in annual report
Composite Cover System Inspections	Quarterly inspections for the first year; annually thereafter pending NYSDEC approval in writing	**No** quarterly report	Information generated included in annual report
Site-wide Inspections	Annual inspections	**No** quarterly report	Information generated included in annual report

* The frequency of events will be conducted as specified until otherwise approved by NYSDEC and NYSDOH

20.0 CERTIFICATIONS

Site inspections and sampling activities will take place as outlined above for the first year. The frequency thereafter will be determined by NYSDEC and NYSDOH. Certification of inspection of all ICs and ECs will be submitted to NYSDEC on a calendar year basis and must be submitted by March 1 of the following year. Certification will be performed by a Professional Engineer or qualified environmental professional. The inspection report will address several aspects of the ECs, including confirmation that the monitoring equipment are in place and functional and an evaluation of their performance and effectiveness. Further information on the certification requirements are outlined in the Reporting Plan of the SMP.

IV. OPERATION AND MAINTENANCE PLAN

21.0 INTRODUCTION

The Operation and Maintenance Plan describes the measures necessary to operate and maintain any mechanical components of the remedy (i.e., the SSD systems and the AS/SVE systems) selected for the Site. This Operation and Maintenance Plan:

- Includes the steps necessary to allow individuals unfamiliar with the Site to operate and maintain the SSD and AS/SVE systems;

- Includes an operation and maintenance contingency plan; and,

- Will be updated periodically during use, as necessary, to reflect changes in Site conditions or the manner in which the SSD and AS/SVE systems are operated and maintained.

Other remediation controls used at the Site (e.g., MNA and use of a composite cover system) require no additional instructions for maintenance (information on the composite cover system can be found in the Engineering and Institutional Control Plan). MNA will be monitored via a network of monitoring wells placed throughout the Site and surrounding area. Groundwater monitoring well maintenance will be addressed in Section 24.0 of this plan.

Copies of this Operation and Maintenance Plan, along with the complete SMP will be maintained at the Site. This Operation and Maintenance Plan is not to be used as a stand-alone document, but as a component document of the SMP. The Operation and Management Plan is subject to NYSDEC revision.

22.0 SUB-SLAB DEPRESSURIZATION SYSTEMS

22.1 Scope

This section provides operation and maintenance requirements for the SSD systems, including two off-site on Parcel A (in Buildings 4 and 6) and three on-site (in Buildings 3, 7, and 8). The Operation and Maintenance Program has been prepared based on the NYSDOH Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York – October 2006 and Environmental Protection Agency (EPA) Guidance Document EPA/625/R-92/016 concerning sub-slab depressurization of large buildings and schools (June 1994).

Details of the system design and layout are provided in the Engineering and Institutional Control Plan section of the Site Management Report. As-built drawings are shown in Appendices D through H for systems installed in Buildings 3, 4, 6, 7, and 8.

22.2 System Start-Up and Testing

Prior to initial start-up of the SSD systems, an inspection was performed to confirm that all system components were in place. All equipment was then started in accordance with the manufacturer's recommendations (system component manuals are presented in Appendix I). System testing was then performed, as follows:

- While the system was operating, 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.
- 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.
- 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.
- A manometer test was performed 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.

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

SSD system test results are included in Appendix J. The system testing described above will be conducted if, in the course of the SSD system lifetime, significant changes are made to the system and the system restarted.

22.3 System Operation

22.3.1 Routine Operating Procedures

The vacuum blowers will operate continuously after initial startup. All equipment will be operated in accordance with manufacturer's recommendations (see Appendix I).

22.3.2 Trouble Shooting

During the course of operation for the active SSD systems, especially immediately after start-up, some technical difficulties may be encountered and/or the SSD systems may not operate within design specifications. Any required maintenance, adjustments, or repairs to the system will be conducted as per manufacturer's recommendations and Section 22.4 of this Operation and Maintenance Plan.

22.4 System Maintenance

22.4.1 Routine Equipment Maintenance

Routine equipment maintenance (e.g., replacing vent fans), repairs, and/or adjustments will be determined based on the life expectancy and warranty for the specific part as well as visual observations over time. The need for repairs and/or adjustments will depend upon the results of a specific activity compared to the results obtained when system operations were initiated. Routine maintenance activities and minimum schedules are provided in Appendix R.

22.4.2 Non-routine Maintenance

Non-routine maintenance may also be required during the operation of the SSD systems, including the following situations:

- The building's Owners or occupants report that the warning device indicates the SSD system is not operating properly;
- The SSD system becomes damaged; and/or,
- The building has undergone renovations that may reduce the effectiveness of the SSD system.

Activities conducted during non-routine maintenance visits will vary depending upon the reason for the visit. Repairs or adjustments will be made to the system as appropriate and as per manufacturer guidelines. If necessary, the system will be redesigned and restarted.

23.0 AIR SPARGING/SOIL VAPOR EXTRACTION SYSTEMS

23.1 Scope

This section has been prepared to provide operation and maintenance requirements for the AS/SVE Systems installed in Building 3 and along the southern perimeter of the Site. It is based on the USACE In-Situ Air Sparging Engineer Manual (September 1997), and USACE Soil Vapor Extraction and Bioventing Engineer Manual (June 2002).

23.2 Pre-Commissioning and Start-Up

23.2.1 Pre-Commissioning

Prior to initial start-up, the AS/SVE system was inspected to confirm that all components were in place, and baseline measurements were collected from AS/SVE monitoring wells.

Additionally, the AS system components were purged to evacuate potential VOCs in the system generated by chemical adhesives used during construction. The AS wellheads and valves were opened, air injected into the manifold lines with a compressor, and potential vapors discharged. Air purging was a minimum of 10 minutes and continued until a PID, or similar device, indicated VOCs had been adequately discharged from the system.

The activities described above will be conducted again if, in the course of the AS/SVE system lifetime, significant changes are made to the system and the system restarted.

23.2.2 System Start-Up

SVE operations were started before AS operations. All equipment was started in accordance with the manufacturer's recommendations; blower and compressor manufacturer manuals are provided in Appendix M and O. The equipment was checked to establish that it was operational and performing within the design specifications.

The activities described above will be conducted again if, in the course of the AS/SVE system lifetime, significant changes are made to the system and the system restarted.

23.3 System Operation

23.3.1 Routine Operating Procedures

The vacuum blower and air compressors will operate continuously after start-up. All equipment will be operated in accordance with manufacturer's recommendations (see Appendix M and O for the respective systems).

23.3.2 Trouble Shooting

During the course of operation, especially immediately after start-up, some technical difficulties may be encountered and/or the AS/SVE may not operate within design specifications. A trouble-shooting guide and operation strategies are provided in Appendix Y. Any required maintenance or repairs to the system will be conducted as per manufacturer's recommendations and Section 23.4 of this Plan, and the system restarted.

23.4 System Maintenance

23.4.1 Routine Equipment Maintenance

Routine equipment maintenance (e.g., recharging VGACs), repairs, and/or adjustments will be determined based on the life expectancy and warranty for the specific part as well as visual observations over time. The need for repairs and/or adjustments will depend upon the results of a specific activity compared to the results obtained when system operations were initiated.

VGACs will be recharged prior to breakthrough; breakthrough will be monitored as per Section 14.2 of the Monitoring Plan. The used activated carbon will be disposed of at a NYSDEC-approved disposal facility in accordance with all applicable federal, state, and local regulations. VGACs will be recharged with new or recycled activated carbon. Based on concentrations existing in groundwater, one change-out per 5 years is anticipated.

Routine maintenance activities and minimum schedules are provided in Appendix S.

23.4.2 Non-routine Maintenance

Non-routine maintenance may also be required during the operation of the AS/SVE system, including the following situations:

- The buildings Owners or occupants report that the alarm notification indicates the AS/SVE system is not operating properly;
- Designated representatives have been contacted by the automatic call out system to report that the AS/SVE system is not operating properly; and/or,
- The AS/SVE system becomes damaged.

Activities conducted during non-routine maintenance visits will vary depending upon the reason for the visit. Repairs or adjustments will be made to the system as appropriate and as per manufacturer guidelines. If necessary, the system will be redesigned and restarted.

23.4.3 Air Sparge and Air Sparge Monitoring Well Maintenance

If, during the lifetime of the air sparge and air sparge monitoring wells, biofouling or silt accumulation has been found to have occurred (e.g., decreased flow rates are identified at an air sparge well during routine monitoring, etc.), air sparge and air sparge monitoring wells will be physically agitated/surged and redeveloped to alleviate the problem. Other treatments, such as chemical or thermal, will be evaluated if physical agitation and redevelopment are found to be ineffective. Additionally, air sparge and air sparge monitoring wells will be properly decommissioned (as per the Monitoring Plan) and replaced, as needed, if some event renders the wells unusable.

23.4.4 Soil Vapor Extraction Well Maintenance

Soil vapor extraction and soil vapor extraction monitoring wells are screened above the groundwater table and are not as susceptible to biofouling or silt accumulation. However, a dried out, cracked casing seal is common in certain types of grout when subjected to a vacuum. If the casing seal is found to be slightly damaged, an additional layer of grout can be placed over the existing layer, while the system is shut off, in order to seal the cracks. If the

damage is significant, the well will be decommissioned (as per the Monitoring Plan) and replaced, as needed. Additionally, soil vapor extraction and soil vapor extraction monitoring wells will be properly decommissioned and replaced, as needed, if some event renders the wells unusable.

24.0 GROUNDWATER MONITORING WELL MAINTENANCE

If biofouling or silt accumulation has occurred in the on-site and off-site monitoring wells, the wells will be physically agitated/surged and redeveloped. Other treatments, such as chemical or thermal, will be evaluated if physical agitation and redevelopment are found to be ineffective. Additionally, monitoring wells will be properly decommissioned (as per the Monitoring Plan) and replaced, as needed, if some event renders the wells unusable.

25.0 REPORTING REQUIREMENTS

Maintenance reports and any other information generated during regular operations at the Site will be kept on-file on-site or with the party(ies) implementing the SMP. All reports, forms, and other relevant information generated will be (1) available upon request to the NYSDEC and NYSDOH and (2) submitted at the time of the annual Site Management Report, as specified in the Reporting Plan of the SMP.

25.1 Routine Maintenance Reports

Checklists or forms (see Appendix R for the SSD system checklist and Appendix S for the AS/SVE system checklist) will be completed during each routine maintenance event. Checklists/forms will include, but not be limited to the following:

- The date;
- The name, company, and position of person(s) conducting maintenance activities;
- Any maintenance activities conducted;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet); and,
- Other documentation such as copies of invoices for maintenance work, receipts for replacement equipment, etc., (attached to the checklist/form).

25.2 Non-Routine Maintenance Reports

During each non-routine maintenance event, a form will be completed which will include, but not be limited to, the following information:

- The date;
- The name, company, and position of person(s) conducting non-routine maintenance/repair activities;

- The presence of leaks, if any;
- The date the leak, if any, was fixed;
- Any other repairs or adjustments made to the system;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents (included either on the form or on an attached sheet); and,
- Other documentation such as copies of invoices for repair work, receipts for replacement equipment, etc. (attached to the checklist/form).

26.0 CONTINGENCY PLAN

Emergencies can be characterized as injury to personnel; fire or explosion; environmental release; or serious weather conditions. Fire or explosion and environmental release are not likely to occur in relation to the EC/ICs implemented at the Site, but are included in this contingency plan. A more thorough emergency/contingency plan can be found in the HASP for the Site (Appendix Q).

26.1 Emergency Telephone Numbers

In the event of any situation or unplanned occurrence requiring assistance with environmental matters, the appropriate contact(s) should be made by the Owner or Owner's representative(s) (who in this case is also the BCP Participant) from the lists below. For emergencies, contact should be made with the Program Manager or Project Manager or the Field Safety Officer (FSO) as soon as possible, after notifying the appropriate emergency personnel who will then contact the appropriate response teams. These emergency contact lists must be in an easily accessible location at the Site.

Table 5: Emergency Contact Numbers

Medical, Fire, and Police:	911
One Call Center:	(800) 272-4480 (3 day notice required for utility markout)
Poison Control Center:	(800) 222-1222
Pollution Toxic Chemical Oil Spills:	(800) 424-8802
Family Health Center - Ridgewood:	(718) 497-4455

Table 6: Langan Contact Numbers

Program Manager:	Joel Landes, P.E. (212) 479-5404
Project Manager:	John Gavras, PG, CPG (212) 479-5406
Health & Safety Officer (HSO):	Bob Koto, PG (201) 398-4566
Field Safety Officer (FSO):	Jamie Barr (cell) (917) 882-5428
Health & Safety Coordinator (HSC):	Veronica Tiglao (cell) (646) 957-0997

* Note: Contact numbers subject to change

26.2 Map and Directions to Nearest Health Facility

Site Location: 8000 Cooper Avenue, Glendale, New York

Hospital Name: Family Health Center - Ridgewood

Hospital Location: 6852 Fresh Pond Road, Flushing, New York 11385-5230

Hospital Telephone: (718) 497-4455

Directions to the Hospital:

Directions from the Site, located at 8000 Cooper Avenue, Glendale, New York, to the Family Health Center, located at 6852 Fresh Pond Road, Flushing, New York:

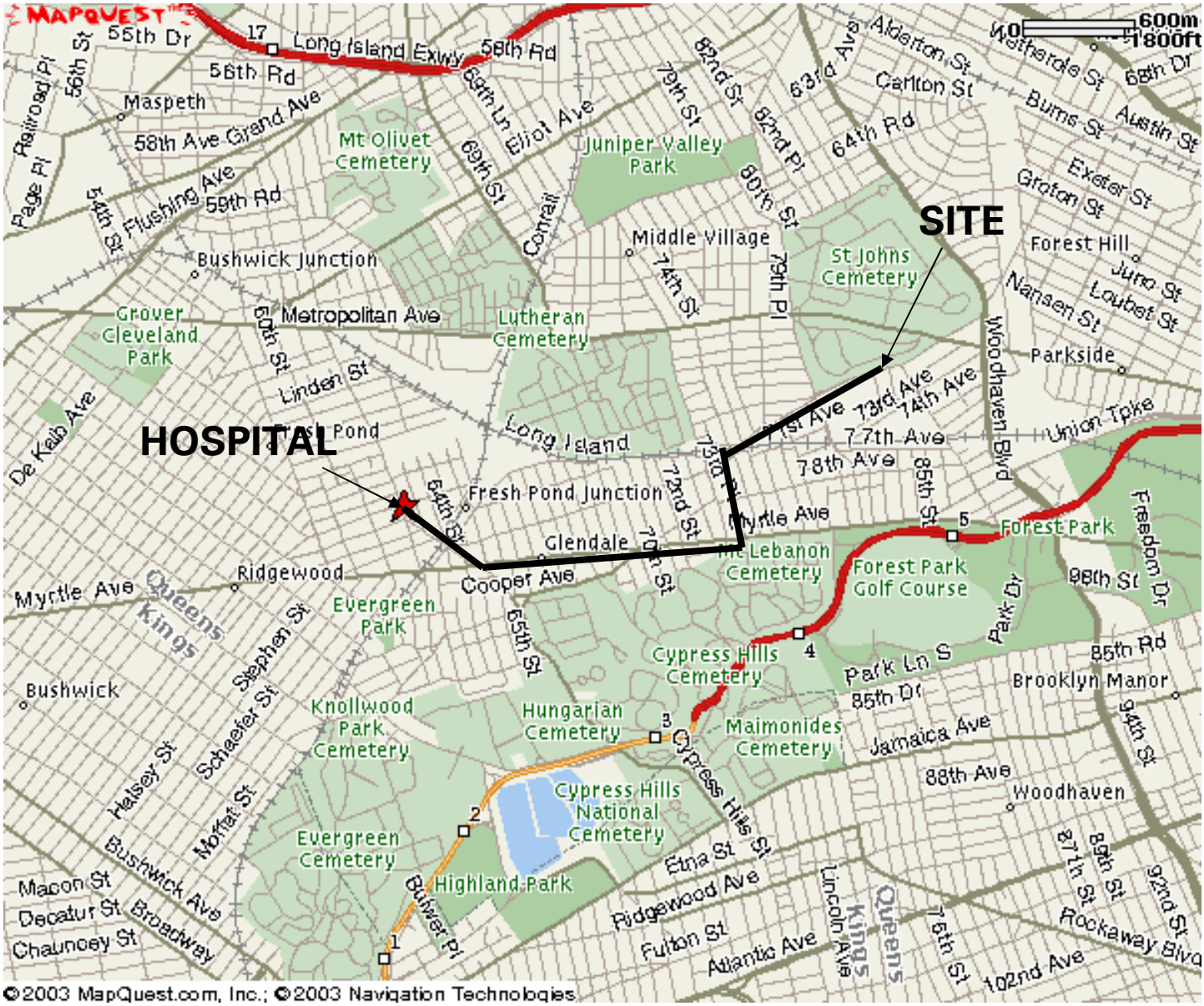
1. Start out going NORTH on 80Th Street to Cooper Avenue.
2. Turn LEFT onto Cooper Avenue.
3. Turn LEFT onto 73rd Place

4. Turn RIGHT onto Myrtle Avenue
5. Turn RIGHT onto Cypress Hills Street.
6. Turn RIGHT onto Fresh Pond Road

Total Distance: 1.67 miles

Total Estimated Time: 6 minutes

Map Showing Route from the Site to the Hospital:



26.3 Response Procedures

26.3.1 Emergency Contacts/Notification System

The fire department and other emergency response group will be notified by telephone of the emergency as soon as possible. The emergency telephone numbers list is found at the beginning of this contingency plan (Section 26.1). The list is also posted prominently at the Site, or made readily available to all personnel at all times.

26.3.2 In Case of Personal Injury

In case of personal injury at the Site, the following procedures should be employed:

- For less severe cases, the individual can be treated with contents of the first-aid kit.
- If necessary, the victim should then be transported to the nearest hospital or medical center (refer to Section 26.2 above). If necessary, an ambulance should be called to transport the victim.

Follow-up action should be taken to correct the situation that caused the accident. Any incident (e.g., near miss, property damage, first aid, medical treatment, etc.) must be reported and evaluated. A first-aid kit will be kept on-site. Emergency first aid procedures to be followed are:

- Skin Contact: Use copious amounts of soap and water. Wash/rinse affected areas thoroughly, and then provide appropriate medical attention. Rinse eyes with water for at least 15 minutes.
- Inhalation: Move to fresh air and/or, if necessary, decontaminate and transport to hospital.
- Ingestion: Decontaminate and transport to emergency medical facility.
- Puncture/Laceration: Decontaminate, if possible, and transport to emergency medical facility.

26.3.3 In Case of Fire or Explosion

Appropriate fire extinguishers will be made available at the Site for trained personnel to use on insipient stage fires without endangering the safety and health of those nearby. If the use of fire extinguishers will not extinguish the fire, immediately notify the fire department.

26.3.4 In Case of Spills or Leaks

Control or stop the spread of minor chemical spills contamination utilizing the appropriate materials (i.e., absorbents, etc.) if possible. If the release is significant, or highly hazardous, immediately notify the appropriate response groups.

26.3.5 In Case of Adverse Weather Conditions

In the event of heavy precipitation (e.g., rain, snow, sleet, etc.), conditions will be assessed on-site to determine if the work can proceed safely. If it is determined that the weather poses a significant hazard, Site operations will be stopped and rescheduled. Some of the items to be considered prior to determining if work should continue include:

- Potential for heat stress and heat-related injuries
- Potential for cold stress and cold-related injuries
- Treacherous weather-related working conditions
- Limited visibility

26.3.6 Evacuation Plans

In the event evacuation of the Site is necessary (e.g., fire, explosion, etc.), personnel will evacuate using evacuation routes posted in all on-site buildings.

26.4 Contingency Plan Amendments

As changes in Site conditions and operations may take place over time, some information in this contingency plan may need to be updated to reflect these changes. The contingency plan will be updated on an as-needed basis. Any updates to the contingency plan will be kept with this Monitoring Plan and will be maintained at the Site.

V. SITE MANAGEMENT REPORTING PLAN

27.0 INTRODUCTION

An annual Site Management Report will be submitted to NYSDEC and NYSDOH annually, following the calendar year reporting period, by March 1. The Site Management Report will be prepared in accordance with the requirements in the NYSDEC Draft DER-10 Technical Guidance for Site Investigation and Remediation, dated December 2002. This Site Management Reporting Plan and its requirements are subject to revision by NYSDEC.

This report will include the following:

- Identification of all required EC/ICs required by the Final Engineering Report (FER) for the Site:
- An evaluation of Engineering and Institutional Control Plan;
- Assessment of the continued effectiveness of all institutional and/or engineering controls for the Site;
- Certification of the EC/ICs;
- A summary of the required periodic Site Inspections; and
- All deliverables generated during the calendar reporting period, as specified in Table 4 in Section 19.0 of the Monitoring Plan.

This Reporting Plan is not to be used as a stand-alone document, but as a component document of the SMP. The Reporting Plan is subject to NYSDEC revision.

28.0 CERTIFICATION OF ENGINEERING AND INSTITUTIONAL CONTROLS

ECs implemented at the Site include several SSD systems, two AS/SVE systems, monitored natural attenuation (MNA), and a composite cover system. ICs will be enforced through the Environmental Easement (see Appendix C) and a Soil Management Plan (see Appendix P). Further information of EC/ICs can be found in the Engineering and Institutional Control Plan portion of the SMP.

Inspection of the EC/ICs will occur as outlined in the schedules provided in the Monitoring Plan of the SMP. After the last inspection of the calendar year reporting period, a Professional Engineer licensed to practice in New York State will sign and certify the document. The document will certify that the EC/ICs employed at the Site are:

- Unchanged from the previous certification;
- In-place and effective;
- Performing as designed;
- Nothing has occurred that would impair the ability of the controls to protect the public health and environment;
- Nothing has occurred that would constitute a violation or failure to comply with any operation and maintenance plan for such controls;
- Access is available to the Site by NYSDEC and NYSDOH to evaluate continued maintenance of such controls; and
- Site usage is compliant with the environmental easement.

The signed certification will be included in the annual Site Management Report (see Section 30).

29.0 SITE INSPECTIONS

29.1 Inspection Frequency

All inspections will be conducted at the frequency specified in the schedules provided in the Monitoring Plan of the SMP. At a minimum, a Site-wide inspection will be conducted:

- Annually;
- When a breakdown of the treatment systems has occurred; and
- Whenever a severe condition has taken place, such as an erosion event or flooding that may affect the ECs.

29.2 Inspection Forms, Sampling Data, and Maintenance Reports

All inspections and monitoring events will be recorded on the appropriate forms for their respective system (refer to Appendices R [SSD systems], S [AS/SVE systems], and U [Monitoring Well Network]). Additionally, a general Site-wide inspection form will be completed during the Site-wide inspection (see Appendix W). These forms are subject to NYSDEC revision.

All applicable inspection forms and other records (including all sampling data of any media at the Site and system maintenance reports) generated for the Site during the calendar year will be included in the annual Site Management Report.

29.3 Evaluation of Records and Reporting

The results of the inspection and Site monitoring data will be evaluated as part of the EC/IC certification to confirm that the:

- EC/ICs are in place, are performing properly, and remain effective;

- The Monitoring Plan is being implemented;

- Operation and maintenance activities are being conducted properly; and, based on the above items,

- The remedy continues to be protective of public health and the environment and is performing as designed in the Final Remedial Action Work Plan (RAWP) and FER for the Site.

30.0 SITE MANAGEMENT REPORT

A Site Management Report will be prepared for the Site certification period that summarizes the results of the Monitoring Plan, inspections, and the project evaluation discussed in Section 29.3 above. The Site Management Report will be submitted annually following the calendar year reporting period, by March 1. Other activities such as groundwater and soil vapor monitoring reports will be submitted quarterly for the first year, and as determined by NYSDEC thereafter, with those results incorporated into the annual Site Management Report. The report will include:

- The EC/IC certification;
- All applicable inspection forms and other records generated for the Site during the calendar year;
- A summary of any discharge monitoring data and/or information generated during the calendar year with relevant comments and conclusions;
- As necessary, cumulative data summary tables and/or graphical representations of contaminants of concern which include a listing of all compounds analyzed along with the applicable standards, with any exceedance highlighted;
- Results of all analyses, copies of all laboratory data sheets, and the required laboratory data deliverables required for all points sampled during the calendar year (also to be submitted electronically in the NYSDEC-identified format);
- A summary of performance for all treatment systems at the Site during the calendar year, including information such as (when and where applicable):
    - The number of days the system was run for the reporting period;
    - The average, high, and low flows per day(on-site AS/SVE systems only);
    - The mass removed (on-site AS/SVE systems only);
    - A description of breakdowns and/or repairs along with an explanation for any significant downtime;
    - A summary of the performance and/or effectiveness monitoring; and
    - Comments, conclusions, and recommendations based on an evaluation and resolution of performance problems.

- A Site evaluation, which will address the following:
    - The compliance of the remedy with the requirements of the RAWP and FER for the Site;
    - The performance and effectiveness of the remedy;
    - The operation and the effectiveness of all treatment units, etc., including identification of any needed repairs or modifications;
    - Any new conclusions or observations regarding the Site contamination based on the inspections or data generated by the Monitoring Plan for the media being monitored; and
    - Recommendations regarding any necessary changes to the remedy and/or Monitoring Plan.
- A figure showing sampling and well locations, and significant analytical values at sampling locations; and
- Comments, conclusions, and recommendations, based on an evaluation of the information included in the report, regarding EC/ICs at the Site (to be prepared by a professional engineer licensed in the State of New York).

The Site Management Report will be submitted, in hard-copy format, to the document repositories for the Site (the Glendale Public Library, located at 78-60 73rd Place, Glendale, New York, and Region 2 NYSDEC offices, located at 41-40 21st Street, Long Island City, New York). Electronic format will be submitted to NYSDEC and NYSDOH, along with a hard copy.