WEST 17th STREET AND 10th AVENUE SITE

NEW YORK, NEW YORK

Final Engineering Report

NYSDEC BCP Number: C231040

Prepared for:

17th and 10th Associates LLC
c/o The Related Companies, L.P.
New York, NY 10022
FLS Project Number: 10022-004

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CERTIFICATIONS

I, Arnold Fleming, P.E., am currently a registered professional engineer licensed by the State of New York. I had primary direct responsibility for implementation of the remedial program for the 17th Street and 10th Avenue Site (NYSDEC BCA Index No. W2-1034-04-11 Site No. C231040).

I certify that the Site description presented in this FER is identical to the Site descriptions presented in the Environmental Easement, the Site Management Plan, and the Brownfield Cleanup Agreement for the 17th Street and 10th Avenue Site and related amendments.

I certify that the Remedial Action Work Plan (RAWP) dated November 2005, the approved Stipulations List dated April 2006, the RAWP Modification dated June 20, 2006, and the Operable Unit 2 (OU2) Oxygen Release Compound (ORC) Injection Work Plan dated January 2007 and approved by the NYSDEC were implemented and that all requirements in those documents have been substantively complied with.

I certify that the data submitted to the Department demonstrates that the remediation requirements set forth in the remedial work plan and any other relevant provisions of ECL 27-1419 have been or will be achieved in accordance with the time frames, if any, established in the work plan.

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

I certify that all use restrictions, Institutional Controls, Engineering Controls, and all operation and maintenance requirements applicable to the Site are contained in an Environmental Easement created and recorded pursuant ECL 71-3605 and that all affected local governments, as defined in ECL 71-3603, have been notified that such Easement has been recorded. A Site Management Plan has been submitted by the Applicant for the continual and proper operation, maintenance, and monitoring of all Engineering Controls employed at the Site, including the proper maintenance of all remaining monitoring wells, and that such plan has been approved by NYSDEC.

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

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

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

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

NYS Professional Engineer #	Date	Signature

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

Final Remedial Engineering Report

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LIST OF ACRONYMS

Acronym	Definition
FLS	Fleming-Lee Shue, Inc.
FER	Final Engineering Report
SMP	Site Management Plan
NYS	New York State
BCP	Brownfield Cleanup Program
NYSDEC	New York State Department of Environmental Conservation
BCA	Brownfield Cleanup Agreement
RAWP	Remedial Action Work Plan
COC	Certificate of Completion
ICs	Institutional Controls
ECs	Engineering Controls
NYCRR	New York City Rail Road
RI	Remedial Investigation
ftbg	feet-below grade
TAGM	Technical and Administrative Guidance Memorandum #4046
RSCOs	Recommended Soil Cleanup Objectives
TOGS	Technical & Operational Guidance Series
VOCs	Volatile organic compounds
SVOCs	Semi-volatile organic compounds
EPA	Environmental Protection Agency
TCL	Target Compound List
TICs	Tentatively identified compounds
ppm	parts per million
ppb	parts per billion
PCBs	Polychlorinated Biphenyls
TAL	Target Analyte List
BTEX	benzene, toluene, ethyl benzene, and xylene
PCE	tetrachloroethylene
PAHs	polycyclic aromatic hydrocarbons

MTBE	methyl-tert-butyl ether
USTs	underground storage tanks
ASTM	American Society of Testing and Materials
ID	Inner diameter
SS	Stainless steel
SSDS	active sub-slab depressurization system
NYSDOH	New York State Department of Health
O&M	Operation and Maintenance
SoMP	Soil Management Plan
HASP	Health and Safety Plan
CAMP	Community Air Monitoring Plan
EPA	Environmental Protection Agency
MSL	Mean Sea Level

Final Remedial Engineering Report

1.0 BACKGROUND

17th and 10th Associates LLC entered into a Brownfield Cleanup Agreement (BCA) with the New York State Department of Environmental Conservation (NYSDEC) in January 2005 to investigate and remediate a 1.213-acre property located in the borough of Manhattan, New York, New York. A mixed use with restricted residential development is proposed for the property. The site redevelopment has been completed and contains a 24-story commercial/residential building. Refer to the Brownfield Cleanup Program (BCP) application for additional details.

A digital copy of this FER with all project documents approved under the BCP is included in Appendix A.

1.1 SITE LOCATION AND DESCRIPTION

The site is located in the County of New York, New York City, New York and is identified as Block 714 and Lot 1 on the New York City Tax Map (the "Site"). A Site Location Map (Figure 1) shows the Site location. The Site is situated on an approximately 1.213-acre area bounded by West 17th Street to the north, West 16th Street to the south, residential buildings and a small playground of the New York City Housing Authority (NYCHA) Robert Fulton Houses to the east, and 10th Avenue to the west (see Figure 1). An elevated New York City Rail Road (NYCRR) (the former High Line Viaduct) crosses over the southwest corner of the Site. A five-story residential building with street-level retail is located on the northwest corner of this geographic area; however, this structure is not part of the Site. The location of the Site is shown in Figure 1. The boundary map included in the BCA as required by Environmental Conservation Law (ECL) Title 14 Section 27-1419 is included in Appendix B. The 1.213-acre property is fully described in Appendix C – Metes and Bounds. A global positioning system coordinate for the starting point is included.

1.2 CONTEMPLATED REDEVELOPMENT PLAN

The Remedial Action performed under the RAWP dated November 2005, the approved Stipulations List dated April 2006, the RAWP Modification dated June 20, 2006, and the Operable Unit 2 (OU2) Oxygen Release Compound (ORC) Injection Work Plan dated January 2007 has made the Site protective of human health and the environment to standards consistent with the contemplated end use. The redevelopment is complete and the end use is a 24-story residential building, constructed in 2007, which has a footprint of approximately 52,000-square feet and a below-grade basement parking and a health club, a first floor commercial retail plaza, and residential units of various sizes. The development plan has been designed to accommodate the restrictions regarding construction in the area of the NYCRR High Line Viaduct with the intention of providing a means of ingress/egress for public access to the structure, which, in the future, will become a public park. The redevelopment plan is depicted on Figure 2.

1.3 DESCRIPTION OF SURROUNDING PROPERTY

The High Line Viaduct crosses over the southwest corner of the Site. Easement rights and restrictions imposed by the zoning regulations are associated with the High Line Viaduct. Surrounding properties to the north are developed with residential buildings with street-level retail. Surrounding properties to the east are developed with residential buildings and a small playground, an amenity of the NYCHA projects, the Robert Fulton Houses. Surrounding properties to the south are developed with the Chelsea Market building, whose tenants include a variety of commercial retail businesses and upper level office space. Surrounding properties to the west are developed with a large office building, occupied by the United States Drug Enforcement Agency (DEA) and other government agencies.

1.3.1 Sensitive Receptors

As mentioned above, a small playground associated with the NYCHA Robert Fulton Houses exists to the east of the Site. Additionally, the High Line Viaduct has been identified by the City of New York Landmarks Preservation Commission as an eligible State/National Register Listing of Historic Places. However, the Site development has been designed so as to leave the elevated viaduct undisturbed by construction of the new residential structure.

2.0 DESCRIPTION OF REMEDIAL INVESTIGATION FINDINGS

The Site was investigated in accordance with the scope of work presented in the NYSDEC-approved Remedial Investigation (RI) Work Plan dated February 2005 and the Supplemental RI Work Plan dated May 2005. The investigation was conducted between May 2005 and March 2007. The RI Report was submitted to NYSDEC on August 26, 2005. A Supplemental Remedial Investigation (SRI) was conducted in 2007. The Site was declared not to be a significant threat Site by NYSDEC and New York State Department of Health (NYSDOH).

2.1 SUMMARY OF REMEDIAL INVESTIGATIONS PERFORMED

2.1.1 Borings and Wells

2005 Remedial Investigation (RI). The 2005 RI included a soil gas investigation, installation and sampling of soil borings, monitoring well installation, and groundwater sampling. Twenty-three soil borings were advanced to depths of approximately 20 feet below ground surface (bgs), and two soil samples were collected at each boring location. Eight monitoring wells were installed and groundwater samples were collected. Soil sampling, soil vapor and monitoring well locations are depicted on Figure 3.

2007 Supplemental Remedial Investigation. FLS also conducted a Supplemental RI in May 2007, which included the installation and soil and groundwater sampling of four off-site wells and the installation of one upgradient piezometer (see Figure 3).

2.1.2 Chemical Analytical Work Performed

The analytical parameters for soil, groundwater, and soil gas samples collected during the RI and SRI are provided below.

Soil. Each soil sample was analyzed for the following:

- Target Compound List (TCL) semi-volatile organic compounds (SVOCs) plus up to 20 tentatively identified compounds (TICs) by EPA Method 8270,
- TCL VOCs plus up to 10 TICs by EPA Method 8260,

- TAL Heavy Metals by EPA Method 6010,
- Mercury by EPA Method 7471,
- Pesticides by EPA Method 8081, and
- Polychlorinated Biphenyls (PCBs) by EPA Method 8082.

Groundwater. Each groundwater sample was analyzed for the following:

- TCL SVOCs by EPA Method 8270,
- TCL VOCs by EPA Method 8260,
- TAL Metals by EPA Method 6010,
- Mercury by EPA Method 7471,
- Pesticides by EPA Method 8081, and
- Polychlorinated Biphenyls (PCBs) by EPA Method 8082.

Soil gas. All soil gas samples were analyzed for VOCs using EPA Method TO-15.

2.1.3 Documentation

Sampling methodology, chains-of-custody, and laboratory analytical reports are contained in the RI and Supplemental RI Reports. Sample locations for the RI and SRI are depicted on Figure 3.

2.1.3 Summary of Remedial Investigation Findings

Soil sample results for the RI were compared to the NYSDEC Technical and Administrative Guidance Memorandum (TAGM) #4046 Recommended Soil Cleanup Objectives (RSCOs) and groundwater results were compared to the NYSDEC Division of Water Technical & Operational Guidance Series (TOGS) Ambient Water Quality Standards and Guidance Values (Class GA Groundwater Standards). A summary of the findings of the RI and SRI is provided below:

Soil

VOCs were detected in shallow and deep soil samples at concentrations above the Track 1 SCOs and included toluene, ethylbenzene, and total xylenes. Soil boring FLS-4 had the

highest soil total VOC concentration at 356,400 ppb at approximately 15.5 ft-bg. Soil VOC constituent exceedances in borings FLS-4 and FLS-15 immediately above and into the saturated zone at 13 ft-bg are consistent with constituents found in gasoline and are possibly associated with former USTs removed in 1991. Additional monitoring wells MW F-7 and MW F-8 were installed at these locations.

The highest total SVOC concentration in soil (21,681,000 ppb) was detected in a soil sample collected from 2 to 4 ft-bg in soil boring FLS-10 (FLS-10-2.2-SO). Many of the SVOCs detected at elevated levels were polycyclic aromatic hydrocarbons (PAHs), a class of compounds found in some petroleum, asphalt, and as byproducts of combustion. The type and levels of SVOCs are typical of urban fill material, which often contains asphalt and products of incomplete combustion of coal and wood, such as cinders, coal ash, etc. With the exception of the samples collected from borings FLS-2 and FLS-10, soil samples exhibiting elevated PAHs did not contain elevated levels of petroleum-fuel analytes such as naphthalene and 2-methylnaphthalene. Therefore, the elevated PAH levels indicate that the source was related to historic fill materials at the Site rather than to a petroleum-fuel release.

Elevated metals concentrations (relative to Eastern USA background) were detected in most of the soil samples. Metals detected included arsenic, barium, cadmium, calcium, lead, magnesium, mercury, nickel, and zinc in varying combinations. Calcium and magnesium are earth minerals, and are major components of cement found in concrete, the major fill material found in the subsurface at the Site. The presence of the metals may reflect the presence of onsite fill material or previous activities on the Site.

Table 1 shows exceedances above the 6 NYCRR Part 375-6.8 Track 1 Unrestricted SCOs for all soil/fill at the Site prior to the remedy. Figure 5 is a spider map that indicates the location(s) of and summarizes exceedances above Track 1 Unrestricted SCOs for all soil/fill prior to the remedy. Pre-remedy TAGM RSCO exceedances are also shown on Tables from the RI given in Appendix D.

Groundwater

2005 Remedial Investigation

Levels of VOCs above Class GA standards were detected in every well except MW F-5. VOCs with concentrations above the standards included benzene, toluene, ethylbenzene,

and total xylenes (BTEX) compounds and methyl tert-butyl ether (MTBE). The highest VOC concentrations were in well MW F-7, which corresponds to soil VOC contamination and visual observations of petroleum contamination at this location. Some VOC contamination may be due to contamination from off-Site sources to the east and north, as VOC exceedances were detected in upgradient wells MW F-1, MW F-2 and MW F-4.

SVOCs were prevalent in the groundwater in the southwestern portion of the Site (wells MW F-6, MW F-7 and MW F-8). SVOCs detected above the standards were dibenzofuran, 2-methylnaphthalene and naphthalene. SVOC exceedances were detected in well MW F-1 and are likely related to migration of contaminants from offsite sources to the north, and/or fuel oil contamination noted in the soil at boring FLS-1 approximately 100 feet to the east, and up-gradient of MW F-1.

All unfiltered groundwater samples contained metals concentrations above the Class GA groundwater standards. Iron, magnesium, manganese and sodium were detected in varying concentrations in all of the filtered groundwater samples. Mercury was detected in the groundwater above the standard in sample MW F-1.

2007 Supplemental Remedial Investigation

VOCs were detected in all five groundwater samples and in the field blank (FB-030107). VOCs detected above the Class GA Standards were benzene, cis-1,2-dichloroethene, ethylbenzene, and total xylenes. Cis-1,2-dichloroethene was detected at concentration ranging from 20 to 23 µg/L, above its Class GA Standard of 5µg/L in groundwater samples MWF-10, MWF-11 and duplicate MWF-11.

Petroleum-fuel related SVOCs (2-methylnaphthalene and naphthalene) were detected in two of the five groundwater samples. Naphthalene was detected in groundwater samples MWF-11 and duplicate MWF-11 above Class GA Standards, while 2-methylnaphthalene was detected in these samples at concentrations below Class GA Standards.

A pre-remedy groundwater summary table from the 2005 RI is included in Appendix D. A spider map that indicates the locations of and summarizes pre-remedial exceedances of GA groundwater standards is included as on Figure 6.

Soil Vapor

Laboratory analytical soil gas results indicated the presence of VOCs in all soil gas samples. The highest concentration of VOCs (703 parts per billion volume (ppbv)) was detected in soil-gas sample FLS-4. These results are possibly associated with the former USTs removed in 1991. PID readings in boring FLS-4 peaked at 1,684 parts per million (ppm) at a depth of 16 ft-bg. A pre-remedy soil gas analytical summary is included in Appendix D and depicted on Figure 7.

2.2 SIGNIFICANT THREAT

The NYSDEC and NYSDOH have determined that this Site does not pose a significant threat to human health and the environment. Notice of that determination has been provided for public review. The notice is included in Appendix F.

2.3 SITE HISTORY

Prior to 1865, the original Hudson River shoreline was close to the western boundary of the Site. The Site was filled sometime prior to 1865 and has since been developed with a variety of commercial, residential, and manufacturing uses.

According to a letter dated May 10, 1993 by Franklin Company Contractors (FCC), UST removals and closure assessments for six 550-gallon gasoline USTs associated with a former auto body shop were conducted in 1991 by FCC. Sidewall samples collected during the closure assessment indicated that petroleum impacts existed in the area around the USTs. As a result, a spill (NYSDEC Spill No. 92-06441) was assigned to the site. Subsequently, seven monitoring wells (MW-1 through MW-7) were installed in the vicinity of the former UST farm to delineate the petroleum impacted groundwater plume and to monitor for the presence of petroleum impacts and liquid phase hydrocarbons (LPH), which was detected in MW-2. An undated Well Closure Report by FCC reported the closure of MW-2 through MW-7 (MW-1 was assumed previously destroyed). Approximately 30 pounds of Oxygen Release Compound (ORC) was injected into each monitoring well prior to closure by grouting with bentonite. Spill No. 92-06441 was subsequently closed by the NYSDEC as detailed in a NYSDEC letter dated December 13, 2000.

A signed affidavit included in the May 10, 1993 letter report by Franklin stated that three additional 550-gallon USTs were removed from 108-110 10th Avenue in November 1993.

2.3.1 Past Uses and Ownership

- According to the findings of a Phase I Environmental Site Assessment (ESA) conducted by Langan Engineering in April 2004, various industrial businesses occupied the Site between 1920 and 2003. These historic uses, included automobile and truck repair shops, automobile parking, a freight terminal housing trucking and transportation companies, glass, dye, rubber and textile companies.

2.3.2 Phase I and Phase II Reports

2.3.2.1 Phase I ESA

The following environmental concerns were identified in the Langan 2004 Phase I ESA:

- A former auto repair and painting shop at 449 West 16th Street in the 1920's, which utilized six 550-gallon gasoline USTs;
- A former auto parking lot at 457 and 461 West 16th Street and 96-108 10th Avenue in the 1950's and 1960's, which utilized two 550-gallon gasoline USTs;
- A freight terminal at 448-454 West 17th Street from 1950 to 1985, which utilized one 550-gallon gasoline UST; and
- Miscellaneous uses such as repair shops, trucking and transportation companies, glass, dye, rubber and textile companies, and an art studio from the 1920's until 2003.

2.3.2.2 Phase II ESA

In the course of a limited Phase II ESA performed in 2004, Langan installed three soil borings (L1, L2, and L3) at the Site between February and March of 2004. Soil boring depths ranged from 53 to 81 ft-bg. No PID readings, visual contamination, or olfactory evidence of petroleum impacts were observed at borings L1 and L3; therefore, no further analysis was conducted. PID screening of boring L2 identified elevated levels of VOCs and, as a result, soil samples were collected and submitted for laboratory analyses. Elevated levels of benzene were detected at 10 to 12 ft-bg and elevated levels of

methylene chloride, toluene, ethylbenzene, xylenes, naphthalene and 2-methylnaphthalene were detected at 12 to 14 ft-bg.

Subsequently, L1 through L3 were converted to observation wells designated as L1(OW) through L3(OW). A groundwater sample was collected from L2 (OW) and submitted for analysis. The results indicated elevated levels of toluene, ethylbenzene, xylenes, cadmium, chromium, copper, lead and nickel.

2.3.3 Sanborn Maps

Sanborn fire insurance maps, included in the Langan Phase I ESA, indicated the presence of several past uses at the site, which may have been contributors to petroleum-related impacts to the soil and groundwater. These details are presented in Section 2.3.1.

All Sanborn maps available for the Site were reviewed prior to preparation of the RAWP.

2.4 GEOLOGICAL CONDITIONS

2.4.1 Geology

The following geologic data was obtained from the Preliminary Geotechnical Engineering Study (GES) by Langan dated March 26, 2004, the GES by Langan dated July 11, 2005, the Supplemental GES by Langan dated November 28, 2005, the RI Report by FLS dated August 2005, and the Supplemental RI Report by FLS dated October 2007.

The generalized subsurface profile consists of urban fill overlying sand, with bedrock at depths between 40 and 70 ft-bg. Descriptions of each soil stratum are given below.

Historic Fill

Historic fill material was encountered in all borings. The fill consists of brown and grey, coarse to fine sand, some silt, and gravel, brick, wood, and concrete fragments. Langan measured the fill thickness as ranging from approximately four to fourteen feet, consistent with the findings of the FLS 2005 RI.

Sand

Sand was encountered below the fill in each boring. The sand layer consisted of brown and reddish brown, coarse to fine sand with varying amounts of silt transitioning to coarse to fine sand and gravel over the bedrock surface. The thickness of the lower coarse to fine sand and gravelly sand is typically between 31 and 47 feet. The upper medium to fine sand extends typically to depths of about 20 ft-bg.

Bedrock

Bedrock was encountered in each boring below the sand. Bedrock consisted of moderately fractured, medium-hard mica schist and moderately fractured, hard pegmatite. Bedrock was found at depths ranging from about 21 to 77 ft-bg. Bedrock was found to be shallowest at the east end of the Site and slopes downward to the west toward the Hudson River.

Geological sections prepared by Langan are included in Appendix G.

2.4.2 Hydrogeology

The Site-specific hydrogeologic data was obtained from the GES by Langan dated July 11, 2005 and the RI Report by FLS dated 2005.

General Hydrology

Generally, net groundwater flow is to the west, towards the Hudson River, as shown on Figure 4. A groundwater depression around well MW F-8 detected during the 2005 RI likely influenced groundwater in the western portion of the Site causing localized southerly flow towards well MW F-8. Potential explanations for the change in flow direction may include: off-Site pumping by a large car wash facility at the corner of 10th Avenue and West 15th Street (which may have a shallow supply well); the potential presence of former river deposits to the west of the Site (river deposits tend to have low conductivity and may act as a barrier to groundwater flow); and/or a broken sewer line below 16th Street, accepting local groundwater into the combined sewer.

During the Supplemental Remedial Investigation, measurements indicated that groundwater flows to the southwest towards 10th Avenue and the Hudson River, as

shown on Figure 4A. The groundwater gradient at the site was measured as approximately 0.03 ft/ft.

Groundwater contours developed from data collected on July 13, 2005 are depicted on a groundwater flow map included as Figure 4.

Site Groundwater Elevations

The groundwater table was measured at approximately 11 to 15 ft-bg during the FLS RI activities. The groundwater elevations ranged from approximately -7.5 to -2 ft-mean sea level (msl).

Surface Water

No surface water bodies exist on the Site. The closest surface water body is the Hudson River, located approximately 700 feet west of the Site.

2.5 CONTAMINATION CONDITIONS

2.5.1 Conceptual Model of Site Contamination

VOC-related petroleum impacts to the soil were generally widespread throughout the Site at depths ranging from 1.5 to 15.5 ft-bg. This stratum is inclusive of a historic fill layer, which exists at depths of 4 to 14 ft-bg. However, based on the type and extent of petroleum-related contamination, these impacts were likely largely due to historic operations at the Site rather than in the presence of the historic fill. Additionally, petroleum impacts to the groundwater were generally widespread throughout the Site. Details are presented in the following sections.

2.5.2 Description of Areas of Concern

As mentioned in Section 2.3.1, past uses of the property included the utilization of gasoline USTs, the approximate former locations of which are depicted on Figure 8. As mentioned in Section 2.4.1, historic fill material has been encountered throughout the site at thicknesses ranging from 4 to 14 feet.

The RI results indicated that VOC-related petroleum impacts to soil, groundwater, and soil gas were generally widespread across the site. Petroleum impacts to the soil have been detected from approximately 1.5 to 15.5 ft-bg. Specifically, elevated VOC

concentrations (exceeding RSCOs and/or Track 1 SCOs) were detected in soil gas in all soil gas sampling points, in soil at sample locations FLS-2, 4, 12A, 15, and 16, and in groundwater in all monitoring wells except for MW F-5 and MW F-9, both located on the outer boundaries of the property. Elevated SVOC concentrations were detected in soil samples from all soil borings except for FLS-1 through FLS-3 and FLS-7 and FLS-8; and in groundwater samples from MW F-6 through MW F-8. Elevated dissolved metals concentrations were detected in groundwater samples collected from MW F-11 and MW F-12. Elevated VOC concentrations were also detected in soil gas collected from soil gas sampling points across the Site.

2.5.3 Identification of Standards, Criteria and Guidance

The original Track 1 SCOs for the Site were the TAGM RSCOs. However, during remedy implementation, it became apparent that these SCOs could not be achieved due to the following:

1) **Safety considerations which impacted construction methods**, specifically, the fact that sheeting could not be driven adjacent to the existing structures (the buildings located at the northwest and southeast corners of the Site) without compromising the structural integrity of the building foundations and, the inability to drive sheeting adjacent to or under the High Line because of headroom clearance limitations. As a result, the RAWP was modified in June 2006 and the site was sheeted using shoulder beams and lagging, with underpinning of the adjacent structures.

2) **The inability to attain and maintain compliance with Class GA groundwater standards and achieve Track 1 for groundwater in OU-1 and OU-2.** The above change in sheeting method (i.e., the inability to use tight sheeting) and the inability to isolate groundwater along the southeast side of the site (where underpinning of an adjacent building occurred) resulted in the potential for groundwater contaminants from offsite to re-enter the Site, precluding a Track 1 cleanup for groundwater in OU-1. The inability to place sheeting along the 10th avenue side of the Site (west of OU-2) prevented treatment of the OU-2 groundwater and achievement of the groundwater standards in this portion of the Site.

3) **The presence of petroleum-impacted groundwater and the urban fill in OU-2.** Soil excavation in OU2 was restricted by conditions in the Zoning Resolution that limit construction activities within 25 feet of the High Line. Prior to construction, it was

discovered that the High Line was supported by piles, rather than spread footings. As a result, the piles were sheeted and soil was excavated to the foot of the High Line Supports. While this enabled removal of significantly more source material, petroleum-contaminated soils remain in this area below the foot of the High Line Supports, precluding a Track 1 remedy for OU-2.

Based on the above considerations, alternate Track 4 SCOs were developed for the site in consultation with NYSDEC. These Track 4 SCOs are the Site-specific Soil Action Levels (SSSALs) provided in Table 4.

2.5.4 Soil/Fill Contamination

Prior to remediation, historic fill material was encountered throughout the site at thicknesses ranging from 4 to 14 feet. Petroleum impacts to the soil were detected from approximately 1.5 to 15.5 ft bg and, due to the nature and extent of the impacts, appear related to historic operations at the Site rather than to the presence of historic fill. These contaminants include petroleum-related VOCs and SVOCs.

2.5.4.1 Description of Soil/Fill Contamination

Soil laboratory analytical results from the RI indicated the presence of VOCs, SVOCs (including PAHs), and metals at concentrations exceeding the RSCOs and/or the Track 1 SCOs at depths of approximately 1.5 to 15.5 ft-bg.

2.5.4.2 Comparison of Soil/Fill with SCGs

Track 1 exceedances for VOCs were detected in soil samples from borings FLS-2, FLS-4, FLS-12, FLS-15, and FLS-16 and included acetone, toluene, ethylbenzene, total xylenes, and tetrachloroethylene (PCE). These impacts are consistent with the presence of gasoline, which was historically stored onsite in USTs, and/or solvents. Track 1 exceedances for SVOCs were detected in MW F-1, MW F-2, MW F-3, FLS-4, FLS-6, FLS-10, FLS-11, FLS-12, FLS-12A, FLS-13, FLS-14, and FLS-16 and included acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, bibenzofuran, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene. Track 1 exceedances for metals were detected in soil samples collected from FLS-1 through FLS-6, FLS-8, FLS-10 through FLS-15, MW F-1, MW F-4, and MW F-5 and included arsenic, barium, cadmium, chromium, copper, lead,

manganese, mercury, nickel, silver, and zinc. Track 1 exceedances for pesticides were detected in soil samples collected from MW F-4, FLS-8, and FLS-13 and included Dichlorodiphenyldichloroethane (4,4-DDD), 1,1'-(dichloroethenylidene)bis[4-chlorobenzene] (4,4-DDE), and Dichlorodiphenyltrichloroethane (4,4-DDT).

SSSAL exceedances for VOCs were detected in soil samples from boring FLS-4 and ethylbenzene and total xylene. SSSAL exceedances for SVOCs were detected in soil samples collected from MW F-1, MW F-2, MW F-3, FLS-4, FLS-6, FLS-10, FLS-11, FLS-12, FLS-12A, FLS-13, FLS-14, and FLS-16 and included acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, bibenzofuran, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene. SSSAL exceedances for metals were detected in soil samples collected from MW F-2 through MW F-6, FLS-3, FLS-6, FLS-8, FLS-10, FLS-11, FLS-12, and FLS-16 and included arsenic, barium, lead, mercury, and silver. No SSSAL exceedances were detected for pesticides.

Table 1 shows exceedances from Track 1 Unrestricted SCOs dated May 10, 2006 for RI soil samples collected from soil/fill at the Site. Figure 5 is a spider map that shows the location and summarizes exceedances from Track 1 Unrestricted SCOs for all soil/fill.

2.5.5 On-Site and Off-Site Groundwater Contamination

As mentioned in Section 2.1.3, RI results indicated that petroleum impacts to the groundwater were generally widespread across the Site. Off-Site impacts to the groundwater exist as evidenced by sampling results from MW F-9 and MW F-12. Details are presented in the following sections.

2.5.5.1 Description of Groundwater Contamination

As detailed in Section 2.3, groundwater impacts, including the presence of non-aqueous phase liquid (NAPL), were previously detected by Franklin in seven monitoring wells (MW-1 through MW-7) located in the vicinity of the six former 550-gallon gasoline USTs. According to FCC, the petroleum impacted groundwater was remediated, the monitoring wells were closed in place, and the associated Spill Number (92-06441) was closed by the NYSDEC.

However, during RI activities, elevated VOC concentrations in the groundwater were detected in all monitoring wells except for MW F-5 and MW F-9, which were both located on the outer boundaries of the property. Elevated SVOC concentrations were detected in groundwater samples in MW F-6 through MW F-8. Elevated dissolved metals concentrations were detected in groundwater samples collected from MW F-11 and MW F-12. All monitoring wells contained screening intervals of approximately 10 to 20 ft-bg, which represented the groundwater stratum tested. It should be noted that MW F-9 through MW F-12 were located offsite in the adjacent sidewalk, due to the ongoing development of the property. The data obtained from MW F-9 through MW F-12 was generally considered congruent with onsite groundwater conditions since the monitoring wells were installed downgradient of the Site.

2.5.5.2 Comparison of Groundwater with SCGs

The Class GA standards were utilized as a remediation goal for the groundwater on-Site. Several Class GA exceedances were noted in samples collected from MW F-1 through MW F-12 during the RI activities; specifically for benzene, ethylbenzene, and total xylenes, which are typically gasoline or solvent constituents, cis-1,2-dichloroethene, which is typically utilized as a solvent, and naphthalene, iron, magnesium, and manganese, which may have been present due to incomplete combustion components, which likely existed in the historic urban fill at the site.

As mentioned in Section 2.3.1, past uses of the site have included dye, rubber, and textile manufacturing, which may have utilized benzene, ethylbenzene, and total xylenes, which are all precursors in the associated production processes and, additionally, may have been used as solvents. Additionally, the presence of these compounds may be due to historic petroleum storage operations.

A table that indicates exceedances of Class GA standards in monitor wells prior to the remedy is given in Appendix D. A spider map that indicates the locations of and summarizes exceedances above Class GA standards prior to the remedy is shown in Figure 6.

2.5.6 On-Site and Off-Site Soil Vapor Contamination

2.5.6.1 Description of On-Site and Off-Site Soil Vapor Contamination

On-site. As detailed in Section 2.1.1.1, as part of the 2005 RI, twenty-four temporary soil gas sampling points (FLS 1-A through FLS 6-D) were installed to an approximate depth of 5 ft-bg and used to measure VOCs in the soil gas with a PID and by laboratory analysis. VOCs were detected in every soil gas sampling point and the highest total VOC concentration was detected in FLS-4 at 703 parts per billion volume (ppbv).[pa]. VOCs detected included benzene, total xylenes, tetrachloroethene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, and chloroform. PID readings in FLS-4 peaked at 1,684 parts per million (ppm) at a depth of 16 ft-bg.

A soil gas analytical summary is included in Appendix D and depicted on Figure 7.

Off Site. Indoor air samples were collected within the 5-story Off-Site Building (OB) located in the northwest corner of the Site in accordance with the FLS Modification to RAWP dated June 20, 2006 and the subsequent NYSDEC approval letter dated July 7, 2006 to address concerns regarding potential migration of VOCs from a nearby manufactured gas plant during construction dewatering. Eight-hour time-weighted indoor air samples were collected using Summa canisters and shipped under chain-of-custody (COC) procedures for analysis by EPA T0-15 for VOCs. Additionally, Gastech colorimetric tubes were utilized to immediately determine if elevated levels of VOCs existed. Two rounds of baseline samples (prior to dewatering) and four rounds of monthly samples during the dewatering period (August – December 2006) were collected. An additional round of samples was collected in January 2007 following the end of dewatering activities.

Indoor air sample results were compared to the NYSDOH indoor background concentrations; specifically, the *NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York* dated October 2006, Table C.4 for Indoor Air. Some exceedances of these background concentrations were noted for dichlorodifluoromethane, hexane, 1,2,4-trimethylbenzene, and toluene. However, the concentrations of these constituents were also noted in the baseline samples collected prior to dewatering and did not increase significantly during dewatering activities.

The sampling also indicated increasing concentrations of trichloroethylene (TCE). Based on observations made during the sampling events, these concentrations are associated with routine building maintenance and the presence of cleaning materials in the basement which were not present during the initial baseline sampling, but were noted during the later sampling events. This conclusion is supported by a review of groundwater data for the site which indicates that TCE was not detected in MW-12, the closest well to the OB, and was either not detected or detected at extremely low levels in other on- and offsite wells.All colorimetric tube benzene measurements were below detection limits.

Laboratory analytical reports are included in Appendix Z and are summarized in Table 16.

2.5.6.2 Comparison of Soil Vapor with SCGs

There are currently no established SCGs for soil vapor. Pre-remedial soil vapor analytical results obtained during the 2005 RI were compared to the indoor-air background concentrations in Table C3 - Control Home Database from the New York State Department of Health (NYSDOH) *Guidance for Evaluating Soil Vapor Intrusion in the State of New York* dated October 2006. Exceedances of these background concentrations were noted for all detected VOCs (benzene, total xylenes, tetrachloroethene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, and chloroform).

A table of soil vapor data collected prior to the remedy is given in Appendix D. A spider map that indicates the location(s) of and summarizes soil vapor data prior to the remedy is shown in Figure 7.

2.6 ENVIRONMENTAL AND PUBLIC HEALTH ASSESSMENTS

2.6.1 Qualitative Human Health Exposure Assessment

No existing exposure pathways existed prior to or following development. Potential exposure was limited to construction and utility workers exposed to contaminated soil and groundwater via inhalation and dermal contact. These exposures were limited to the construction phase of the redevelopment activities. Implementation of a site-specific Health and Safety Plan (HASP), included in the RAWP, mitigated construction-related exposure toimpacted environmental media. In addition to the HASP, which outlined procedures to monitor worker exposure, a Community Air Monitoring Plan (CAMP), including monitoring of dust and airborne contaminants at the Site boundaries, was

implemented to monitor any potential offsite exposures.

2.6.2 Fish & Wildlife Remedial Impact Analysis

In accordance with NYSDEC Division of Environmental Remediation (DER) Draft DER-10 Technical Guidance for Site Investigation and Remediation Dated December 25, 2002, a Fish & Wildlife Remedial Impact Analysis (FWRIA) was not required for the Site.

2.7 INTERIM REMEDIAL ACTION

As described in Section 2.3, approximately 30 pounds of ORC was injected into wells MW-2 through MW-7 by Franklin prior to closure by grouting with bentonite. Available reports indicate that some active NAPL recovery may have been conducted by FCC in MW-2. Based on the available information, these activities were conducted in the early 1990s, prior to the entry of the Site into the BCP.

2.8 REMEDIAL ACTION OBJECTIVES

Based on the results of the Remedial Investigation, the following Remedial Action Objectives (RAOs) have been identified for this Site.

2.8.1 Groundwater RAOs

RAOs for Public Health Protection

- Prevent ingestion of groundwater containing contaminant levels exceeding drinking water standards.
- Prevent contact with, or inhalation of, volatiles emanating from contaminated groundwater.

RAOs for Environmental Protection

- Restore ground water aquifer, to the extent practicable, to pre-disposal/pre-release conditions.
- Prevent the discharge of contaminants to surface water.
- Remove the source of ground or surface water contamination.

2.8.2 Soil RAOs

RAOs for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation of, or exposure to, contaminants volatilizing from contaminated soil.

RAOs for Environmental Protection

- Prevent migration of contaminants that would result in groundwater or surface water contamination.
- Prevent impacts to biota due to ingestion/direct contact with contaminated soil that would cause toxicity or bioaccumulation through the terrestrial food chain.

3.0 DESCRIPTION OF APPROVED REMEDIAL ACTION PLAN

The Site was remediated in accordance with the scope of work presented in the NYSDEC-approved Remedial Action Work Plan (RAWP) dated November 2005, the approved Stipulations List dated April 2006, the RAWP Modification dated June 20 2006, and the ORC Injection Work Plan dated January 2007.

The factors considered during the analysis of remedial alternatives included:

Protection of human health and the environment;

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

Short-term effectiveness and impacts;

Long-term effectiveness and permanence;

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

Implementability;

Cost effectiveness;

Community Acceptance; and

Land use.

The following criterion was utilized during the remediation:

- 6 NYCRR Part 375-6 Soil Cleanup Objectives
- New York State Groundwater Quality Standards – 6 NYCRR Part 703;
- NYSDEC Ambient Water Quality Standards and Guidance Values Class GA Standards – TOGS 1.1.1;
- NYSDEC Draft DER-10 Technical Guidance for Site Investigation and Remediation - December 2002;
- NYSDEC Draft Brownfield Cleanup Program Guide – May 2004;
- New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan
- NYS Waste Transporter Permits – 6 NYCRR Part 364; and
- NYS Solid Waste Management Requirements – 6 NYCRR Part 360 and Part 364;

3.1 SUMMARY OF PROPOSED REMEDIAL ACTION

For purposes of remediation, the site was divided into two operable units (OUs). OU1 is the eastern portion of the Site, which is now fully occupied by the residential building. OU2 is the High Line area that extends along 10th Avenue and the western portion of 16th Street. OU2 will be completely occupied by commercial/retail space.

Below is a description of the proposed Remedial Actions required by the NYSDEC-approved Remedial Action Work Plan.

1. Excavation of soil/fill from OU1 exceeding Track 1 SCOs listed in Table 2 and excavation of the top 1' of soil from OU2 . Soil excavation depth in OU-1 ranged from 13 feet to 14.5 feet throughout most of OU-1, with depth extending to 18 feet in the northern portion of OU-1. The original Track 1 SCOs

referenced in the RAWP were the TAGM RSCOs. Alternate Track 4 SCOs were developed for the site in conjunction with NYSDEC, based on the limitations on excavating below the High Line supports in OU2, and safety considerations which precluded the use of tight sheeting in OU1.

2. Removal of three (3) 550-gallon underground storage tanks (USTs) from the southern portion of the Site and one (1) 2,000-gallon UST from the northern portion of the Site. Approximately 1,176 gallons of #2 fuel oil was removed from the 2,000-gallon UST. All tanks were cleaned and removed intact by a certified tank removal contractor. UST removal certifications are included in Appendix U.

3. Installation and maintenance of a Preprufe® vapor membrane beneath OU1 and OU2 to prevent human exposure to potential soil vapor intrusion ;

4. Construction of an engineered composite cover system consisting of the building's concrete foundation in OU-1 and a concrete slab in OU-2 to prevent human exposure to residual contaminated soil/fill remaining under the Site;

5. Implementation of a Citizen Participation Plan, including establishment of a document repository and fact sheet mailings to keep the public informed regarding remedial activities;

6. Implementation of a Health and Safety Plan (HASP) and Community Air Monitoring Plan (CAMP) during all remedial activities to address exposure of workers and the public to potential airborne contaminants; air monitoring for particulates and VOCs was conducted in the worker breathing zone and on a continuous basis at upwind and downwind monitoring stations and along the Site boundaries;

7. Recording of an Environmental Easement to prevent future exposure to any residual contamination remaining at the Site (a copy of the Environmental Easement is provided in Appendix B).

8. Oxygen-Release Compound (ORC) injection program in OU2, including post-remedial groundwater monitoring for VOCs, SVOCs and Monitored Natural Attenuation (MNA) parameters to evaluate the effectiveness of the ORC; groundwater monitoring for Monitored Natural Attenuation will be performed under the Site Management Plan;

9. Installation and operation of a sub-slab depressurization system (SSDS) in OU2;

10. Maintenance of positive pressure in occupied areas of the subgrade ;

11. A Site Management Plan for long term management of residual contamination as required by the Part 375 Regulations to be included as part of the Environmental Easement, which includes plans for: (1) Institutional and Engineering Controls, (2) monitoring, (3) operation and maintenance and (4) reporting;

12. Screening for indications of contamination (by visual means, odor, and monitoring with PID) of all excavated soil during all intrusive site work to facilitate removal and appropriate disposal of contaminated material;

13. Construction dewatering of OU1 with groundwater treatment prior to discharge to the New York City sewer system as per a NYCDEP Permit to Discharge;

14. Collection and analysis of end-point samples to evaluate the performance of the remedy with respect to attaining Track 4 SSSALs.

15. Appropriate off-Site disposal of all material removed from the Site in accordance with all Federal, State and local rules and regulations for handling, transport, and disposal;

16. All responsibilities associated with the Remedial Action, including permitting requirements and pretreatment requirements, addressed in accordance with all applicable Federal, State and local rules and regulations.

17. Preparation of a Final Engineering Report (FER) which describes the remedial activities, certifies that the remedial requirements have or will be achieved,

defines the Site boundaries, and describes any institutional or engineering controls to be implemented at the Site.

4.0 DESCRIPTION OF REMEDIAL ACTIONS PERFORMED

Remedial activities completed at the Site were conducted in accordance with the NYSDEC-approved RAWP for the West 17th Street and 10th Avenue Site (November 2005), the approved Stipulations List (April 2006), the Remedial Action Work Plan Modification dated June 12, 2006, and the OU2 ORC Injection Work Plan (January 2007). The approved RAWP is included in Appendix I; this is the digital file of the RAWP. All deviations from the RAWP are noted below.

The original Track 1 SCOs for the Site were the TAGM RSCOs. However, during remedy implementation, it became apparent that these SCOs could not be achieved due to the following:

1) **Safety considerations which impacted construction methods**, specifically, the fact that sheeting could not be driven adjacent to the existing structures (the buildings located at the northwest and southeast corners of the Site without compromising the structural integrity of the building foundations and, the inability to drive sheeting adjacent to or under the High Line because of headroom clearance limitations. As a result, the RAWP was modified in June 2006 and the site was sheeted using shoulder beams and lagging, with underpinning of the adjacent structures.

2) **The inability to attain and maintain compliance with Class GA groundwater standards and achieve Track 1 for groundwater in OU-1 and OU-2.** The above change in sheeting method (i.e., the inability to use tight sheeting) and the inability to isolate groundwater along the southeast side of the site (where underpinning of an adjacent building occurred) resulted in the potential for groundwater contaminants from offsite to re-enter the Site, precluding a Track 1 cleanup for groundwater in OU-1. The inability to place sheeting along the 10th avenue side of the Site (west of OU-2) prevented treatment of the OU-2 groundwater and achievement of groundwater standards in this portion of the Site.

3) **The presence of petroleum-impacted groundwater and the urban fill in OU-2.** Soil excavation in OU2 was restricted by conditions in the Zoning Resolution that limit construction activities within 25 feet of the High Line. Prior to construction, it was discovered that the High Line was supported by piles, rather than spread footings. As a result, the piles were sheeted and soil was excavated to the foot of the High Line Supports. While this enabled removal of significantly more source material, petroleum-

contaminated soils remain in this area below the foot of the High Line Supports, precluding a Track 1 remedy for OU-2.

Based on the above considerations, alternate Track 4 SSSALss were developed for the site in consultation with NYSDEC. These Track 4 SSSALs are provided below. The Track 4 SSSALs for individual constituents are contained in Table 4.

Contaminant	**SSSAL**
Individual volatile organic compounds	Part 375 Track 2 Restricted Residential Soil Cleanup Objectives
Individual semi-volatile organic compounds (excluding polycyclic aromatic hydrocarbons)	Part 375 Track 2 Restricted Residential Soil Cleanup Objectives
Total semi-volatile organic compounds (including polycyclic aromatic hydrocarbons)	200 ppm
Metals	Part 375 Track 2 Restricted Residential Soil Cleanup Levels

4.1 GOVERNING DOCUMENTS

4.1.1 Site Specific Health & Safety Plan (HASP)

All remedial work performed under this Remedial Action was in full compliance with governmental requirements, including Site and worker safety requirements mandated by Federal OSHA.

All remedial and invasive work performed at the Site was in full compliance with the Health and Safety Plan (HASP). The HASP outlines the procedures to be followed to protect onsite personnel and others during all remedial activities at the Site and was prepared in conformance with the Occupational Safety and Health Administration (OSHA) standards and other applicable regulations governing Site remediation and construction, and procedures regarding health and safety. The Site Safety Coordinator was David Blitzer of FLS. A resume is included in Appendix J.

4.1.2 Quality Assurance Project Plan (QAPP)

The Quality Assurance Project Plan (QAPP), which was included as an attachment to the RAWP, governed sampling and analytical methods for end-point sampling. The QAPP

outlines the procedures and protocols to be followed during all remedial investigation and remedial action activities at the Site. The QAPP was prepared to ensure quality assurance (QA) and quality control (QC) for all sampling and data acquisition conducted under the RIWP and RAWP.

4.1.3 Construction Quality Assurance Plan (CQAP)

The Construction Quality Assurance Plan (CQAP) managed performance of the Remedial Action tasks through designed and documented QA/QC methodologies applied in the field and in the lab. The CQAP provided a detailed description of the observation and testing activities that were used to monitor construction quality and confirm that remedy construction was in conformance with the remediation objectives and specifications. The CQAP described:

- Responsibilities of FLS key personnel involved in the project.
- The observations and tests that were used to monitor construction and the frequency of performance of such activities.
- The sampling activities, sample size, sample locations, frequency of testing, acceptance and rejection criteria, and plans for implementing corrective measures as addressed in the plans and specifications.
- Requirements for project coordination meetings between the Applicant and its representatives, the Construction Manager, Excavation Contractor, remedial or environmental subcontractors, and other involved parties.
- Description of the reporting requirements for quality assurance activities including such items as daily summary reports, schedule of data submissions, inspection data sheets, problem identification and corrective measures reports, evaluation reports, acceptance reports, and final documentation.
- Description of the final documentation retention provisions.

4.1.4 Soil/Materials Management Plan (SoMP)

The Soil Management Plan (SoMP) provided detailed plans for managing all soils/materials that were disturbed at the Site, including excavation, handling, storage,

transport and disposal. It also included all of the controls that were applied to these efforts to assure effective, nuisance free performance in compliance with all applicable Federal, State and local laws and regulations. These controls included management of vehicles coming onto the Site to prevent queuing, screening and manifesting all soils leaving the Site. Although stockpiling was limited, any stockpiled materials were staged on plastic and covered prior to removal from the Site.

4.1.5 Storm-Water Pollution Prevention Plan (SWPPP)

This document addressed requirements of New York State Storm-Water Management Regulations including physical methods to control and/or divert surface water flows and to limit the potential for erosion and migration of Site soils, via wind or water.

The erosion and sediment controls for all remedial construction were performed in conformance with requirements presented in the New York State Guidelines for Urban Erosion and Sediment Control.

A Sediment and Erosion Control Plan (SECP) dated March 2006 was developed for the site and was utilized during the pre-construction, construction, post-construction phases of the project to control sediment from entering stormwater runoff leaving the site.

4.1.6 Community Air Monitoring Plan (CAMP)

The Community Air Monitoring Plan dated March 2006 was designed to protect off-site receptors, including residences and businesses, and on-site workers not directly involved with the subject work activities. Air monitoring for particulates and VOCs was conducted on a continuous basis at upwind and downwind stations and along the Site boundaries. Upwind and downwind locations were established based on prevailing wind direction and background was established on a daily basis. No exceedances of the CAMP action levels were noted during the duration of the remedial activities.

4.1.7 Contractors Site Operations Plan (SOP)

The Remediation Engineer reviewed all plans and submittals for this remedial project (i.e. those listed above plus contractor and sub-contractor document submittals) and confirmed that they were in compliance with the RAWP. The Remediation Engineer ensured that all documents submitted for this remedial project after the RAWP were

approved, including contractor and sub-contractor document submittals, were in compliance with the RAWP. All remedial documents were submitted to NYSDEC and NYSDOH in a timely manner and prior to the start of work.

4.1.8 Citizen Participation Plan

A certification of mailing dated May 10, 2006 was sent by the Volunteer's agent (FLS) to the NYSDEC project manager following the distribution of all remaining Fact Sheets and notices that includes: (1) certification that the Fact Sheets were mailed; (2) the date they were mailed; (3) a copy of the Fact Sheet; and (4) a list of recipients (contact list).

No changes were made to approved Fact Sheets authorized for release by NYSDEC without written consent of the NYSDEC.

The approved Citizen Participation Plan for this project is attached in Appendix K.

Document repositories have been established at the following locations for the duration of the project and contain all applicable project documents:

New York Public Library
Muhlenberg Branch
209 West 23rd Street
New York, NY 10011
(212) 924-1585

Hours:

Mon	Tue	Wed	Thu	Fri	Sat	Sun
10-6	12-8	10-6	12-8	10-6	10-5	—

4.2 REMEDIAL PROGRAM ELEMENTS

Remediation of OU1 consisted of excavation of contaminated fill and petroleum-impacted soils; construction and maintenance of an engineered composite cover including a vapor barrier and a cap consisting of the building's concrete foundation, with continued maintenance of the cap; an environmental easement to prevent future exposure to any residual contamination remaining at the Site. Groundwater was remediated via construction dewatering and treated to meet NYCDEP Sewer Discharge limits prior to

discharge into the sewer system.

Remediation of OU2 included: excavation of the top 1' of surface materials; installation of a vapor barrier; capping the area with asphalt and/or cement, with continued maintenance of the cap; treatment of groundwater and subsurface soils via enhanced biodegradation using ORC®; installation of a sub-slab depressurization system; an environmental easement to prevent future exposure to residual contamination; and post-remediation groundwater monitoring downgradient of OU-1, including monitoring for MNA parameters.

The remedial program included the following elements:

1. Excavation of soil/fill from OU1 exceeding Track 4 SSSALs listed in Table 4 and excavation of the top 1' of soil from OU2 . Soil excavation depth in OU-1 ranged from 13 feet to 14.5 feet throughout most of OU-1, with depth extending to 18 feet in the northern portion of OU-1. Alternate Track 4 SCOs were developed for the site in conjunction with NYSDEC, based on the limitations on excavating below the High Line supports in OU2, and safety considerations which precluded the use of tight sheeting in OU1.

2. Removal of three (3) 550-gallon underground storage tanks (USTs) from the southern portion of the Site and one (1) 2,000-gallon UST from the northern portion of the Site. Approximately 1,176 gallons of #2 fuel oil was removed from the 2,000-gallon UST. All tanks were cleaned and removed intact by a certified tank removal contractor. UST removal certifications are included in Appendix V.

3. Installation and maintenance of a Preprufe® vapor membrane beneath OU1 and OU2 to prevent human exposure to potential soil vapor intrusion ;

4. Construction of an engineered composite coverconsisting of the building's concrete foundation under OU-1 and a concrete slab in OU-2 to prevent human exposure to residual contaminated soil/fill remaining under the Site;

5. Implementation of a Citizen Participation Plan, including establishment of a document repository and fact sheet mailings to keep the public informed regarding remedial activities;

6. Implementation of a Health and Safety Plan (HASP) and Community Air Monitoring Plan (CAMP) during all remedial activities to address exposure of workers and the public to potential airborne contaminants; air monitoring for particulates and VOCs was conducted in the worker breathing zone and on a continuous basis at upwind and downwind monitoring stations and along the Site boundaries;

7. Recording of an Environmental Easement to prevent future exposure to any residual contamination remaining at the Site (a copy of the Environmental Easement is provided in Appendix B).

8. Oxygen-Release Compound (ORC) injection program in OU2, including post-remedial groundwater monitoring for VOCs, SVOCs and Monitored Natural Attenuation (MNA) parameters to evaluate the effectiveness of the ORC; groundwater monitoring for Monitored Natural Attenuation will be performed under the Site Management Plan;

9. Installation and operation of a sub-slab depressurization system (SSDS) in OU2;

10. Maintenance of positive pressure in occupied areas of the subgrade level

11. A Site Management Plan for long term management of residual contamination as required by the Part 375 Regulations to be included as part of the Environmental Easement, which includes plans for: (1) Institutional and Engineering Controls, (2) monitoring, (3) operation and maintenance and (4) reporting;

12. Screening for indications of contamination (by visual means, odor, and monitoring with PID) of all excavated soil during all intrusive site work to facilitate removal and appropriate disposal of contaminated material;

13. Construction dewatering of OU1 with groundwater treatment prior to discharge to the New York City sewer system as per a NYCDEP Permit to Discharge;

14. Collection and analysis of end-point samples to evaluate the performance of the remedy with respect to attaining Track 4 SSSALs.

15. Appropriate off-Site disposal of all material removed from the Site in accordance with all Federal, State and local rules and regulations for handling, transport, and disposal;

16. All responsibilities associated with the Remedial Action, including permitting requirements and pretreatment requirements, addressed in accordance with all applicable Federal, State and local rules and regulations.

17. Preparation of a Final Engineering Report (FER) which describes the remedial activities, certifies that the remedial requirements have or will be achieved, defines the Site boundaries, and describes any institutional or engineering controls to be implemented at the Site.

4.2.1 Involved Parties

Demolition activities were performed by The Bedroc Group. Excavation activities were performed by Urban Construction. The dewatering system was designed, installed, and operated by Moretrench, Inc. Plaza Construction Corporation was the general construction contractor. Uptown Security Co. was the security contractor. Environmental consultant activities were performed by FLS.

The Remedial Engineer is Arnold F. Fleming, P.E..

4.2.2 Site Preparation

FLS mobilized to the site on May 11, 2006 and began CAMP activities. A calibrated DustTrak Model 8520 particle monitor and a calibrated MiniRAE 2000 VOC Monitor were placed in both upwind and downwind locations on site for the entirety of the project and continuously monitored as required by the CAMP. No exceedances of the CAMP action levels were noted during the remedial activities at the Site.

Dewatering points were installed by MoreTrench, Inc. beginning on July 28, 2006 and the dewatering system was activated on August 14, 2006. The dewatering system employed a dewatering pump operating at 600 gallons per minute (gpm), which filtered through geotextile fabric into an 11,000-gallon dewatering box. Two 20 horsepower (HP) transfer pumps, activated by a float switch, pumped recovered groundwater from the dewatering box through two bag filters connected in parallel to remove any remaining fines, two 10,000-pound activated carbon filters connected in series to treat the groundwater for VOCs and/or SVOCs, and a flow totalizer. The dewatering system discharged into a combined city sewer outfall and was monitored continuously 24 hours a day to ensure its operation. The dewatering permit approval is included in Appendix L.

Pre-construction meetings were held with NYSDEC and all contractors on May 5, 2006 and May 18, 2006.

A complete list of agency approvals required by the RAWP is included in Appendix L. This list includes a citation of the law, statute or code to be complied with, the originating agency, and a contact name and phone number in that agency. This will be updated in the Final Remediation Report.

All SEQRA requirements and all substantive compliance requirements for attainment of applicable natural resource or other permits were achieved during this Remedial Action.

NYSDEC project sign was erected at the project entrance and in place during all phases of the Remedial Action.

4.2.3 General Site Controls

In accordance with the Sediment Erosion Control Plan (SECP), erosion and sedimentation controls were employed at the site for the length of the project and included but was not limited to a perimeter silt fence, an ingress/egress truck wash, haybales to buffer stormwater entering the Site, the Site grade was lowered (below street level), which prevented significant amount of stormwater and sediment from leaving the Site, and dust control utilizing water via a fire-hose.

On May 31, 2006, it was discovered that some equipment had been stolen from the Site. Therefore, a security firm (Uptown Security Co.) was contracted to provide Site security for the remainder of the project.

On August 20, 2006, a stop work order was issued by the Fire Department City of New York (FDNY) due to cracks observed in a building on 16th Street east of the site. The cracks may have been caused by excavation activities and in response, Urban did not conduct excavation activities on the eastern portion of the site until underpinning had been installed beneath the subject building. These modifications to the excavation plan satisified the FDNY and subsequently, the stop work order was lifted on August 21, 2006.

4.2.3.1 Indoor Air Monitoring

Site buildings were demolished prior to redevelopment and no on-Site indoor air monitoring has been conducted. Off-site indoor air samples were collected within the 5-story Off-Site Building (OB) located in the northwest corner of the Site in accordance with the FLS Modification to RAWP dated June 20, 2006 and the subsequent NYSDEC approval letter dated July 7, 2006 to address concerns regarding potential migration of VOCs from a nearby manufactured gas plant during construction dewatering. Eight-hour time-weighted indoor air samples were collected using Summa canisters and shipped under COC procedures for analysis by EPA T0-15 for VOCs. Additionally, Gastech colorimetric tubes were utilized to immediately determine if elevated levels of VOCs existed. Two rounds of baseline samples (prior to dewatering) and four rounds of monthly samples during the dewatering period (August – December 2006) were collected. An additional round of samples was collected in January 2007 following the end of dewatering activities.

Indoor air sample results were compared to the NYSDOH indoor background concentrations; specifically, the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York dated October 2006, Table C.4 for Indoor Air. Some exceedances of these background concentrations were noted for dichlorodifluoromethane, hexane, 1,2,4-trimethylbenzene, toluene, and toluene. However, the concentrations of these constituents were generally not considered to be at dangerous levels and did not increase significantly during dewatering activities.

The sampling indicated increasing concentrations of trichloroethylene (TCE). Based on observations made during the sampling events, these concentrations are associated with routine building maintenance and the presence of cleaning materials in the basement. These materials were not present during the initial baseline sampling, but were noted during the later sampling events. A review of site groundwater data ndicates that TCE

was not detected in MW-12, the closest well to the OB, and was either not detected or detected at extremely low levels in other on- and offsite wells.

Additionally, all colorimetric tube benzene measurements were below detection limits.

Laboratory analytical reports are summarized in Table 16.

4.2.4 Nuisance controls

As detailed in Section 4.2.3, several measures were employed to reduce the amount of dust, sediment, and erosion onsite and offsite as a result of excavation activities. Additionally, the project was conducted in accordance associated building permits, codes, and plans governing noise and air pollution.

4.2.5 CAMP results

Daily air monitoring reports are provided in Appendix M.

4.2.6 Reporting

All daily and monthly reports are included in Appendices M and N, respectively.

The digital photo log required by the RAWP is included in Appendix O.

4.3 CONTAMINATED MATERIALS REMOVAL

Between July 12, 2006 and approximately January 3, 2007, an approximate total of 42,173 tons of soil was removed during remediation, as shown on Table 3. Tabulated daily load summaries are provided in Appendix P. The area of excavation is shown on Figure 8.

The soil was determined to be either non-hazardous historic fill or non-hazardous petroleum-impacted historic fill. Approximately 4,418 cubic yards of petroleum-impacted historic fill and 23,697 cubic yards of historic fill were removed from the Site. Approximately 520 cubic yards of concrete were removed from the Site.

The excavated materials were sent to four facilities: 36,634 tons were transported for thermal treatment to Clean Earth of Philadelphia, PA, 5,496 tons were transported for disposal to FDP of Jersey City, NJ, approximately 2,220 tons of native material were sent to the GATX site (380 Development Site), Staten Island, NY for use as fill material, and

255 tons were transported for bioremediation at Clean Earth of Carteret, NJ. Non-hazardous waste manifests are included as Appendix Q. The disposal facility approval letters are provided in Appendix R.

A list of the Track 4 SCOs for this project is shown in Table 4.

A map of the location of original sources and areas where excavations were performed is shown in Figure 8.

A contour map of the subgrade topography showing the base of the excavation is included in Appendix S.

4.3.1 Disposal Details

In order to characterize the soil prior to disposal, FLS performed waste characterization sampling based on disposal facility requirements using a grid system shown on Figure 8. A description of the sampling methodology and analytical requirements was described in a June 16, 2006 letter to Urban F/E, LLC and is included as Appendix T.

Letters from Applicants to disposal facility owners and acceptance letters from disposal facility owners are attached in Appendix U.

Manifests and bills of lading are included in Appendix Q.

Table 3 shows the total quantities of each class of material removed from the Site and the disposal locations.

4.3.2 ORC-Advanced Application

On October 10, 2006, approximately 45 pounds of ORC-Advanced was applied along the western excavation extent, beneath the highline. ORC injection points are shown on Figure 15.

An additional ORC application beneath the High Line, as described in the *Operable Unit 2 (OU2) Oxygen Release Compound (ORC) Injection Work Plan*, was implemented on March 19 -22, 2007.

4.3.3 UST Removals

On July 17 and 18, 2006, three 550-gallon USTs were discovered in the southern portion of the site. The three 550-gallon USTs contained some petroleum contact water (PCW), which was vacuumed out by A.B.C. Tank Repair & Lining, Inc. (ABC) and the USTs were cleaned by ABC and were removed intact on July 20, 2006 and transported off-Site on July 21, 2006 by Metropolitan Heat & Power Co., Inc. (MHPC). The associated fill lines were grouted with concrete.

On August 2, 2006, a 2,000-gallon UST was discovered in the northern portion of the site and 1,176 gallons of #2 fuel oil was removed from the UST on August 3, 2006 by ABC. The UST was removed intact and transported off-Site on August 4, 2006 by MHPC. The associated fill line was grouted with concrete.

Former UST locations are depicted on Figure 8 and UST removal certifications are included in Appendix U.

4.4 REMEDIAL PERFORMANCE (END-POINT) SAMPLE RESULTS

End point samples were collected in accordance with the RAWP and associated stipulations and modifications. Specifically, a September 5, 2006 stipulation modification letter requested that stipulation 65 be modified to allow for the reduced collection of end-point bottom samples.

Between September 6, 2006 and November 17, 2006, thirty-two sidewall end-point grab samples and fifty-one bottom end-point grab samples were collected. End-point samples were collected immediately following exposure of the collection surface so as to not allow for the possible volatilization of VOCs. Soil samples were collected, immediately stored on wet ice, and transported to Accutest Laboratories, a NYSDOH Environmental Laboratory Accreditation Program (ELAP)-approved laboratory for analysis by EPA Method 8260 for VOCs, by EPA Method 8270 for SVOCs, by EPA Method 8081 for pesticides, by EPA Method 8082 for polychlorinated biphenyls (PCBs), and by EPA Method 6010 for total analyte list (TAL) metals. End-point soil sample locations are depicted on Figure 9. With the exception of two sidewall samples, all results were below the Track 4 SSSALs for the Site, which are listed below. The sidewall samples are located offsite and reflect the presence of inaccessible urban fill under the sidewalk.

Contaminant	SSSAL
Individual volatile organic compounds	Part 375 Track 2 Restricted Residential Soil Cleanup Objectives
Individual semi-volatile organic compounds (excluding polycyclic aromatic hydrocarbons)	Part 375 Track 2 Restricted Residential Soil Cleanup Objectives
Total semi-volatile organic compounds (including polycyclic aromatic hydrocarbons)	200 ppm
Metals	Part 375 Track 2 Restricted Residential Soil Cleanup Levels

The SSSALs for individual constituents are provided in Table 4.

Laboratory analytical reports are included in Appendix Y.

DUSRs were prepared by Chemworld Environmental, Inc. for all data generated in this remedial performance evaluation program. The DUSRs are included in Appendix WA tabular and map summary of all end-point sampling is included in Tables 5 through 14 and Figure 9, respectively and all exceedances of SCOs are indicated.

4.5 BACKFILL

Soil was not imported onsite for use as backfill.

4.6 RESIDUAL CONTAMINATION REMAINING ON-SITE

As discussed in Section 4.0, alternate Track 4 SSSALs were established for the Site and are provided in Table 4. With the exception of two offsite sidewall samples, all post excavation results were below the revised SSSALs.

This Site Management Plan (SMP) was prepared to manage residual contamination at the Site in perpetuity or until extinguishment of the Environmental Easement in accordance with 6 NYCRR Part 375.

Tables 5 through 9 and Figure 10 (spider map) summarize results of all soil samples remaining at the Site after completion of Remedial Action that exceed the TAGM 4046/RSCOs.

Tables 10 through 14 and Figure [9] (spider map) summarize results of all soil samples remaining at the Site after completion of Remedial Action that exceed the Track 4 SCOs.

A contour map of the subgrade topography showing the base of the excavation is included in Appendix S. Since residual contaminated soil and possibly groundwater and soil vapor exists beneath the Site after completion of the Remedial Action, Institutional and Engineering Controls are required to protect human health and the environment. These Engineering and Institutional Controls (ECs/ICs) are described hereafter. Long-term management of these EC/ICs and residual contamination will be performed under a SMP accompanying this FER as Appendix Y (under separate cover).

4.7 ENGINEERING CONTROL SYSTEMS

Residual contamination is present at this Site and ECs were implemented to protect public health and the environment in the future. The Site has two primary Engineering Control Systems. These are: (1) a composite cover system consisting of a concrete building foundation at OU1, a concrete slab at OU2, and a vapor barrier beneath OU1 and OU2 and (2) a SSDS beneath the building at OU2. Occupied areas of the subgrade level will be maintained at positive pressure through manipulation of the HVAC system. This will prevent potential infiltration/intrusion of soil vapor.

4.7.1 Composite Cover System

Exposure to residual contaminated soils is prevented by an engineered, composite cover system that has been built on the Site. This composite cover system is comprised of a concrete building foundation at OU1, a concrete slab at OU2, and a vapor barrier beneath OU1 and OU2.

The vapor barrier consists of a Preprufe® 300R high density polyethylene (HDPE) vapor membrane, which was applied at the bottom and sides of the foundation of both buildings at OU1 and OU2. Vapor barrier specifications are provided in Appendix W. In OU1, the vapor barrier will prevent groundwater as well as any soil vapor from entering the basement of the building.

Figure 12 shows the NYSDEC-approved design for each remedial cover type used on this Site. Figure 11 shows the location of each cover type built at the Site. A SoMP is included in Appendix H of the SMP, and outlines the procedures required in the event the composite cover system and underlying residual contamination are disturbed. The SoMP is also discussed in detail in Section [2.3.2] of the SMP. Issues related to maintenance of this cover are provided in the Monitoring Plan included in Section 4 of the SMP.

4.7.2 SSDS

In OU2, the vapor barrier will be used in conjunction with the SSDS to prevent any soil vapor from entering the building through joints or cracks in the floor slab. The SSDS was designed to create a slight pressure differential between the interior and sub slab environment of the buildings to be located in OU2. A SSDS was not installed beneath OU-1 as excavation in this area extended into native soil below the water table and therefore, soil vapor headspace should not exist below the building.

As per EPA guidance (Radon Prevention in the Design and Construction of Schools and Other Large Buildings, 1994), a six-inch layer of clean, 1.5-inch gravel was placed below the slab and above a layer of geotextile fabric, which should prevent significant amounts of soil from entering the SSDS. A suction pit was constructed with four 8 by 8 by 12-inch concrete blocks overlain by a 4 by 4-foot sheet of 0.75-inch thick plywood. A 20-foot long, 4-inch diameter Schedule (SCH) 5S stainless steel suction pipe was inserted into the middle of the suction pit and run through the building to a DynaVac HS5000 regenerative blower via 4-inch diameter SCH 40 chlorinated polyvinyl chloride pipe (CPVC), which was connected to the stainless steel pipe with a rubber fernco coupling. All horizontal piping runs were slightly pitched back towards the suction pit to allow for drainage of any moisture. Although EPA guidance recommends a slope of 1/8 inch per foot, the piping was installed at a slope of approximately 1/16 inch per foot due to site restrictions.

The SSDS mechanical system components have not been installed or activated as of the date of this report since the building is not occupied. However, the DynaVac HS5000 will be located outside of the building within a mechanical room that is accessed from the roof and sealed from the interior of the building encompassing OU1 and will generate a flow of 28 cubic feet per minute (cfm) at 35 inches of water column (“ WC). A manometer will be installed on the influent pipe as a vacuum indicator and a low-vacuum alarm will notify the building manager in the event low vacuum conditions (less than 0.5” WC) occur, which can identify leaks in the system.

The discharge location will be above the roof formed by the set-back of the 12th Floor of the building in OU1. The placement was dictated by NYSDOH and EPA requirements. The discharge point will be fitted with a 2-inch diameter CPVC tee to prevent precipitation from entering the pipe without impeding air flow.

As per EPA guidance, above-grade piping not sealed within the trash chute will be labeled to indicate that it is part of the SSDS system. Labels were placed approximately every 10 feet stating "This is a component of a Subslab Ventilation System / DO NOT ALTER OR DISCONNECT". A label on the vent stack at the roof level reads, "Soil gas vent stack. DO NOT PLACE AIR INTAKE WITHIN 10 FEET."

Calculations for the sizing of the fan and fan details are included in Appendix X. A cross-section showing the aggregate, geotextile fabric, vapor barrier, suction pit, vent pipe, and concrete slab and wall of OU2 and OU1 is included as Figure 13. The exhaust route throughout the building is shown in Figure 14. As-built drawings will be submitted as an addendum once construction is complete.

A start-up plan and procedures for operating and maintaining the SSDS are documented in the Operation and Maintenance Plan in Section 4 of the Site Management Plan (SMP). The procedures for monitoring the systems are included in Section 3, "Monitoring Plan" of the SMP. The Monitoring Plan also addresses inspection procedures that must occur after any severe weather condition has taken place that may affect on-Site ECs.

4.8 POST-REMEDIAL GROUNDWATER SAMPLING

Application of ORC to enhance monitored natural attenuation of groundwater contamination in OU2 has been implemented as described in the *Operable Unit 2 (OU2) Oxygen Release Compound (ORC) Injection Work Plan,* dated January 2007. Groundwater monitoring will be performed on a quarterly basis to assess Monitored Natural Attenuation and to determine whether the ORC injection is effectively treating the groundwater beneath OU-2. Groundwater samples will be collected from four off-Site monitoring wells. The groundwater samples will be collected using low-flow sampling methods and analyzed for VOCs by EPA Method 8260; SVOCs and 2-methylnaphthalene by EPA Method 8270; TAL Total Metals by EPA Method 6010B and 7470A. The samples will also be analyzed for nitrate; nitrite; iron and manganese. The analytical results for these additional MNA parameters, in conjunction with field measurements of dissolved oxygen (DO), pH, and oxidation-reduction potential (ORP) will be used to monitor the effectiveness of the ORC and assess the need for an additional injection of ORC along the downgradient property boundary.

Post-remedial groundwater sampling will be conducted until 1) Class GA groundwater concentrations are achieved; or, 2) asymptotic conditions are established over an

extended period and NYSDEC issues written approval to discontinue the monitoring program. In either case, the program can be discontinued, with NYSDEC's concurrence, without an amendment to or extinguishment of the Environmental Easement.

4.9 INSTITUTIONAL CONTROLS

A series of Institutional Controls are required under the RAWP to implement, maintain and monitor Engineering Control systems and prevent future exposure to residual contamination by controlling disturbances of the subsurface soil. Adherence to these on-Site Institutional Controls is required under the Environmental Easement and will be implemented under the SMP attached to this FER. These Institutional Controls for the Site (Controlled Property) are:

- Compliance with the Environmental Easement by the Grantor and the Grantor's successors and adherence of all elements of the SMP is required;
- All Engineering Controls must be operated and maintained as specified in the SMP;
- A composite cover system consisting of a concrete building foundation at OU1, a concrete slab at OU2, and a vapor barrier beneath OU1 and OU2 must be inspected, certified and maintained as required in the SMP;
- The SSDS must be inspected, certified, operated and maintained as required by the SMP;
- All Engineering Controls on the Controlled Property must be inspected and certified at a frequency and in a manner defined in the SMP;
- Groundwater, soil vapor, and other environmental or public health monitoring must be performed as defined in the SMP;
- Data and information pertinent to Site Management for the Controlled Property must be reported at the frequency and in a manner defined in the SMP;
- 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 proper functioning in the manner specified in the SMP;

- Engineering Controls may not be discontinued without an amendment or extinguishment of the Environmental Easement; and

- A positive air pressure will be maintained at all times in the basement at OU1.

The Site (Controlled Property) also has a series of Institutional Controls in the form of Site restrictions. Adherence to these Institutional Controls is required under the Environmental Easement. Site restrictions that apply to the Controlled Property are:

- Vegetable gardens and farming on the Controlled Property are prohibited;
- Raising of livestock or producing animal products for human consumption is prohibited;
- Single family housing is prohibited;
- Use of groundwater underlying the Controlled Property is prohibited without treatment rendering it safe for the intended purpose. Approval by the New York State Department of Health must be obtained prior to any such intended use;
- All future activities on the Controlled Property that will disturb residual contaminated material are prohibited unless they are conducted in accordance with the soil management provisions in the Site Management Plan;
- The Controlled Property may be used for restricted residential and commercial use only, provided the long-term Engineering and Institutional Controls included in the SMP are employed;
- The Controlled Property may not be used for a higher level of use, such as unrestricted residential use without an amendment or extinguishment of the Environmental Easement;
- Grantor of Environmental Easement or successor to submit to NYSDEC a written statement that certifies, under penalty of perjury, that: (1) controls employed at the Controlled Property are unchanged from the previous certification or that any changes to the controls were approved by the NYSDEC; and, (2) nothing has occurred that impairs the ability of the controls to protect public health and environment or that constitute a violation

or failure to comply with the SMP. NYSDEC retains the right to access such Controlled Property at any time in order to evaluate the continued maintenance of any and all controls. This certification shall be submitted annually, or an alternate period of time that NYSDEC may allow. This annual statement must be certified by an expert that the NYSDEC finds acceptable.

4.10 DEVIATIONS FROM THE REMEDIAL ACTION WORK PLAN

A Track 1 cleanup was originally envisioned for OU1 and contaminated fill and petroleum-impacted soils beneath OU1 were removed as part of Site development as per the RAWP. However, during remedy implementation, it became apparent that the remedy for OU-1 could not be implemented as described in the RAWP due to the following:

1) **Safety considerations which impacted construction methods**, specifically, the fact that sheeting could not be driven adjacent to the existing structures (the buildings located at the northwest and southeast corners of the Site without compromising the structural integrity of the building foundations and, the inability to drive sheeting adjacent to or under the High Line because of headroom clearance limitations. As a result, the RAWP was modified in June 2006 and the site was sheeted using shoulder beams and lagging, with underpinning of the adjacent structures.

2) **The inability to attain and maintain compliance with Class GA groundwater standards and achieve Track 1 for groundwater in OU-1 and OU-2.** The above change in sheeting method (i.e., the inability to use tight sheeting) and the inability to isolate groundwater along the southeast side of the site (where underpinning of an adjacent building occurred) resulted in the potential for groundwater contaminants from offsite to re-enter the Site, precluding a Track 1 cleanup for groundwater in OU-1. The inability to place sheeting along the 10th avenue side of the Site (west of OU-2) prevented treatment of the OU-2 groundwater, thus preventing achievement of groundwater standards in this portion of the Site.

3) **The presence of petroleum-impacted groundwater and the urban fill in OU-2.** Soil excavation in OU2 was restricted by conditions in the Zoning Resolution that limit construction activities within 25 feet of the High Line. Prior to construction, it was discovered that the High Line was supported by piles, rather than spread footings. As a result, the piles were sheeted and soil was excavated to the foot of the High Line

Supports. While this enabled removal of significantly more source material, petroleum-contaminated soils remain in this area below the foot of the High Line Supports, precluding a Track 1 remedy for OU-2.

Due to the above limitations, alternate Track 4 SSSALs were developed for the site in consultation with NYSDEC.

4.11 SITE MANAGEMENT PLAN

The SMP provides a detailed description of all procedures required to manage residual contamination at the Site following the 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 all 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.