Remedial Action Work Plan

For

Pfizer Site B & D, Operable Unit 2

177 Harrison Avenue

Block 2266, southern portion of Lot 1

NYSDEC VCA Index No. D2-0010-0703 / Site No. V-00350-2

E-Designation E-238

CEQR Number 09HPD019K

OER No. 11EHAN258K

Prepared for:

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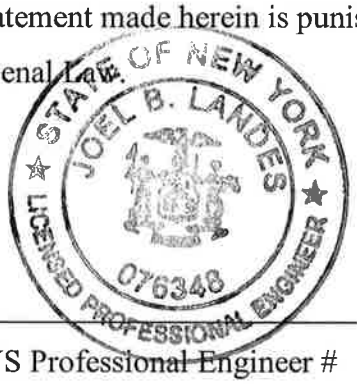
AUGUST 22, 2011

CERTIFICATION

I, Joel Landes, certify that I am currently a NYS registered professional engineer and that this Remedial Action Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

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
	9/22/11	

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REMEDIAL ACTION WORK PLAN

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LIST OF ACRONYMS

Acronym	Definition
AST	Aboveground Storage Tank
AWQS/GV	Ambient Water Quality Standards/Guidance Values
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes
CAMP	Community Air Monitoring Plan
C&D	Construction & Demolition
CEQR	City Environmental Quality Review
CFR	Code of Federal Regulations
CHASP	Construction Health and Safety Plan
CO	Certificate of Occupancy
CPC	City Planning Commission
DSNY	Department of Sanitation
"E"	E-Designation
EAS	Environmental Assessment Statement
EIS	Environmental Impact Statement
ESA	Environmental Site Assessment
EC/IC	Engineering Control and Institutional Control
ELAP	Environmental Laboratory Accreditation Program
FDNY	New York City Fire Department
FEIS	Final Environmental Impact Statement
GPR	Ground Penetrating Radar
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations Emergency Response
IDW	Investigation Derived Waste
LRA	Limited Risk Assessment
NNO	Notice of No Objection
NTP	Notice To Proceed
NOS	Notice Of Satisfaction
FNOS	Final Notice of Satisfaction
NYC BSA	New York City Board of Standards and Appeals
NYC DCP	New York City Department of City Planning
NYC DEP	New York City Department of Environmental Protection

NYC DOB	New York City Department of Buildings
NYC DOF	New York City Department of Finance
NYC HPD	New York City Housing Preservation and Development
NYCRR	New York Codes Rules and Regulations
NYCOER	New York City Office of Environmental Remediation
NYS DEC	New York State Department of Environmental Conservation
NYS DEC DER	New York State Department of Environmental Conservation Division of Environmental Remediation
NYS DEC PBS	New York State Department of Environmental Conservation Petroleum Bulk Storage
NYS DOH	New York State Department of Health
NYS DOT	New York State Department of Transportation
OSHA	United States Occupational Health and Safety Administration
OU	Operable Unit
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PCE	Tetrachloroethene
PE	Professional Engineer
PID	Photo Ionization Detector
PM	Particulate Matter
QEP	Qualified Environmental Professional
RA	Register Architect
RAOs	Remedial Action Objectives
RAP	Remedial Action Plan
RCA	Recycled Concrete Aggregate
RCR	Remedial Closure Report
RD	Restrictive Declaration
RI	Remedial Investigation
SCOs	Soil Cleanup Objectives
SCGs	Standards, Criteria and Guidance
SMP	Site Management Plan
SPDES	State Pollutant Discharge Elimination System
SSDS	Sub-Slab Depressurization System
SVOCs	Semi-Volatile Organic Compounds
ULURP	Uniform Land Use Review Procedure

USCS	Unified Soil Classification System
USGS	United States Geological Survey
UST	Underground Storage Tank
TAL	Target Analyte List
TCL	Target Compound List
TCO	Temporary Certificate of Occupancy
VB	Vapor Barrier
VCA	Voluntary Cleanup Agreement
VOCs	Volatile Organic Compounds

EXECUTIVE SUMMARY

Langan Engineering & Environmental Services, PC (Langan) has developed this plan to remediate the southern, 15,000-square-foot portion of the property located at 177 Harrison Avenue (Tax Block 2266, Lot 1) in Brooklyn, New York. The southern portion of Lot 1 (Site) constitutes Operable Unit #2 (OU-2) (the western portion) of the Pfizer Inc Site B property, which is subject to a Voluntary Cleanup Agreement (VCA Index No. D2-0010-0703, Site No. V-00350-2) between Pfizer Inc. (former lessee of the Site and current owner of the adjacent Lot 46 property) and the New York State Department of Environmental Conservation (NYSDEC). The Site is owned by Congregation YGS. The eastern portion of Pfizer Inc Site B occupies Block 2266, Lot 46 and is referred to as OU-1. The Pfizer Site D property, located to the south of the Site on Block 2269, Lot 1, is also part of OU-1 and subject to the VCA for Site V00350.

When completed, the Site will contain the southern portion of a five-story high school building. Congregation YGS is proposing to remediate the Site in a manner that is protective of human health and the environment, and is consistent with Congregation YGS' contemplated end use of the Site as a private high school for girls. Congregation YGS proposes to perform the work set forth in this RAWP. This RAWP exclusively addresses development of the southern portion of Lot 1 (OU-2) which is subject to the VCA. Because the proposed development will impact the entirety of Lot 1, discussion of previous investigations will also incorporate the northern, non-VCA portion of Lot 1, where relevant. The northern portion of Lot 1 is being considered for entry into the New York City Brownfield Cleanup Program (NYCBCP). As such, that portion is also referenced in this report as the "NYCBCP Parcel".

Multiple subsurface investigations have been performed to compile and evaluate data and information necessary to develop this Remedial Action Work Plan (RAWP). The remedial action described in this document achieves the remedial action objectives, complies with applicable environmental standards, criteria and guidance and conforms to applicable laws and regulations.

Site Description/Physical Setting

The Site is located in the County of Kings, Brooklyn, New York and is identified as Block 2266 and a portion of Lot 1 on the New York City Tax Map. The Brooklyn, N.Y. United States Geological Survey (USGS) topographical quadrangle map (Figure 1) shows the Site location. The Site is situated on a 15,000-square-foot parcel, which combined with the adjoining northern

NYCBCP Parcel, comprises a 29,200-square-foot (0.7-acre) area to be developed into a high school. The development site (entirety of Lot 1) is bounded by a poultry market, Wallabout Street, and multiple-family residences to the north, multiple-family residential buildings along Wallabout Street and the remainder of the Pfizer B site (Tax Block 2266, Lot 46) along Gerry Street to the northeast; Gerry Street and the Pfizer D site to the southeast across Gerry Street; and Harrison Avenue and a parking lot to the southwest across Harrison Avenue (see Figure 2). The Site is currently vacant.

The Site was occupied by a variety of different types of structures/purposes including residential dwellings, a junk lot, a recreational facility and light manufacturing between the 1900s and the 1930s; a lumber yard between the 1940s and the 1950s; and private parking after 1950 to 2010. Pfizer leased the site for parking. The Site was backfilled with fill from an unidentified source and brought to its current grade elevation prior to the 1970s.

Regulatory Status

An E-Designation for Hazardous Materials (E-238) was placed on the entire Lot 1 property by the New York City Department of City Planning (NYCDCP) as part of the Broadway Triangle rezoning action. As such, development-related activities on the Site are subject to review and approval by the New York City Office of Environmental Remediation (NYCOER). The northern portion of Lot 1 that borders Wallabout Street is being considered for enrollment in the New York City Brownfield Cleanup Program (NYCBCP).

Based on the presence of chlorinated volatile organic compounds (VOCs) in groundwater, the Site and adjacent Lot 46 property are subject to a Voluntary Cleanup Agreement (VCA Index No. D2-0010-0703, Site No. V-00350-2) (VCA) between Pfizer Inc. (former lessee of the Site and current owner of the adjacent Lot 46 property) and the New York State Department of Environmental Conservation (NYSDEC). The area adjacent to the Site is referenced as Operable Unit 1 (OU-1) of Pfizer Sites B and D. The chlorinated VOCs in groundwater are chemicals typical of those used by dry cleaners. A source for the chlorinated VOCs has not been identified on OU-1. Petroleum VOCs identified in soil on the Lot 46 portion of Site B were excavated and removed in 2002. Pursuant to the VCA, remedial activities conducted on the Site (i.e., OU-2 of Pfizer Sites B and D) are subject to review and approval by the NYSDEC.

This RAWP has been developed in adherence to the requirements of the VCA. A separate RAWP for the northern portion of Lot 1 that addresses the requirements of the E-Designation and NYCBCP has been submitted by Congregation YGS to the NYCOER.

Summary of the Remedial Investigations

Pfizer Site B and D Investigations

Roux Associates, Inc. (Roux) conducted multiple investigations and remedial measures on the Site B portion of the Pfizer VCA property on behalf of Pfizer Inc. between 1996 and 2005. The investigations included soil, groundwater, and soil vapor sampling on the western (on-site Lot 1) and eastern (off-site Lot 46) portions of Site B, as well as perimeter sidewalk areas. In addition, quarterly groundwater monitoring of wells installed on Lot 46 and on the Harrison Avenue and Wallabout Street sidewalks adjacent to the Site have been conducted since 2006.

Nine (9) soil borings, three (3) monitoring wells, and 12 test pits were completed on Lot 1 during Roux's investigations of the Site B parcel. All but one monitoring well, MW-13, were installed on the Site. The three wells were paved over in 2008. Four adjacent, off-site monitoring wells were also installed on the Harrison Avenue and Wallabout Street sidewalks. In total, 32 soil samples were collected from the Site during Roux's investigation of Pfizer Site B between 1996 and 2005. Roux collected three (3) grab groundwater samples from soil borings in 1996 and 1997, and multiple groundwater samples from the three Site wells (MW-1, MW-2, and MW-13) and four off-site wells (MW-1R, MW-11, MW-16, and MW-18) on the adjoining Harrison Avenue and Wallabout Street sidewalks. Roux also collected 10 soil vapor samples from 5 soil vapor sampling points on the Site.

Other Investigations

A Phase I Environmental Site Assessment (ESA) was conducted at the Site and NYCBCP Parcel (i.e., the entirety of Lot 1) on behalf of Park Avenue Bank in 2005, and Langan conducted a pre-construction, environmental investigation of the Site in 2009 on behalf of the Site owner, Congregation YGS. Discussions with NYSDEC and NYCOER about Congregation YGS's proposed construction activities prompted the NYSDEC and NYCOER to request that Langan collect additional soil vapor, soil, and groundwater samples from the northern and southern portions of Lot 1, and groundwater samples from perimeter sidewalk wells. The findings of this Remedial Investigation (RI) are presented in Langan's Remedial Investigation Report, dated June 2011.

The NYCBCP Parcel was investigated in accordance with the scope of work presented in the NYCOER-approved Supplemental Environmental Site Investigation Work Plan and Health and Safety Plan, dated May 6, 2011. The southern, VCA portion of Lot 1 was investigated in accordance with an NYSDEC-approved Supplemental Investigation Scope Summary provided to NYSDEC in an e-mail, dated May 17, 2011. Additional groundwater sampling for SVOC

analysis was conducted at the request of the NYSDEC following a conference call between Langan, NYSDEC, and Pfizer Inc. on June 8, 2011. The RI was conducted in three phases on May 12, 2011, May 18 through May 20, 2011, and June 13, 2011.

In total, 22 soil borings, 2 monitoring wells, and seven 7 test pits were completed on the southern and northern portions of Lot 1 during Langan's 2009 pre-construction investigation and 2011 Remedial Investigation. Langan collected a total of 47 soil samples from the Site during the 2009 and 2011 investigations. Of these, six (6) were composite samples collected for waste characterization purposes, and 30 were samples collected for total and Toxicity Characteristic Leaching Procedure (TCLP) metals analysis from two areas of concern on the southern portion of the Site. Langan collected six (6) groundwater samples from the two on-site and four off-site perimeter sidewalk wells, and two (2) soil vapor samples from two sampling points on the NYCBCP Parcel.

Investigation Scope Summary

The following table summarizes the investigation activities on the northern and southern, VCA portions of the Site.

	Northern Portion of Lot 1 (NYCBCP Parcel)	**Southern, VCA Portion of Lot 1 (Site)**	**Adjoining Sidewalks**
Borings	11	21	-
Monitoring Wells	1**	4**	4
Test Pits	5	14	-
Soil Samples	21	58	-
Groundwater Samples	8	21	51
Soil Vapor Samples	2	10	-

*Well MW-13 was paved over in 2008.

**Wells MW-1 and MW-2 were paved over in 2008.

Findings of Pfizer Site B Investigations and Langan's 2009 Pre-Construction Investigation

1. The elevation of the property ranges from el 9 to el 12 Borough President of Brooklyn Datum (BPBD).
2. The depth to groundwater across Lot 1 varies from approximately 5 to 8 feet bgs. General groundwater flow direction across the Site is from the southeast (Gerry Street) to the northwest (Wallabout Street).

3. The depth to bedrock is greater than 100 feet bgs.

4. The Site stratigraphy, from the surface down, consists of approximately 10 feet of fill material comprised of sand and gravel with variable proportions of cinders, metal debris, and concrete, brick, and glass fragments. The fill material is underlain by approximately 2 to 3 feet of clay and silt and approximately 90 feet of sand, silt, and clay.

5. A geophysical survey and 19 test pit excavations did not reveal evidence of buried structures (e.g., petroleum storage tanks or vaults) on the northern or southern portions of Lot 1.

6. Samples of fill collected on the Site contained concentrations of SVOCs and metals above Part 375 Unrestricted and Commercial Use SCOs. Based on the depth and distribution of the SVOC- and metals-impacted soil, the elevated concentrations are likely attributable to conditions in the fill.

7. Groundwater samples collected during multiple investigations contained concentrations of petroleum and chlorinated volatile organic compounds (VOCs) above NYSDEC Ambient Water Quality Standards and Guidance Values (AWQS/GV). The off-site source of petroleum VOCs was removed during remedial activities (i.e., soil excavation and groundwater removal on Lot 46) that were conducted in accordance with the VCA. The up-gradient, off-site source for the chlorinated VOCs is subject to ongoing investigation under the VCA. These chemicals are typical of those used by dry cleaners. Investigation and remediation of groundwater contamination on the adjacent Lot 46 and on Pfizer Site D, to the south of the Site, is ongoing.

8. Groundwater samples collected from monitoring wells on Lot 46 during the latest round of sampling (February 2011) contained total chlorinated VOC concentrations ranging from 1.2 µg/L to 1,695 µg/L. Total chlorinated VOC concentrations in off-site monitoring wells located in the Harrison Avenue and Wallabout Street sidewalks adjacent to the Site ranged from 1 µg/L in MW-11 to 2,064 µg/L in MW-18.

9. Six soil vapor extraction (SVE) wells were located on the Site between March 2007 and February 2011. The wells were connected to an air sparge (AS)/SVE blower system installed on Lot 46 as part of the VCA. The system was shut down after contaminant removal concentrations reached asymptotic levels. The six SVE wells were disconnected from the Lot 46 system at the property fence line on April 29, 2011.

10. Soil vapor samples collected in 2005 contained petroleum and chlorinated VOCs. Tetrachloroethene (PCE) was detected at all five soil vapor sampling points at elevated

concentrations. A maximum PCE concentration of 470 µg/m^3 was detected in a sample collected from the eastern portion of the Site.

Findings and Conclusions of 2011 Remedial Investigation

1. SVOC concentrations exceeded the Part 375 Unrestricted Use SCOs in 8 of the 9 analyzed soil samples collected from the Site. Total SVOC concentrations exceeded 3,000 mg/kg in a sample collected from 6 to 8 feet below ground surface (bgs) on the south-central portion of the Site.
2. Multiple metals were detected at concentrations above the Part 375 Unrestricted Use SCOs in soil samples collected from the Site. Seventeen (17) soil samples contained at least one of five metals (barium, arsenic, cadmium, lead, and mercury) at concentrations above the Part 375 Commercial Use SCOs. The maximum depth intervals of samples exceeding the commercial use SCOs were 8 to 10 feet bgs at MW-25 (barium) and 7 to 10 feet bgs at MW-26 (mercury).
3. Four samples collected from the Site contained hazardous concentrations of lead.
4. One metal (arsenic) was detected at a concentration above the AWQS in one filtered groundwater sample collected from off-site well MW-1R on the Harrison Avenue sidewalk. SVOCs were not detected in the filtered groundwater samples; however, one unfiltered sample (MW-26), which was noted to contain visible sediment, contained five SVOCs at concentrations above the TOGS AWQS/GV. Based on this data, groundwater at the Site is not considered to be impacted by SVOCs or metals.

Areas of Concern

- The Site contains seven localized areas of concern (areas where soil exceeds applicable SCOs below the minimum depth of construction excavation of 2 feet bgs). These are the areas in the vicinity of the following boring locations: MW-25 (lead, mercury, barium, and SVOCs at 5 to 10 feet bgs), MW-26 (lead, mercury, and arsenic at 5 to 10 feet bgs), SBB-01 (lead at 5 to 7 feet bgs), SBB-07 (lead, mercury, barium, and SVOCs at 5 to 7 feet bgs), SBB-08 (lead and barium at 3 to 5 feet bgs), SBB-28 (arsenic, lead, barium, and SVOCs at 6 to 8 feet bgs), and SBB-27 (barium at 5 to 7 feet bgs).
- Groundwater on the Site contains concentrations of benzene, vinyl chloride, and cis-1,2-DCE above the AWQS/GV.
- Soil vapor on the Site contains elevated concentrations of the chlorinated solvents PCE and TCE.

Qualitative Human Health Exposure Assessment

Human health exposure risk was evaluated for both current and future Site and off-Site conditions, in accordance with the NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation. The assessment includes an evaluation of potential sources and migration pathways of site contamination, potential receptors, exposure media, and receptor intake routes and exposure pathways. The significant conclusions are summarized below:

1) There may be complete exposure pathways for Site contaminants to Site human receptors for current conditions. However, because the Site is vacant and without structures, there are no current receptors at the Site.

2) There is a moderate risk of exposure during the construction and remediation activities. This risk can be minimized by following the appropriate health and safety, vapor and dust suppression, and Site security measures.

3) The existence of a complete exposure pathway for Site contaminants to human receptors during proposed future Site conditions is unlikely, since metals and SVOC-contaminated soils and some contaminated groundwater will be removed during remediation activities, the entire Site will be capped with an impermeable cover, and a soil vapor mitigation system will be installed. Indoor air samples will be collected upon completion of the remediation to further evaluate potential exposure pathways.

4) The Site is not believed to be a source of groundwater contamination. Contaminated groundwater that may be migrating onto the Site is being addressed by Pfizer in accordance with the VCA.

5) There are negligible risks to the ecological environment based on current conditions. The future conditions at the Site will not impact the ecological conditions at the Site.

Summary of the Remedy

The proposed plan achieves all of the remedial action goals established for the project. The proposed remedial action is effective in both the short-term and long-term and reduces mobility, toxicity and volume of contaminants and uses standard methods that are well established in the industry.

The proposed remedial action will consist of:

1. Implementation of a Community Air Monitoring Program for particulates and volatile organic compounds.

2. Soil excavation, as required, to a minimum depth of 2 feet bgs to bring the Site to the development grade and accommodate foundation elements and a sub-slab depressurization system for the school building development. Construction excavation to approximately 9 feet bgs will be required to accommodate an elevator pit on the northeastern portion of the Site.

3. Targeted excavation of seven (7) AOCs to depths below construction sub-grade to remove all soil containing contaminants exceeding the site-specific SCOs (SSSCOs). The SSSCOs established for this site are the restricted residential use SCOs with the exception of:

    - characteristic lead hazardous soils (i.e., 5 mg/l TCLP);
    - metals exceeding Part 375 Commercial Use SCOs; and
    - total SVOCs at a concentration above 500 mg/kg.

4. Construction and maintenance of an engineered composite cover consisting of a building slab to prevent human exposure to soil/fill on the Site.

5. Installation of a vapor barrier system beneath the building slab and along exterior foundation sidewalls to prevent contaminated soil vapors from migrating into the building.

6. Installation of an active SSDS to prevent accumulation and potential migration of contaminated soil vapors into the building.

7. Import of materials to be used for backfill beneath the composite cover system in compliance with this plan and in accordance with applicable laws and regulations. Imported soil will be sampled and analyzed in accordance with NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation (May 2010) section 5.4(e) prior to import to the Site, and will meet the criteria established in Part 375-6.7(d), i.e., the lower of the protection of groundwater or protection of public health SCOs for restricted residential use.

8. Sampling and analysis of excavated soil/fill in accordance with the requirements of the selected disposal facilities. The excavated soil/fill will be classified and segregated, based on the analytical results of the soil characterization sampling.

9. Collection and analysis of soil end-point samples in accordance with DER-10 section 5.4(b).

10. Transportation and off-site disposal of soil/fill material at permitted facilities in accordance with this plan, disposal facility requirements, and applicable laws and regulations for handling, transport, and disposal.
11. Screening of imported soil and excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a photoionization detector (PID).
12. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas.
13. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations.
14. Performance of activities required for the remedial action, including permitting requirements and dewatering pretreatment requirements, in compliance with applicable laws and regulations.
15. Submittal of a Construction Completion Report (CCR) that describes the remedial activities, certifies that the remedial requirements have been achieved, describes all Engineering and Institutional Controls to be implemented at the Site, and lists any deviations from this RAWP.

Remedial Design

Green remediation principles and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per DER-31. The major green remediation components are as follows;

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
- Reducing direct and indirect greenhouse gas and other emissions;
- Increasing energy efficiency and minimizing use of non-renewable energy;
- Conserving and efficiently managing resources and materials;\
- Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;
- Maximizing habitat value and creating habitat when possible
- Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals; and
- Integrating the remedy with the end use where possible and encouraging green and sustainable re-development

Excavation

On-site soils which exceed the SSSCOs would be excavated and transported off-site for disposal. Approximately 3,000 cubic yards of soil would be removed. Clean fill meeting the requirements of NYCRR Part 375-6.8(d) would then be brought in to replace the excavated soil and establish the designed grades at the site, as needed.

Vapor Mitigation

Any future on-site buildings would be required to have a soil vapor barrier and sub-slab depressurization system, or a similar engineered system, to prevent the migration of vapors into the building from groundwater.

Cover System

The entire Site will be covered by the proposed concrete building slab.

Institutional Control

Imposition of an institutional control in the form of a deed restriction for the controlled property that:

a. requires the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3).

b. allows the use and development of the controlled property for restricted residential, commercial, or industrial uses as defined by Part 375-1.8(g), though land use is subject to local zoning laws;

c. restricts the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the Department, NYSDOH or NYCDOH;

d. prohibits agriculture or vegetable gardens on the controlled property;

e. requires compliance with the Department approved Site Management Plan;

Site Management Plan

Since the remedy results in contamination remaining at the site that does not allow for unrestricted use, a Site Management Plan is required, which includes the following:

a.) An Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary to ensure the following institutional and/or engineering controls remain in place and effective:
Institutional Controls: The deed restriction discussed above.
Engineering Controls: The soil cover, soil vapor membrane, and sub-slab depressurization system discussed above.
This plan includes, but may not be limited to:

i. Soil Management Plan which details the provisions for management of future excavations in areas of remaining contamination;

ii. descriptions of the provisions of the deed restriction including any land use and groundwater restrictions;

iii. a provision for evaluation of the potential for soil vapor intrusion for any buildings developed on the site, including provision for implementing actions recommended to address exposures related to soil vapor intrusion.

iv. provisions for the management and inspection of the identified engineering controls;

v. maintaining site access controls and Department notification; and

vi. the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.

b. A Monitoring Plan to assess the performance and effectiveness of the remedy. The plan includes, but may not be limited to:

i. monitoring of groundwater and soil vapor to assess the performance and effectiveness of the remedy;

ii. a schedule of monitoring and frequency of submittals to the Department;

iii. monitoring for vapor intrusion for any buildings occupied or developed on the site, as may be required pursuant to item 6.a.iii above.

REMEDIAL ACTION WORK PLAN

1.0 INTRODUCTION

This Remedial Action Work Plan (RAWP) has been developed for the southern, 15,000-square-foot portion of the property located at 177 Harrison Avenue (Tax Block 2266, Lot 1) in the East Williamsburg section of Brooklyn, New York. The southern portion of Lot 1 (Site) constitutes Operable Unit #2 (OU-2) (the western portion) of the Pfizer Inc Site B property, which is subject to a Voluntary Cleanup Agreement (VCA Index No. D2-0010-0703, Site No. V-00350-2) between Pfizer Inc. (former lessee of the Site and current owner of the adjacent Lot 46 property) and the New York State Department of Environmental Conservation (NYSDEC). Congregation YGS owns the Site. The eastern portion of Pfizer Inc Site B occupies Block 2266, Lot 46 and is referred to as OU-1. The Pfizer Site D property, located to the south of the Site on Block 2269, Lot 1, is also part of OU-1 and subject to the VCA for Site V00350.

Pfizer Inc. entered into a VCA with the NYSDEC in September 2003, to investigate and remediate the approximately 35,000-square-foot (0.8-acre) Pfizer Site B (Site B) property located at 59-71 and 73-87 Gerry Street in Brooklyn, New York. Pfizer Inc. is a Volunteer in the Voluntary Cleanup Program. Congregation YGS and United Talmudical Academy propose to construct a private high school (Yeshiva YGS) on the western portion of the VCP Site (known as Operable Unit 2 (OU-2)) and the northern portion of Lot 1 which is not subject to the VCA.. When construction of the high school is completed, the Site will contain the southern portion of the five-story high school building. This RAWP exclusively addresses development of the southern, VCA portion of Lot 1. Because the proposed development will impact the entirety of Lot 1, discussion of previous investigations and the remedy will also incorporate the northern, non-VCA portion of Lot 1, where relevant. The northern portion of Lot 1 is being considered for entry into the New York City Brownfield Cleanup Program (NYCBCP). As such, that portion is also referenced in this report as the "NYCBCP Parcel".

This Remedial Action Work Plan (RAWP) summarizes the nature and extent of contamination as determined from data gathered during multiple site investigations conducted to investigate Site B between 1996 and 2011, a 2009 pre-construction environmental investigation of Lot 1, and a Remedial Investigation (RI) of Lot 1, which was conducted in three phases

between May 12 and June 13, 2011. It provides an evaluation of a Track 1 cleanup and other applicable Remedial Action alternatives, their associated costs, and the recommended and preferred remedy. The remedy described in this document is consistent with the procedures defined in DER-10 and complies with all applicable standards, criteria and guidance. The remedy described in this document also complies with all applicable Federal, State and local laws, regulations and requirements. The RI for this Site did not identify fish and wildlife resources.

The work set forth in this RAWP will be performed by Congregation YGS, the owner of the Site.

1.1 SITE LOCATION AND DESCRIPTION

The Site is located in the County of Kings, Brooklyn, New York and is identified as Block 2266 and Lot 1 on the New York City Tax Map. The Brooklyn, N.Y. United States Geological Survey (USGS) topographical quadrangle map (Figure 1) shows the Site location. The Site is situated on a 15,000-square-foot parcel, which combined with the adjoining northern NYCBCP Parcel, comprises a 29,200-square-foot (0.7-acre) area to be developed into a high school. The development site (Lot 1) is bounded by a poultry market, Wallabout Street, and multiple-family residences to the north, multiple-family residential buildings along Wallabout Street and a vacant lot (Tax Block 2266, Lot 46) along Gerry Street to the northeast; Gerry Street and a facility formerly used by Pfizer Inc. to the southeast across Gerry Street; and Harrison Avenue and a parking lot to the southwest across Harrison Avenue (see Figure 2).

The Site underwent review by the New York City Planning Commission (CPC) Uniform Land Use Review Procedure (ULURP) application. As determined through this review, development-related activities at the Site are subject to review and approval by NYCOER in accordance with City Environmental Quality Review (CEQR) procedure (CEQR Number 09HPD019K). An E-Designation for Hazardous Materials (E-238) was placed on the Site by the New York City Department of City Planning (NYCDCP) as part of the Broadway Triangle rezoning action.

1.2 CONTEMPLATED REDEVELOPMENT PLAN

The Remedial Action to be performed by Congregation YGS under the RAWP is intended to make the Site protective of human health and the environment consistent with the contemplated end use of the Site by Congregation YGS. The proposed redevelopment plan and end use is described here to provide the basis for this assessment. However, the Remedial Action contemplated under this RAWP may be implemented independent of the proposed redevelopment plan.

The proposed use of the development site (i.e., the southern VCA Parcel and the northern NYCBCP Parcel) will consist of a new five-story, private high school building. The school building will consist of slab-on-grade construction, contain no basement, and have approximately 80 feet of frontage along Wallabout Street and 200- and 150-foot frontages along Harrison Avenue and Gerry Street, respectively. The building footprint will be approximately 25,000 square feet. The remainder of the site will consist of a concrete-paved walkway and an approximately 2,500-square foot play yard on the northeastern portion of the property. Soil will be excavated to accommodate utilities and building foundation elements. The maximum excavation depth below the building slab required for development is estimated to be two feet below ground surface (bgs). Two elevators will be located in the northwestern (NYCBCP Parcel) and southeastern (VCA Parcel) portions of the building. The estimated depth of the construction excavation for the elevators and associated sump pits is approximately 9 feet bgs. Additional excavation required to meet remedial objectives is described herein. Based on the approximate depth of groundwater at 6 to 8 feet bgs, groundwater is not anticipated to be encountered during excavation activities, with the exception of excavation for the elevator pits. Proposed site development plans are presented in Appendix A. The Site is located in a commercial district overlay within a residential zoning district.

1.3 DESCRIPTION OF SURROUNDING PROPERTY

The adjacent and surrounding properties have historically been used for light manufacturing, residential and commercial purposes. Several properties in the area have been used for automotive repair garages and gasoline stations. Currently, the surrounding area is zoned for residential, commercial, and manufacturing use. Adjacent property usage includes a

poultry market along the south side of Wallabout Street, residential buildings along Wallabout Street, a facility formerly operated by Pfizer Inc. and others along Gerry Street, vehicle parking along Harrison Avenue, and a vacant property (Lot 46) along Gerry Street. According to the OER Searchable Property Environmental E-Database (SPEED), one day-care center is located at 11 Bartlett Street, approximately 300 feet south of the Site. Intermediate School (IS) 318 is located approximately 370 feet northeast of the Site at 101 Walton Street, and United Talmudical Academy is located approximately 475 feet southeast of the Site at 102 Bartlett Street. No hospitals are located within 500 feet of the Site.

2.0 DESCRIPTION OF REMEDIAL INVESTIGATION FINDINGS

Multiple investigations and remedial measures were conducted on the Site B portion of the Pfizer VCA porperty on behalf of Pfizer Inc between 1996 and 2005. The investigations included soil, groundwater, and soil vapor sampling on the western (on-site) and eastern (off-site) portions of Site B, as well as perimeter sidewalk areas. In addition, quarterly groundwater monitoring of wells installed on Lot 46 and on the Harrison Avenue and Wallabout Street sidewalks adjacent to the Site have been conducted since 2006.

A Phase I Environmental Site Assessment (ESA) was conducted at the Site and NYCBCP Parcel on behalf of Park Avenue Bank in 2005, and Langan conducted an environmental investigation of the Site and NYCBCP Parcel in 2009 on behalf of the Site owner, Congregation YGS. Discussions with NYSDEC and NYCOER about Congregation YGS's proposed construction activities prompted the NYSDEC and NYCOER to request that Langan collect additional soil vapor, soil, and groundwater samples from the northern and southern portions of the Site, and perimeter sidewalk wells. The findings of this Remedial Investigation (RI) are presented in Langan's Remedial Investigation Report, dated June 2011.

The NYCBCP Parcel was investigated in accordance with the scope of work presented in the NYCOER-approved Supplemental Environmental Site Investigation Work Plan and Health and Safety Plan, dated May 6, 2011. The Site was investigated in accordance with an NYSDEC-approved Supplemental Investigation Scope Summary provided to NYSDEC in an e-mail, dated May 17, 2011. Additional groundwater sampling for SVOC analysis was conducted at the request of the NYSDEC following a conference call between Langan, NYSDEC, and Pfizer Inc. on June 8, 2011. The RI was conducted in three phases on May 12, 2011, May 18 through May 20, 2011, and June 13, 2011. The RI was submitted to NYSDEC in June 2011. Copies of the sub-surface investigation reports are provided in Appendix B.

2.1 SUMMARY REMEDIAL INVESTIGATIONS PERFORMED

This section provides a summary of all on-site soil vapor, soil, and groundwater sampling conducted as part of Pfizer's investigation of OU-2 and Langan's 2009 and 2011 investigations. The 2005 Phase I ESA conducted on OU-2 and remedial measures conducted on OU-1 are also

discussed. The following discussion primarily addresses samples, borings, and wells on the Site (i.e., OU-2) with referenced to the NYCBCP Parcel and OU-2. Analytical results of samples collected from the wells on the Harrison Avenue and Wallabout Street sidewalks adjoining the Site are also discussed.

The following table summarizes the investigation activities on OU-2 and adjoining areas:

	Site	Northern Portion of Lot 1 (NYCBCP Parcel)	Adjoining Sidewalks
Borings	21	11	-
Monitoring Wells	4**	1*	4
Test Pits	14	5	-
Soil Samples	58	21	-
Groundwater Samples	21	8	51
Soil Vapor Samples	10	2	-

*Well MW-13 was paved over in 2008.

**Wells MW-1 and MW-2 were paved over in 2008.

2.1.1. Borings, Wells, and Test Pits

Pfizer Site B Investigations

Nine (9) soil borings, three (3) monitoring wells, and 12 test pits were completed at the Site during Roux' investigations of the Site B parcel. All but one monitoring well, MW-13, were installed at the Site. Four adjacent, off-site monitoring wells were also installed on the Harrison Avenue and Wallabout Street sidewalks. The following tables summarize the work completed during the Site B investigations.

Location	ID No.	Date Completed	Boring/Well/Test Pit
Site	SBB-01 through SBB-03	1996; 1997 (redrilled); 2005 (redrilled)	Borings
Site	SBB-07 through SBB-08	1997; 2005 (redrilled)	Borings

Location	ID No.	Date Completed	Boring/Well/Test Pit
Site	SBB-25 through SBB-28	2005	Borings
Site	MW-1 and MW-2	2003	Monitoring Wells
NYCBCP Parcel	MW-13	2005	Monitoring Well
Sidewalk	MW-11	2005	Monitoring Well
Sidewalk	MW-1R and MW-16	2008	Monitoring Wells
Sidewalk	MW-18	2009	Monitoring Wells
Site	TP-4 through TP-14; TP-22	2003	Test Pits

Langan Investigations

Thirteen (13) soil borings, two (2) monitoring wells, and two (2) test pits were completed on the Site during Langan's 2009 pre-construction investigation and 2011 Remedial Investigation. The following tables summarize the work completed during the pre-construction and remedial investigations.

Location	ID No.	Date Completed	Boring/Well/Test Pit
Site	B-2, B-3, and B-5	2009	Borings
Site	MW-25, MW-26, B-25A- B-25D and B-26A – B-26D	2011	Borings
Site	MW-25 and MW-26	2011	Monitoring Wells
Site	TP-4 and TP-5	2011	Test Pits

2.1.2 Samples Collected

Pfizer Site B

In total, 32 soil samples were collected from the Site during Roux' investigation of Pfizer Site B between 1996 and 2005. Roux collected three (3) grab groundwater samples from soil borings in 1996 and 1997, and multiple groundwater samples from the two former on-site wells (MW-1 and MW-2) and four off-site wells (MW-1R, MW-11, MW-13, MW-16, and MW-18) on the adjoining Harrison Avenue and Wallabout Street sidewalks and the NYCBCP Parcel. Roux collected 10 soil vapor samples from 5 soil vapor sampling points on the Site.

Langan Investigations

Langan collected a total of 26 soil samples from the Site during the 2009 pre-construction investigation and 2011 Remedial Investigation. Of these, three (3) were composite samples collected for waste characterization purposes, and 30 were samples collected for total and TCLP metals analysis from two areas of concern. Langan collected six (6) groundwater samples from the two on-site and four off-site perimeter sidewalk wells.

2.1.3 Chemical Analytical Work Performed

Pfizer Site B Investigations

Soil samples collected during Roux's investigations of Pfizer Site B were variously analyzed for VOCs, SVOCs, and total metals. Five soil samples were also analyzed for TCLP metals. Groundwater samples collected between 1996 and 2003 were analyzed for VOCs, SVOCs, and metals. Groundwater samples were analyzed for VOCs only between 2004 and 2010. The following tables summarize soil, groundwater, and soil vapor samples collected during the Site B investigations.

A. Soil Samples

Soil Sampling Location	Depth Interval	Analytes	Date Collected
SBB-01	6-8'	VOCs, SVOCs, metals	1996

Soil Sampling Location	Depth Interval	Analytes	Date Collected
SBB-02 and SBB-03	4-6’		
SBB-01 and SBB-02	0-2’	Total metals	1997
SBB-02	4-6’	TCLP metals	
SBB-03 and SBB-07	0-2’	Total metals, TCLP metals	
SBB-07	6-7.5’	Total metals	
SBB-08	0-2’ and 8-9’	Total metals	
SBB-01	0-2”; 2-24”; 60-84”	VOCs, SVOCs, total metals	2004
SBB-02	0-2”	VOCs, SVOCs, total metals, TCLP metals	
SBB-02	2-24”; 60-84”	VOCs, SVOCs, total metals	
SBB-03, SBB-07, and SBB-08	0-2”; 2-24”		
SBB-03 and SBB-07	2-24”		
SBB-03 and SBB-08	60-84”		
SBB-07	60-84”	VOCs, SVOCs, total metals, TCLP metals	
SBB-25	72-96”	VOCs, SVOCs, total metals, TCLP metals	
SBB-26	60-84”		
SBB-27	60-84”	VOCs, SVOCs, total metals	
SBB-28	72-96”	VOCs, SVOCs, total metals	

B. Groundwater Samples

Groundwater Sample ID No.	Analytes	Filtered (F)/Unfiltered (U)	Date Collected
SBB-02	VOCs, SVOCs, metals	U	1996
SBB-07	Metals	F/U	1997
SBB-08	Metals	F/U	
MW-1	VOCs, SVOCs, Metals	F/U	2003 (2 rounds)
MW-2			
MW-1	VOCs	U	2004; 2005; 2006-2008
MW-2		U	
MW-13		U	
MW-11		U	2004; 2005; 2006-2010
MW-1R		U	2008-2010
MW-16		U	2008-2010
MW-18		U	2009-2010

C. Soil Vapor Samples

Soil Vapor Sample ID No.	Analytes	Sample Depth (ft bgs)	Date Collected
SV-1	VOCs	3 and 6	2004
SV-2			
SV-3			
SV-4			
SV-5			

Langan Investigations

Soil samples collected during Langan's investigations in 2009 and 2011 were variously analyzed for VOCs, SVOCs, total metals, pesticides, and PCBs. Thirty-two (32) samples were collected for analysis of TCLP metals. Groundwater samples were variously analyzed for SVOCs and metals. The following tables summarize soil, groundwater, and soil vapor samples collected during Langan's investigations.

A. Soil Samples

Soil Sampling Location	Depth Interval (ft)	Analytes	Date Collected
B3	0-1	VOCs	2009
B3	0-9	SVOCs, PCBs, total metals, pesticides, TCLP metals	
B5	4-5	VOCs	
B5	1-11	SVOCs, PCBs, total metals, pesticides	
TP-4	5-7	VOCs	
TP4	1-8	SVOCs, PCBs, metals, pesticides	
MW-25	3-5; 6-8; 8-10	Total and TCLP metals	2011
B25A through B25D			
MW-26	3-5; 5-7; 7-10		
B26A through B26D			

B. Groundwater Samples

Groundwater Sample ID No.	Analytes	Filtered (F)/Unfiltered (U)	Date Collected
MW-25	SVOCs and metals	F/U	2011
MW-26	SVOCs and metals		
MW-1R	Metals		
MW-11	Metals		
MW-16	SVOCs and metals		
MW-18	SVOCs and metals		

2.1.4 Geophysical Work and Test Pit Investigations

A limited site investigation conducted by Roux in 2003 included a geophysical survey and the excavation of 12, approximately 10-foot by 8-foot by 8-foot deep test pits (see Section 2.1.5). The findings of the geophysical survey and test pit investigation did not indicate the presence of buried structures at the Site. Metal debris was noted in the fill material observed within each test pit. The Site lithology consisted of an approximately eight-foot thick brown, sandy fill layer underlain by an approximately 2-foot thick green clay/silt layer. Native soil underlying the clay layer consisted of fine- to medium-grained sand.

Langan's 2009 pre-construction environmental investigation included the excavation of two (2) test pits to investigate potential subsurface structures, soil conditions, and the configuration of two adjacent building foundations (see Section 2.1.5). Composite and grab soil samples were also collected from the test pits for laboratory analysis. The test pits were excavated to depths of 5 to 13 feet bgs. The findings of the investigation did not reveal buried structures at the Site. Fill at the Site was observed to extend from surface grade to between 9 and 12 feet bgs. The fill material was generally comprised of fine sand, gravel, construction debris, concrete, brick fragments, cinders, and metal debris. The investigation concluded that a clay layer underlies the fill material on the southwestern portion of the Site.

2.1.5 Documentation

Roux Associates, Inc. (Roux) developed the following environmental work plans and reports for Pfizer site, which includes the southern portion of the Site as well as the adjoining Lot 46:

1. *Environmental Site Assessment on Site B*, May 1996
2. *Results of the Supplemental Investigation at Site B*, July 1997
3. *Site B Investigation and Remediation Work Plan*, April 2000
4. *Site B Interim Remedial Measure Work Plan*, August 2002
5. *Interim Remedial Measure and Limited Site Investigation Results Report and Supplemental Site Investigation Work Plan – Site B*, June 2003
6. *Supplemental Site Investigation Summary Report for Site B*, June 2005
7. *Remedial Design/Remedial Action Work Plan – Site B*, February 2006
8. *Groundwater Remediation Progress Report Nos. 1 through 18*, November 2006 through January 2011

The following environmental reports were developed for the entirety of Lot 1 (i.e., the Site and the NYCBCP Parcel):

1. *Phase I Environmental Assessment*, April 2005, prepared by Singer Environmental Group, LTD
2. *Environmental Report*, December 2009, prepared by Langan
3. *Remedial Investigation Report*, June 2011, prepared by Langan

2.1.5.1 Pfizer Site B Investigations (OU-1)

Numerous site investigations have been conducted on behalf of Pfizer Inc. to address areas of concern (AOCs) on Pfizer Site B (Site B) since 1996. The focus of the investigations has been primarily to evaluate VOC contamination in groundwater on the southern portions of Lots 1 and 46 and adjacent off-site areas, and petroleum contamination in soil on Lot 46. The following

investigations included groundwater, soil, and/or soil vapor sampling on the southern portion of Lot 1:

Environmental Site Assessment on Site B, May 1996

Investigation Scope

- Collection of three soil samples from soil borings SBB-01 through SBB-03 for analysis of VOCs, semi-volatile organic compounds (SVOCs), and metals.
- Collection of perched groundwater sample (unfiltered) from soil boring SBB-02 for analysis of VOCs, SVOCs, and metals. The report stated that the groundwater sample was silty; therefore, the analytical results were considered biased high, especially with respect to metals concentrations.

Investigation Findings

- Acetone, a common laboratory contaminant, was the only VOC detected in the soil samples. The detected concentrations were below the current NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives (SCOs).
- Four SVOCs (i.e., benzo(a)pyrene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene) were detected at concentrations above the Part 375 Unrestricted Use SCOs in the sample collected from a depth of 4 to 6 feet bgs in boring SBB-02.
- Six metals (i.e., arsenic, barium, copper, lead, mercury, and zinc) were detected at concentrations above the Part 375 Unrestricted Use SCOs in at least one of the following samples: SBB-0 (6-8), SBB-02(4-6), and SBB-03(4-6). Lead concentrations in the samples ranged from 459 to 1,710 mg/kg (SBB-02(4-6), and mercury concentrations ranged from 0.71 to 8.7 mg/kg (SBB-02(4-6).
- VOCs were not detected at concentrations above the NYSDEC TOGS 1.1.1 Class GA Ambient Water Quality Standards (TOGS AWQS) in the groundwater sample collected from boring SBB-02.
- Six SVOCs (i.e., benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, and indeno(1,2,3-cd)pyrene) were detected at

concentrations above the NYSDEC TOGS 1.1.1 Class GA Guidance Values in the groundwater sample collected from boring SBB-02. The detected concentrations were estimated values between 3 and 5 µg/L.

- Multiple metals, including arsenic, mercury, and lead, were detected at concentrations above the TOGS AWQS in the groundwater sample collected from boring SBB-02.

Results of the Supplemental Investigation at Site B, July 1997

Investigation Scope

- Redrilling of borings at former locations SBB-01 through SBB-03 and subsequent collection of soil samples for analysis of total metals from the upper 0 to 2 feet below ground surface (bgs). Samples collected from SBB-02 (4-6 ft bgs) and SBB-03 (0-2 ft bgs) were also analyzed for metals using the Toxicity Characteristic Leaching Procedure (TCLP).
- Collection of soil samples from two new borings, SBB-07 and SBB-08, for analysis of total metals. The soil sample collected from 0 to 2 feet bgs in boring SBB-07 was also analyzed for metals using TCLP.
- Collection of filtered and unfiltered perched groundwater samples from borings SBB-07 and SBB-08 for analysis of total metals.

Investigation Findings

- Eight metals (i.e., arsenic, barium, chromium, manganese, copper, lead, mercury, and zinc) were detected at concentrations above the current Part 375 Unrestricted Use SCOs in one or more of the collected samples. Detected lead concentrations ranged from 319 mg/kg to 2,840 mg/kg (SBB-03(0-2)), and mercury concentrations ranged from 0.26 to 5.2 mg/kg (SBB-03(0-2)).
- The TCLP analytical results did not indicate hazardous concentrations of metals.
- Multiple metals, including arsenic, lead, and mercury, were detected at concentrations above the TOGS AWQS in the unfiltered samples collected from

borings SBB-07 and SBB-08; however, the metals concentrations were below the TOGS AWQS in the filtered samples.

Site B Interim Remedial Measure Work Plan, August 2002

At the request of NYSDEC and the New York State Department of Health (NYSDOH), Roux prepared an Interim Remedial Measure (IRM) Work Plan for Site B. The objectives of the IRM were to remove petroleum-contaminated soil and remove and treat groundwater from the Lot 46 portion of Site B. No remedial activities were proposed for the Site.

Interim Remedial Measure and Limited Site Investigation Results Report and Supplemental Site Investigation Work Plan, June 2003

Investigation Scope

- Geophysical survey to evaluate the potential presence of subsurface structures.
- Excavation of 12, approximately 10-foot by 8-foot by 8-feet deep test pits (TP-4 through TP-14 and TP-22) to evaluate the potential presence of subsurface structures and screen soil for evidence of contamination.
- Installation, sampling, and surveying of two monitoring wells (MW-1 and MW-2). The groundwater samples were analyzed for VOCs, SVOCs, and total metals. Two rounds of samples were collected for VOC analysis.

Investigation Findings

- No buried structures were identified during the geophysical survey or test pit investigation. Metal debris was noted in the fill material observed within each test pit.
- The Site lithology consisted of an approximately eight-foot thick brown, sandy fill layer underlain by an approximately 2-foot thick green clay/silt layer. Native soil underlying the clay layer consisted of fine- to medium-grained sand.
- The depth to groundwater ranged from 7.75 to 9.87 feet bgs. The groundwater flow direction at the Site was estimated to be west-northwest. Groundwater flow on Lot 46 appeared to be towards the northeast.

- The following three VOCs were detected in the sample collected from MW-2 at concentrations above the TOGS AWQS: benzene at 2 and 29 µg/L, cis-1,2-dichloroethene at 680 and 850 µg/L, and vinyl chloride at 120 µg/L.
- One SVOC, benzo(a)pyrene, was detected in the sample collected from MW-2 at a concentration of 0.4 µg/L, which exceeds the TOGS AWQS.
- Arsenic and lead were detected at concentrations that exceeded the TOGS AWQS in one or both of the unfiltered samples collected from MW-1 and MW-2; however, the filtered samples did not exhibit concentrations above the TOGS AWQS.

Supplemental Site Investigation Summary Report for Site B, June 2005

Investigation Scope

- Collection of sub-surface soil vapor samples from two depth intervals (3 feet and 6 feet bgs) from five locations (SV-1 through SV-5).
- Redrilling of borings at former locations SBB-01 through SBB-03, SBB-07, and SBB-08, and collection of soil samples for analysis of VOCs, SVOCs, and total metals. Samples collected from SBB-02 (0-2) and SBB-07 (5-7) were also analyzed for TCLP metals.
- Advancement of new borings SBB-25 through SBB-28, and collection of soil samples for analysis of VOCs, SVOCs, and total metals. Samples collected from SBB-25 (6-8) and SBB-26 (5-7) were also analyzed for TCLP metals.
- Collection of groundwater samples from wells MW-1 and MW-2 for analysis of VOCs.
- Completion of a sensitive receptor survey to identify all parks, playgrounds, schools, places of worship, and senior citizen centers within a 0.25-mile radius from Site B.
- Installation of one well on the northern, non-VCA portion of the Site (MW-13) and one off-site monitoring well (MW-11) on the Harrison Avenue sidewalk adjacent to the northern portion of the Site. One groundwater sample was collected from each well for analysis of VOCs.

Investigation Findings

- The following VOCs were detected in one or more of the soil vapor samples: tetrachloroethene (PCE), 1,1,1-trichloroethane, benzene, n-heptane, n-hexane, toluene, o-xylene, ethylbenzene, 1,3-butadiene, and cyclohexane. The following samples contained PCE at a concentration above the Air Guideline Value (AGV) established in the New York State Department of Health (NYSDOH) October 2006 Guidance for Evaluating Soil Vapor Intrusion in the State of New York: SV-1(3) at 150 µg/m^3, SV-2(3 and 6) at 330 µg/m^3, SV-3(3) at 390 µg/m^3, SV-3(6) at 300 µg/m^3, SV-4(6) at 330 µg/m^3, SV-5(3) at 410 µg/m^3, and SV-5(6) at 470 µg/m^3.
- VOCs were not detected in the soil samples at concentrations above the Part 375 Unrestricted Use SCOs.
- Multiple SVOCs were detected in each of the nine soil borings at concentrations that exceeded the Part 375 Unrestricted Use SCOs. Total SVOC concentrations above 500 mg/kg were detected in the following samples: SBB-7 (5-7), SBB-25 (6-8), and SBB-28 (6-8).
- Multiple metals (i.e., mercury, lead, arsenic, barium, and cadmium) were detected at concentrations above the Part 375 Unrestricted Use SCOs in samples collected from each boring. Maximum detected metal concentrations were as follows: mercury at 621 mg/kg (SBB-26(5-7)); lead at 8,920 mg/kg (SBB-25(6-8)); arsenic at 235 mg/kg (SBB-01(2"-24")); barium at 2,760 mg/kg (SBB-25(6-8)); and cadmium at 3.7 mg/kg (SBB-01(5-7)).
- The TCLP analytical results did not indicate hazardous concentrations of metals.
- Two VOCs, cis-1,2-dichloroethene and vinyl choride, were detected at concentrations above the TOGS AWQS in a groundwater sample collected from well MW-2. VOCs were not detected in samples collected from wells MW-1, MW-13, or off-site well MW-11.

Groundwater Remediation Progress Report Nos. 1 through 18 – Site B, November 2006 through February 2011

Eighteen quarterly Groundwater Remediation Progress Reports were prepared by Roux. The reports summarize the analytical results of groundwater sampling for VOC analysis and

the progress of contaminant removal by a soil vapor extraction/air sparging (SVE/AS) system that commenced operation in October 2006. The system included six SVE wells located on the Site. The wells were attached to a blower system located on Lot 46. On-site wells MW-1 and MW-2 were sampled during the first eight sampling events (November 2006 to May 2008).

Wells MW-1, MW-2, and MW-13 were paved over with asphalt and rendered inaccessible between the August and November 2008 sampling events. Off-site monitoring wells (MW-1R and MW-16) were installed adjacent to the Site on the Harrison Avenue and Wallabout Street sidewalks, respectively, in November 2008. Off-site monitoring well MW-18 was installed on the Harrison Avenue sidewalk adjacent to the northeastern corner of the Site in February 2009.

Laboratory analysis of groundwater samples indicated the following:

- Several VOCs, including benzene, cis-1,2-dichloroethene (DCE), and vinyl chloride were detected at concentrations above their respective TOGS AWQS in samples collected from MW-2. MW-2 was located in the eastern portion of the Site (i.e., nearer Lot 46 than wells MW-1 and MW-13).
- One VOC, acetone (a common laboratory contaminant), was detected at a concentration above the TOGS AWQS in MW-1 during one sampling event.
- No VOCs were detected at concentrations above the TOGS AWQS in MW-13.
- No VOCs have been detected at concentrations above the TOGS AWQS in off-site wells located along the adjoining Harrison Avenue sidewalk (MW-1R and MW-11).
- Petroleum and chlorinated VOCs were detected at concentrations above the TOGS AWQS in off-site wells located along the adjoining Wallabout Street sidewalk (MW-16 and MW-18).

Total VOC concentrations in MW-2 during the final on-site sampling event (May 2008) were 62.8 µg/L. During the latest sampling round conducted in November 2010, total VOC concentrations in the off-site wells along Wallabout Street (MW-16 and MW-18) were 76 µg/L and 1,724 µg/L, respectively. Between October 2006 and February 2011, the AS/SVE

system removed approximately 160 pounds of VOCs from the subsurface of Pfizer Inc Site B.

2.1.5.2 Congregation YGS Investigations of OU-2

Phase I Environmental Assessment, April 2005, prepared by Singer Environmental Group, Ltd

Singer Environmental Group, LTD conducted a Phase I Environmental Assessment of Lot 1 in April 2005 to identify potential recognized environmental conditions (RECs). The assessment was conducted on behalf of Park Avenue Bank. A review of available historical Sanborn fire insurance maps indicated that the property was used for a variety of different types of structures/purposes including residential dwellings, a junk lot, recreational facility and light manufacturing between the 1900s and the 1930s; a lumber yard between the 1940s and the 1950s; and private parking after 1950 to 2010. Pfizer leased the site for parking The findings of the report are as follows:

- No visible and/or friable asbestos-containing materials (ACM) or PCB-containing materials were observed.
- No evidence of storage tanks was observed.
- No chemical or hazardous material usage or storage was observed.

Environmental Report, December 2009, prepared by Langan

Investigation Scope

- Excavation of seven (7) test pits to depths between 5 and 13 feet bgs.
- Collection of 14 soil samples, including 6 composite and 8 grab samples. The grab samples were analyzed for VOCs, and the composite samples were analyzed for SVOCs, total metals, pesticides and PCBs. Two samples were analyzed for TCLP metals.
- Installation of one observation well (B-3(OW)) to obtain groundwater level data.

Investigation Findings

- Fill material was observed in the soil borings and test pits from the surface to depths ranging from 9 to 12 feet bgs. The fill was comprised of fine-grained sand, coarse- to fine-grained gravel, cinders, and concrete, brick, glass, and metal fragments. The fill is generally underlain by silty clay in the southwestern portion of the Site and medium-grained sand elsewhere. Silty clay and silty sand extend to an approximate minimum depth of 100 feet bgs.
- No staining, petroleum odors, or elevated organic vapor concentrations were noted in the test pits and soil samples.
- Several SVOCs, including benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, and indeno(1,2,3-cd)pyrene, were detected at concentrations above the Part 375 Unrestricted Use SCOs.
- Metals, including arsenic, barium, cadmium, chromium, copper, lead, mercury, and zinc, were detected at concentrations above Part 375 Unrestricted Use SCOs.
- Based on TCLP analysis of two soil samples, hazardous concentrations of metals were not detected.
- Groundwater elevations were measured in one on-site observation well B-3(OW) and four off-site monitoring wells. Based on these measurements and historical levels from the wells installed during Roux's investigations, the general direction of groundwater flow was determined to be westward. The groundwater measurements indicate a depth to water of approximately 6 to 8 feet bgs.

<u>Remedial Investigation Report – 177 Harrison Avenue, June 2011, prepared by Langan</u>

Investigation Scope

- Advancement of seven (7) soil borings (B-6 through B-12) on the NYCBCP Parcel. Collection of two soil samples from each boring for analysis of VOCs, SVOCs, total metals, and PCBs. Shallow samples were also analyzed for pesticides.
- Collection of two soil vapor samples from a depth of 5 feet bgs on the NYCBCP Parcel.

- Advancement of 10 soil borings (MW-25, MW-26, B-25A through B-25D, and B-26A through B-26D) on the Site to investigate to two areas of concern, in which elevated lead and mercury concentrations were detected during investigations of OU-2. Collection of 30 soil samples, 3 from each boring, for analysis of total and TCLP metals.
- Installation of two groundwater monitoring wells, MW-25 and MW-26, on the Site. Collection of groundwater samples from each well for analysis of metals and SVOCs.
- Collection of groundwater samples from off-site, cross-gradient wells MW-1R and MW-11 for analysis of metals.
- Collection of groundwater samples from off-site, down-gradient wells MW-16 and MW-18 for analysis of metals and SVOCs.

Investigation Findings

- Multiple metals were detected at concentrations above the Part 375 Unrestricted Use SCOs in soil samples collected from the Site. Seventeen (17) soil samples contained at least one of five metals (barium, arsenic, cadmium, lead, and mercury) at concentrations above the Part 375 Commercial Use SCOs. The maximum depth intervals of samples exceeding the commercial use SCOs were 8 to 10 feet bgs at MW-25 (barium) and 7 to 10 feet bgs at MW-26 (mercury).
- Four samples collected from the Site (MW25-6-8, B25C-8-10, MW26-3-5, and B26D-5-7) contained hazardous concentrations of lead.
- One metal, arsenic, was detected at a concentration above the TOGS AWQS in one filtered groundwater sample collected from off-site well MW-1R on the Harrison Avenue sidewalk. SVOCs were not detected in the filtered groundwater samples; however, one unfiltered sample (MW-26), which was noted to contain visible sediment, contained five SVOCs at concentrations above the TOGS AWQS. Based on this data, groundwater at the Site is not considered to be impacted by SVOCs or metals.

Areas of Concern

- The Site contains seven (7) localized areas of concern (below the minimum depth of construction excavation of 2 feet bgs) at the following boring locations based on total SVOC concentrations above 500 mg/kg, concentrations of metals above the Part 375 Commercial Use SCOs, and/or hazardous concentrations of lead: MW-25 (lead, mercury, barium, and SVOCs at 5 to 10 feet bgs), MW-26 (lead, mercury, and arsenic at 5 to 10 feet bgs), SBB-01 (lead at 5 to 7 feet bgs), SBB-07 (lead, mercury, barium, and SVOCs at 5 to 7 feet bgs), SBB-08 (lead and barium at 3 to 5 feet bgs), SBB-28 (arsenic, lead, barium, and SVOCs at 6 to 8 feet bgs), and SBB-27 (barium at 5 to 7 feet bgs)..
- Groundwater on the Site contains concentrations of benzene, vinyl chloride, and cis-1,2-DCE above the AWQS/GV.
- Soil vapor on the Site contains elevated concentrations of the chlorinated solvents PCE and TCE.

2.2 SITE HISTORY

2.2.1 Past Uses and Ownership

The Site has been used for private parking since at least the 1970s and is currently owned by Congregation YGS. The following table lists available deed transaction information for the Site.

Date	First Party Name	Second Party Name
5/11/2004	Ruth Apfelbaum	Congregation YGS
5/11/1973	Executors of Meyer Fine	Rose Fine

2.2.2 Phase I and Phase II Reports

Multiple environmental investigations were conducted at the Site between 1996 and 2011. Site investigations conducted by Roux on behalf of Pfizer Inc primarily addressed OU-1 and OU-2 of Site as part of the VCA. Investigations conducted by Langan in 2009 and 2011 on behalf of Congregation YGS addressed environmental conditions on Lot 1 (i.e., the Site and the NYCBCP Parcel). In addition, a Phase I Environmental Site Assessment (ESA) of the Site was

conducted in 2005 by Singer Environmental Group, LTD on behalf of Park Avenue Bank. A complete listing and summaries of the previous investigations are provided in Section 2.1.5.

2.2.3 Sanborn Maps

All Sanborn Maps available for this Site were reviewed prior to preparation of the RAWP. The Site was primarily occupied by multiple-story residences with storefronts between 1887 and 1935. The NYCBCP Parcel also contained a church in 1887, a wagon shop in 1918, and a folding box manufacturing facility in 1935. The Site contained a bottling company, garden, and school in 1904, a dance hall in 1935 and a junk lot in the 1935.

The Site appeared to be cleared of all but one former residential structure by 1947. The NYCBCP Parcel contained a lumber yard in 1947, and the entire Lot 1 contained a lumber yard in 1950. The Site has been used for private parking since at least 1977. Copies of the Sanborn Maps are included in Appendix B.

2.3 GEOLOGICAL CONDITIONS

Site Geology

As discussed in Section 2.1, the Site geology has been characterized during the course of several subsurface investigations addressing environmental conditions on Site B and Lot 1. Environmental investigations conducted between 1996 and 2011 have incorporated 21 borings and 14 test pits on the Site, as well as 11 borings and 5 test pits on the adjoining northern NYCBCP Parcel. In addition, Langan conducted a geotechnical investigation of Lot 1during two phases in October 2009 and January 2011. The investigation was conducted on behalf of UTA/Building Fund (i.e., Congregation YGS) and incorporated four (4) standard drill borings, two (2) test pits, and four (4) cone penetrometer test borings on the Site. The borings were advanced to depths of approximately between 60 and 100 feet bgs. The geotechnical investigation is summarized in a Final Geotechnical Engineering Report, dated February 28, 2011. A copy of the report is included in Appendix B.

The findings of the investigations indicate that a layer of fill is located throughout the Site and NYCBCP Parcel. A layer of fill generally consists of coarse- to fine-grained sand, some coarse- to fine-grained gravel with a trace to some silt, construction debris, concrete, brick, glass,

cinders and metal. The thickness of the fill layer varies from about 8 to 12 feet. The fill is underlain by an approximately 1- to 3-foot layer of clay and/or clayey silt. The clay/silt layer is underlain by a 5- to 15-foot layer of coarse- to fine-grained sand, which is in turn underlain by interlayered silt and clay. An approximately 40-foot layer of coarse- to fine-grained sand generally extends below the silt and clay to a depth of approximately 100 feet bgs. Bedrock has not been encountered during the Site investigations. A copy of the geotechnical boring location map and corresponding subsurface profiles are included as Figures 2 through 8.

Site Hydrogeology

Groundwater data has been obtained from historical wells MW-1 and MW-2, which were paved over in 2008, and existing wells MW-25 and MW-26, which were installed by Langan in 2011. Well MW-13 was located on the NYCBCP Parcel and also paved over in 2008. Historical and recent groundwater data has also been obtained from off-site wells located along Harrison Avenue (MW-1R and MW-11) and Wallabout Street (MW-16 and MW-18).

Groundwater depths and elevations measured during sampling events in 2008, 2010, and 2011 are presented in the following table:

Well	May 2008		November 2010		May 2011	
	Depth (bgs)	Elevation*	Depth (bgs)	Elevation*	Depth (bgs)	Elevation*
MW-1	7.13	4.20	-	-	-	-
MW-2	8.73	4.19	-	-	-	-
MW-13	7.80	3.59	-	-	-	-
MW-25	-	-	-	-	5.9	-
MW-26	-	-	-	-	6.5	-
MW-1R	-	-	6.6	3.5	5.3	4.7
MW-11	4.65	3.89	5.2	3.3	4.0	4.5
MW-16	-	-	5.6	3.0	4.7	4.0

Well	May 2008		November 2010		May 2011	
	Depth (bgs)	Elevation*	Depth (bgs)	Elevation*	Depth (bgs)	Elevation*
MW-18	-	-	6.3	3.1	5.2	4.2

*In feet relative to mean seal level using the Borough of Brooklyn Datum

- = No measurement taken

The comparatively higher groundwater elevations measured in May 2011 are attributable to heavy rains, which preceded the sampling event. Quarterly groundwater monitoring conducted on and adjacent to Site B has consistently identified a northwesterly groundwater flow direction across Lot 1, from Gerry to Wallabout Street. The direction of groundwater flow on the eastern Site B parcel and Lot 46 is inferred to be towards the north. Based on the Site's location in an east-west trending topographic depression, the regional direction of groundwater flow is ambiguous. The local northerly groundwater flow direction indicates a regional northeasterly flow direction towards the English Kills, which is located approximately 1 mile northeast of the Site. A copy of the most recent groundwater contour map from Roux' February 2011 Groundwater Remediation Progress Report for Site B is included as Figure 9.

2.4 CONTAMINATION CONDITIONS

2.4.1 Conceptual Model of Site Contamination

Soil, groundwater, and soil vapor contamination have been identified at the Site.

2.4.1.1 On-Site Contamination

Soil

Soil samples collected during Roux' 2005 Supplemental Site Investigation of Site B contained multiple SVOCs at concentrations above the Part 375 Unrestricted Use SCOs in each of the nine (9) soil borings. Total SVOC concentrations above 500 mg/kg were detected in three (3) soil samples collected from the western portion of the Site at depths between 5 and 8 feet bgs.

Multiple metals (i.e., mercury, lead, arsenic, barium, and cadmium) were detected at concentrations above the Part 375 Unrestricted Use SCOs during Roux' 2005 investigation and Langan's 2011 Remedial Investigation. Maximum detected metals concentrations exceeded the Part 375 Commercial Use SCOs at multiple locations at depth intervals of up to 10 feet bgs. The 2011 Remedial Investigation also identified hazardous concentrations of lead on the western portion of the Site at depths of up to 10 feet bgs.

Fill at the Site contains cinders, ash, metal, glass, and construction debris indicative of waste associated with combustion processes and possible industrial by-products. The detected SVOCs are classified as carcinogenic polycyclic aromatic hydrocarbons (PAHs). In the absence of significant petroleum staining or other indications of petroleum spills, the detected PAHs are likely attributable to waste derived from combustion. Likewise, elevated concentrations of metals are commonly associated with fill material. The contaminants of concern (COCs) in soil are therefore not attributable to a spill or historical site usage; rather, the COCs are artifacts of historic fill, which was emplaced at the Site prior to the 1970s.

Groundwater

Groundwater at the Site has been historically impacted by petroleum and chlorinated VOCs. Chlorinated VOCs include chemicals that are typically used for dry cleaning. Of three, historical on-site wells, one located on the eastern portion of the Site (MW-2) contained concentrations of benzene, cis-1-2-dichloroethene (cis-1,2-DCE), and vinyl chloride above the TOGS AWQS/GV. The total VOC concentration in well MW-2 during the final sampling event in 2008 was 62.8 µg/l. Based on the absence of elevated VOC concentrations in corresponding soil samples, the source of the VOC impacts is considered to be off-site. Groundwater analysis of SVOCs and metals during the 2011 Remedial Investigation indicated that SVOC and metals contamination in soil has not impacted groundwater at the Site.

Soil Vapor

Tetrachloroethene (PCE) was detected at concentrations above the NYSDOH AGV (100 $\mu g/m^3$) in soil vapor samples collected at five (5) locations throughout the Site. Though PCE has not been detected in groundwater samples collected from the Site, PCE has been detected at concentrations above the TOGS AWQS/GV in samples collected from the eastern portion of Site

B. As such, the source of the PCE is likely either the eastern portion of Site B, or properties south of Gerry Street (e.g., Pfizer Inc Site D of the VCA).

2.4.1.2 Off-Site Contamination

Soil

Elevated concentrations of SVOCs and metals above the Part 375 Commercial Use SCOs were identified in soil samples collected from the northern portion of Lot 1 (i.e., the NYCBCP Parcel) and the eastern portion of Site B. As with the on-site contamination discussed above, the elevated SVOC and metals concentrations are likely associated with historic fill. Historical, petroleum VOC impacts on the eastern portion of Site B were addressed during excavation and removal of contaminated soil in 2003. Historical petroleum contamination on the eastern portion of Site B is the likely source of historical detections of petroleum VOCs at the Site.

Groundwater

Groundwater samples collected from the eastern portion of Site B and a well located north of the NYCBCP Parcel on the Harrison Avenue sidewalk (MW-18) have contained concentrations of VOCs above the TOGS AWQS/GV. VOCs detected at elevated concentrations have included PCE, trichlorethene (TCE), vinyl chloride, cis-1,2-DCE, benzene, and isopropylbenzene. The source of the chlorinated VOCs has yet to be confirmed, but is potentially on Pfizer Inc Site D, which is located south of Gerry Street. Before Pfizer acquired Pfizer Inc. Site D, an entity conducted a tetrachloroethene (PCE) reclamation business on the property. The source of the petroleum VOCs may be residual impacts associated with the former petroleum tanks and contaminated soil that were removed from the eastern portion of Site B.

Soil Vapor

Soil vapor samples collected from the eastern portion of Site B during Roux' 2005 investigation contained PCE and TCE at concentrations above the NYSDOH AGVs. The source of the chlorinated VOCs is likely VOC-impacted groundwater on the eastern portion of Site B.

2.4.2 Description of Areas of Concern

As discussed in Section 2.4.1, groundwater and soil at the Site have historically been impacted by VOCs. Historic fill throughout the Site contains concentrations of SVOCs and metals above the Part 375 Unrestricted Use SCOs. At a minimum, the upper two feet of fill material will be excavated and removed off-site during the proposed development activities. As such, the Areas of Concern (AOCs) include portions of the Site below 2 feet bgs. Localized portions of the fill material contain lead at hazardous concentrations, and SVOCs and metals at concentrations above the Part 375 Commercial Use SCOs. Based on the localized presence of SVOCs and metals at concentrations above those which are typically observed in urban fill, the following AOCs have been identified at former boring locations:

AOC 1 (historic fill): SBB-08 – lead and barium at 2 to 7 feet bgs.

AOC 2 (historic fill): SBB-28 – arsenic, lead, barium, and SVOCs at 6 to 8 feet bgs.

AOC 3 (historic fill): MW-26 – lead, mercury, and arsenic at 5 to 10 feet bgs.

AOC 4 (historic fill): MW-25 – lead, mercury, barium, and SVOCs at 5 to 10 feet bgs

AOC 5 (historic fill): SBB-01 – lead and barium at 5 to 7 feet bgs.

AOC 6 (historic fill): SBB-07 - lead, mercury, barium, and SVOCs at 5 to 7 feet bgs.

AOC 7 (historic fill – VCA Parcel): SBB-27 – barium at 5 to 7 feet bgs.

AOC 8 (groundwater – Site-wide): benzene, vinyl chloride, and cis-1,2-DCE –impacted groundwater on the eastern portion of the Site.

AOC 9 (soil vapor – Site-wide): PCE-impacted soil vapor throughout the Site.

2.4.3 Identification of Standards, Criteria and Guidance

Site characterization of soils and remedy selection for soil cleanup will be accomplished under 6 NYCRR Part 375 – Inactive Hazardous Waste Disposal Sites, with reference to 6 NYCRR Subpart 375-6 Remedial Program Soil Cleanup Objectives. The following SCGs will apply to site remediation:

- DER Technical Guidance for Site Investigation and Remediation (DER-10)
- DER Presumptive/Proven Remedial Technologies (DER-15)

- CP-51 – Soil Cleanup Guidance
- DER Citizen Participation Handbook for Remedial Programs (DER 23)
- DER Green Remediation (DER 31)
- DER Institutional Controls (DER 33)

The following SCGs will apply to the removal of hazardous lead contaminated soil:

- 29 CFR Part 1910.120 - Hazardous Waste Operations and Emergency Response
- 29 CFR Part 1916 NYCRR Part 372 - Hazardous Waste Manifest System and Related Standards for Generators, Transporters and Facilities (November 1998)
- 6 NYCRR Part 375 – Identification and Listing of Hazardous Wastes
- 6 NYCRR Part 376 – Land Disposal Restrictions

Site characterization of groundwater will be in accordance with TOGS 1.1.1 – Ambient Water Quality Standards & Guidance Values and Groundwater Effluent Limitations. Closure of the two on-site wells, MW-25 and MW-26, will be conducted in accordance with the CP-43 – Groundwater Monitoring Well Decommissioning.

Site characterization of soil vapor and soil vapor mitigation measures will be implemented in accordance with the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York, dated October 2006.

2.4.4 Soil/Fill Contamination

The COCs identified in soil at the Site are associated with combustion by-products and waste entrained in historic fill, which extends to a depth of approximately 10 feet bgs. The COCs include metals and SVOCs (specifically carcinogenic PAHs).

2.4.4.1 Summary of Soil/Fill Data

A comprehensive sampling plan showing the locations of all samples collected during the sub-surface investigations is provided in Figure 10. The following tables summarize the concentrations of COCs in soil samples collected at the Site.

Total Metals – Summary of Analytical Results

Soil Sampling Location	Metals Concentrations (mg/kg)												
	Depth Interval	**Pb**	**Hg**	**Cd**	**Cr**	**As**	**Zn**	**Ni**	**Cu**	**Se**	**Th**	**Be**	**Ba**
SBB-01	0-2”	16.2	ND	ND	10.5	3.2	NA	NA	NA	NA	NA	NA	52.5
	2-24”	756	**3.6**	1.3	25.9	235	NA	NA	NA	NA	NA	NA	**456**
	5-8’	**1,690**	0.84	3.7	19.9	39.7	NA	NA	NA	NA	NA	NA	**800**
SBB-02	0-2”	**1,630**	0.51	2.1	23.3	12.8	NA	NA	NA	NA	NA	NA	**779**
	2-24”	**2,120**	0.99	2.6	20.6	10	NA	NA	NA	NA	NA	NA	**760**
	5-8’	179	2.5	ND	12.9	9.8	NA	NA	NA	NA	NA	NA	322
SBB-03	0-2”	87.2	0.13	ND	17	5.8	NA	NA	NA	NA	NA	NA	101
	2-24”	**1,610**	**2.9**	1.5	30.8	18.6	NA	NA	NA	NA	NA	NA	**1,180**
	5-8’	589	0.67	ND	15.7	12.3	NA	NA	NA	NA	NA	NA	228
SBB-07	0-2”	298	0.39	1.5	21.7	9.7	NA	NA	NA	NA	NA	NA	140
	2-24”	912	1.3	2.3	25.4	14.3	NA	NA	NA	NA	NA	NA	**461**
	5-8’	**2,450**	**8.5**	2.4	27.4	11.5	NA	NA	NA	NA	NA	NA	**1,850**
SBB-08	0-2”	319	0.71	ND	19.1	10.1	NA	NA	NA	NA	NA	NA	110
	2-24”	657	0.71	ND	22.9	15.9	NA	NA	NA	NA	NA	NA	539
	5-8’	**1,330**	1.5	3.9	17.9	7.9	NA	NA	NA	NA	NA	NA	**1,320**
SBB-25	6-8’	**8,920**	1.8	3.3	29.2	16.5	NA	NA	NA	NA	NA	NA	**2,760**
SBB-26	5-7’	406	**621**	ND	29.8	8.6	NA	NA	NA	NA	NA	NA	140
SBB-27	5-7’	524	1.8	ND	16.5	8	NA	NA	NA	NA	NA	NA	**982**
SBB-28	6-8’	**1,760**	0.77	3.5	25.7	**18.2**	NA	NA	NA	NA	NA	NA	**477**
B3	0-9’	110	**4.68**	ND	21.8	6.37	121	22.1	60	2.44	ND	0.435	86.7
B5	1-11’	432	2.83	2.93	24	8.76	1,310	17.8	82.9	ND	ND	0.298	**571**

Soil Sampling Location	Metals Concentrations (mg/kg)												
	Depth Interval	**Pb**	**Hg**	**Cd**	**Cr**	**As**	**Zn**	**Ni**	**Cu**	**Se**	**Th**	**Be**	**Ba**
TP-4	1-8’	**5,050**	2.72	1.24	19.9	**17.9**	1,500	15.9	7,000	0.368	ND	0.41	**689**
MW-25	3-5/ 6-8/ 8-10’	37.8/ 816/ 680	0.603 0.597/ 0.805	0.534/ 2.18/ 1.84	16.3/ 33.6/ 15.8	2.44/ 8.56/ 7.67	NA	NA	NA	0.555/ 1.78/ 1.32	NA	NA	48.3/ **484**/ **2,000**
B25-A	3-5/ 6-8/ 8-10’	75.8/ 563/ 759	0.356/ 1.15/ 1.12	0.507/ 1.06/ 1.04	18.3/ 15.6/ 15	7.09/ 5.33/ 6.45	NA	NA	NA	0.758/ 1.04/ 1.6	NA	NA	76.4/ **441**/ **496**
B-25B	3-5/ 6-8/ 8-10’	568/ 132/ 11.3	1.49/ **6.91**/ 0.132	1.73/ 0.766/ 0.569	13.3/ 14.7/ 21.5	13/ 4.89/ 1.89	NA	NA	NA	1.27/ 0.941/ ND	NA	NA	279/ 110/ 48.8
B-25C	3-5 /6-8/ 8-10’	392/ 898/ 316	0.796/ **12.3**/ 1.39	1..39/ 1.58/ 0.716	11.2/ 17.4/ 20.3	13.3/ 6.84/ 2.58	NA	NA	NA	1.25/ 1.33/ 0.47	NA	NA	298/ **1,260**/ 545
B-25D	3-5/ 6-8/ 8-10’	265/ **1,320**/ 60.1	0.32/ **11.7**/ 0.33	1.26/ 4.92/ 0.547	16.9/ 26.9/ 17	6.6/ **20.5**/ 3.01	NA	NA	NA	0.474/ 0.594/ ND	NA	NA	216/ **1,160**/ 77.6
MW-26	3-5/ 5-7/ 7-10’	365/ 370/ 13.2	1.95/ **11.1**/ 2.83	2.3/ 1.6/ 0.48	18/ 19.1/ 12.2	6.22/ 7.5/ 1.61	NA	NA	NA	0.798/ 1.32/ ND	NA	NA	231/ 259/ 27.5
B-26A	3-5/ 5-7/ 7-10’	163/ 420/ 10.4	0.831/ **8.71**/ 0.156	3.31/ 3.2/ 0.317	10.6/ 15/ 14.5	4.5/ **17.1**/ 1.42	NA	NA	NA	ND/ 1.14/ ND	NA	NA	174/ 319/ 23.3
B-26B	3-5/ 5-7/ 7-10’	224/ 124/ 68.4	**18.3**/ 1.69/ 0.864	0.586/ 0.402/ 0.434	15.7/ 14.2/ 12.6	8.44/ 4.19/ 3.64	NA	NA	NA	ND/ ND/ 0.295	NA	NA	105/ 59.5/ 65.7
B-26C	3-5/ 5-7/ 7-10’	246/ 701/ 13.9	**298**/ **163**/ 1.15	1.09/ 1.94/ 0.302	15.1/ 12.3/ 13.1	6.31/ 10.9/ 1.26	NA	NA	NA	0.868/ 1.05/ 1.05	NA	NA	146/ 124/ 28.1
B-26D	3-5/ 5-7/ 7-10’	**1,540**/ **6,730**/ 36.8	**5.1**/ **16.1**/ 0.873	5.72/ **18.2**/ 0.333	25.4/ 26.4/ 12.7/	8.56/ 12.7/ 1.28	NA	NA	NA	1.04/ 1.57/ ND	NA	NA	**818**/ **1,970**/ 36.6

NA – Not Analyzed

ND – Not Detected
Concentrations exceeding Part 375 Commercial Use SCOs are in bold.

Total Metals – Ranking Table (Concentrations Exceeding Part 375 Commercial Use SCOs)

Analyte	Part 375 Commercial Use SCO (mg/kg)	Range (mg/kg)	Samples
Lead	1,000	8,920	SBB-25 (6-8)
		6,730	B-26D (5-7)
		5,050	TP4 (1-8)
		2,450	SBB-07 (5-8)
		2,120	SBB-02 (2-24")
		1,760	SBB-28 (6-8)
		1,690	SBB-01 (5-8)
		1,630	SBB-02 (0-2")
		1,610	SBB-03 (2-24")
		1,540	B-26D (3-5)
		1,330	SBB-08 (5-8)
		1,320	B-25D (6-8)
Mercury	2.8	621	SBB-26 (5-7)
		298	B-26C (3-5)
		163	B-26C (5-7)
		18.3	B-26B (3-5)
		16.1	B-26D (5-7)
		12.3	B-25C (6-8)
		11.7	B-25D (6-8)
		11.1	MW-26 (5-7)
		8.71	B-26A (5-7)
		8.5	SBB-07 (5-8)
		6.91	B-25B (6-8)
		5.1	B-26D (3-5)
		4.68	B3 (0-9)
		3.6	SBB-01 (2-24")
		2.9	SBB-03 (2-24")
Arsenic	16	20.5	B-25D (6-8)
		18.2	SBB-28 (6-8)
		17.9	TP-4 (1-8)
		17.1	B-26A (5-7)
Barium	400	2,760	SBB-25 (6-8)
		2,000	MW-25 (8-10)
		1,970	B-26D (5-7)
		1,850	SBB-07 (5-8)
		1,320	SBB-08 (5-8)
		1,260	B-25C (6-8)
		1,180	SBB-03 (2-24")

Analyte	Part 375 Commercial Use SCO (mg/kg)	Range (mg/kg)	Samples
		1,160	B-25D (6-8)
		982	SBB-27 (5-7)
		818	B-26D (3-5)
		800	SBB-01 (5-8)
		779	SBB-02 (0-2")
		760	SBB-02 (2-24")
		689	TP-4 (1-8)
		571	B5 (1-11)
		496	B25A (8-10)
		484	MW-25 (6-8)
		477	SBB-28 (6-8)
		461	SBB-07 (2-24")
		456	SBB-01 (2-24")
		441	B-25A (6-8)
Cadmium	9.3	18.2	B-26D (5-7)

TCLP Lead – Ranking Table (Concentrations Exceeding EPA Hazardous Waste Limitation)

Sample	Concentration (mg/L)
B-26D (5-7)	38.9
B-25C (8-10)	8.37
MW-26 (3-5)	6.41
MW-25 (6-8)	5.1

Total SVOCs – Ranking Table (Concentrations Exceeding 500 mg/kg)

Sample	Concentration (mg/kg)
SBB-07 (5-7)	20,416
SBB-25 (6-8)	2,908
SBB-28 (6-8)	1,395

2.4.4.2 Comparison of Soil/Fill with SCGs

Metals

Multiple metals (arsenic, mercury, lead, barium, and cadmium) were detected at concentrations above the Part 375 Restricted Residential Use SCOs in samples of historic fill collected at depths varying from 0 to 10 feet bgs from most boring locations during Roux' 2005 and Langan's 2009 and 2011 sub-surface investigations. As shown in the summary and ranking tables in Section 2.4.4.1, four soil samples contained hazardous concentrations of lead, and 12 soil samples contained total lead concentrations above the Part 375 Commercial Use SCO. Fifteen (15) soil samples contained mercury at concentrations above the Part 375 Commercial Use SCO, including three (3) that were two orders of magnitude over the SCO. Four (4) samples contained arsenic at concentrations that marginally exceeded the Part 375 Commercial Use SCO. Twenty-one (21) samples contained barium at concentrations above the Part 375 Commercial Use SCO, include eight (8) that were an order of magnitude above the SCO. One (1) sample contained cadmium at a concentration that was marginally above the Part 375 Commercial Use SCO.

The primary COCs, which were identified at concentrations above those typically associated with historic fill, are lead, mercury, barium, and arsenic. The analytical results of total and TCLP metals analysis conducted during Langan's 2011 RI are summarized in Table 1. The analytical results of Roux' sub-surface investigations of Site B and Langan's 2009 pre-construction investigation are included in the reports provided in Appendix B. A spider map showing soil sample locations and metals exceedances of Track 1 SCOs is provided as Figure 11.

SVOCs

Soil samples collected during Roux's 2005 investigation of Site B contained multiple SVOCs at concentrations above the Part 375 Restricted Residential Use SCOs in each of the nine (9) soil borings. Total SVOC concentrations above 500 mg/kg were detected in three (3) soil samples collected from the western portion of the Site at depths between 5 and 8 feet bgs, as shown in the ranking table in Section 2.4.4.1. The SVOCs exceeding the Restricted Residential Use SCOs generally belong to sub-class of SVOCs characterized as carcinogenic PAHs. Based on the absence of corresponding petroleum impacts, the elevated SVOC concentrations are likely

indicative of the by-products of combustion. The analytical results of SVOC analysis conducted during Roux's investigations of Site B included in the reports provided in Appendix B. A spider map showing soil sample locations and SVOC exceedances of Track 1 SCOs is provided as Figure 12.

VOCs

Soil samples collected from the Site during Roux's 2005 investigation of Site B and Langan's RI did not contain VOCs at concentrations above the Part 375 Restricted Residential Use SCOs. The analytical results of VOC analysis conducted during Roux's and Langan's investigations are included in the reports provided in Appendix B.

PCBs, Pesticides, and Herbicides

Soil samples collected from the Site have not been analyzed for PCBs, pesticides, or herbicides; however, samples collected from historic fill on the NYCBCP Parcel during Langan's RI did not contain PCBs, pesticides, or herbicides at concentrations above the Part 375 Restricted Residential Use SCOs. The analytical results of the PCB, pesticides, and herbicides analysis are included in the reports provided in Appendix B.

2.4.5 On-Site and Off-Site Groundwater Contamination

2.4.5.1 Summary of Groundwater Data

Based on groundwater samples collected from the two historical Site wells (MW-1 and MW-2), the historical well on NYCBCP Parcel (MW-13), and the active four wells along Harrison Avenue and Wallabout Street (MW-1R, MW-11, MW-16, and MW-18), three VOCs (benzene, cis-1,2-DCE, and vinyl chloride) are the COCs in groundwater at the Site. Groundwater samples collected from the two new on-site wells, MW-25 and MW-26, during Langan's 2011 RI indicated that groundwater is not impacted by metals or SVOCs. The following table summarizes the concentrations of COCs in groundwater samples collected during the most recent corresponding sampling events.

Well (Date Sampled)	Benzene (µg/l)	Cis-1,2-DCE (µg/l)	Vinyl Chloride (µg/l)
MW-1 (5/2008)	ND	ND	ND

Well (Date Sampled)	Benzene (µg/l)	Cis-1,2-DCE (µg/l)	Vinyl Chloride (µg/l)
MW-2 (5/2008)	**1.6**	**45**	**15**
MW-13 (5/2008)	ND	ND	ND
MW-1R (11/2010)	ND	ND	ND
MW-11 (11/2010)	ND	ND	ND
MW-16 (11/2010)	ND	**76**	**7**
MW-18 (11/2010)	**24**	**1,700**	**340**

Concentrations exceeding the TOGS AWQS/GV are in bold.

2.4.5.2 Comparison of Groundwater with SCGs

As shown in the table in Section 2.4.5.1 and discussed in Section 2.4.1.1, groundwater on the eastern portion of the Site contains concentrations of benzene, cis-1,2-DCE and vinyl chloride above the TOGS AWQS/GV. The off-site well located on the Harrison Avenue sidewalk north of the NYCBCP Parcel contains the identical VOCs at concentrations above the TOGS AWQS/GV. Based on the absence of VOC impacts in soil at the Site and the presence of historical petroleum-contaminated soil and chlorinated and petroleum VOCs at higher concentrations on the eastern portion of Site B, the source of the VOC impacts may be on the eastern portion of Site B or Pfizer Inc Site D south of Gerry Street (i.e., OU-1). Before Pfizer acquired Pfizer Inc. Site D, an entity conducted a tetrachloroethene (PCE) reclamation business on the property. Pfizer Inc is addressing the off-site sources of VOC contamination on OU-1 in accordance with the VCA.

Tables that indicate exceedances from GA groundwater standards in monitoring wells prior to the remedy are included in the reports provided in Appendix B. The groundwater sampling results from Langan's 2011 RI are summarized in Table 2. Spider maps that indicate the locations of and summarize exceedances of GA groundwater standards prior to the remedy are shown in Figures 13 and 14.

2.4.6 On-Site and Off-Site Soil Vapor Contamination

As described in Section 2.4.1.1, PCE was detected at elevated concentrations in eight (8) soil vapor samples collected from depths of 3 and 5 feet bgs at five (5) locations throughout the Site. PCE was also detected at elevated concentrations in soil vapor samples collected from the eastern portion of the VCA. PCE is therefore considered a COC in soil vapor. The following table summarizes PCE concentrations in soil vapor samples collected during Roux's 2005 sub-surface investigation and Langan's 2011 Remedial Investigation:

Soil Vapor Sample	Sampling Depth	PCE Concentration ($\mu g/m^3$)
SV-1	3	**150**
	6	ND
SV-2	3	**330**
	6	**330**
SV-3	3	**390**
	6	**300**
SV-4	3	88
	6	**330**
SV-5	3	**410**
	6	**470**

Concentrations above the NYSDOH AGV are in bold
ND – Not Detected

2.4.6.1 Comparison of Soil Vapor with SCGs

The 2006 NYSDOH Soil Vapor Guidance document provides a decision matrix for mitigation measures for PCE. The matrix is based on comparisons between sub-slab soil vapor and indoor air concentrations. In the absence of either of these samples, the matrix provides a general guidance for evaluating the need for soil vapor mitigation. Based on the PCE concentrations observed in the soil vapor samples collected at the Site, the decision matrix

indicates that at a minimum, continued sub-slab soil vapor and air monitoring should be conducted.

Though PCE has not been detected in groundwater samples collected from the Site, PCE has been detected at concentrations above the TOGS AWQS/GV in samples collected from the eastern portion of Site B. As such, the source of the PCE is likely either contamination on the eastern portion of Site B or Pfizer Site D.

A table of soil vapor data collected prior to the remedy is shown in Table 4. A spider map that indicates the locations of and summarizes soil vapor data prior to the remedy is shown in Figure 15.

2.5 ENVIRONMENTAL AND PUBLIC HEALTH ASSESSMENTS

2.5.1 Qualitative Human Health Exposure Assessment

Conceptual Site Model

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

Potential Sources of Contamination

Potential sources of contamination at the Site have been identified in Langan's RI and Roux' sub-surface investigations of Site B. Contaminant sources are discussed in the Conceptual Model of Site Contamination in Section 2.4.1. The potential on-site source of soil contamination was identified as fill material. The potential off-site sources of groundwater and soil vapor contamination are historical petroleum impacts associated with underground storage tanks (USTs) on the eastern portion of Site B; groundwater contaminated with petroleum and chlorinated VOCs on Site B; and former operations on Pfizer Inc Site D south of Gerry Street. Before Pfizer acquired Pfizer Inc. Site D, an entity conducted a tetrachloroethene (PCE) reclamation business on the property.

Exposure Media

The media potentially impacted by the above sources include soil, soil vapor, and groundwater. Site soil is likely impacted by waste and combustion by-products entrained in historic fill. Analytical data collected to date indicates that the soil underlying the Site is contaminated with SVOCs, lead, mercury, arsenic, and barium. Historic fill at the Site extends to a depth of approximately 10 feet bgs. Groundwater may have been impacted by historical petroleum contamination and groundwater contaminated with chlorinated VOCs on the eastern portion of Site B, or historical usage of Pfizer Inc Site D. Analytical data collected to date indicates that the groundwater underlying the eastern portion of the Site is impacted with benzene, cis-1,2-DCE, and vinyl chloride. Sub-surface soil vapor contains petroleum VOCs, benzene and toluene, and PCE. Vapors would be expected to accumulate under the proposed building slab, which will represent a vertical barrier to venting of volatile compounds.

Receptor Populations

The Site is currently vacant; therefore, there are no human receptors under current conditions. During construction and remediation activities, receptors will include construction and remediation workers and the local population. Under future conditions, receptors will include the high school students, school employees, and visitors.

Potential Exposure Pathways – On-Site

Current Conditions

Soil throughout the Site has primarily been contaminated with various SVOCs and metals. The Site is currently partially paved with degraded asphalt. Portions of the Site contain exposed soil. In localized areas where human exposure to contaminated soil is possible (i.e., ground surface is not paved or capped in some manner), the potential migration pathway is likely complete for dermal absorption and ingestion.

Groundwater has been contaminated with VOCs (i.e., benzene, cis-1,2-DCE, and vinyl chloride). On-site VOC exceedances of the TOGS AWQS/GV are marginal, and the groundwater contamination appears to be localized to the eastern portion of the Site. VOC-impacted groundwater appears to be migrating on to the Site from up-gradient sources on the eastern portion of Site B and Pfizer Inc Site D. Contaminated groundwater has also been identified in a well down-gradient of the Site on the Harrison Avenue sidewalk (i.e., MW-18).

The approximate depth of groundwater at the Site is between 5 and 8 feet bgs. Groundwater is not exposed at the Site. The Site is served by the public water supply and groundwater is therefore not used at the Site.

Soil vapor samples collected from the Site contained benzene, toluene, hexane, and n-heptane at concentrations above background comparison values. Soil vapor samples exhibited PCE at elevated concentrations. Based on the decision matrix for evaluating mitigation of PCE in soil vapor, which is provided in the 2006 NYSDOH Soil Vapor Guidance Document, mitigation (e.g., installation of a vapor barrier and sub-slab depressurization system) is the conservative approach to addressing PCE impacts in soil vapor at the Site. The Site currently contains no structures, and therefore, no barriers to soil vapor migration.

Construction/Remediation Activities

The proposed construction and remediation activities at the Site will result in potential exposures to Site contaminants. The proposed activities include excavation and removal of metals- and SVOC-impacted soil, and periodic dewatering. Therefore, the potential exists for exposure of soil constituents of concern to construction workers via direct contact, ingestion, and inhalation. If groundwater is encountered during excavation activities, exposure of groundwater constituents of concern to construction workers is also possible via direct contact, ingestion, and inhalation. The proposed construction activities may also result in exposure to the public and construction workers through volatilization of vapors into the air and through generation and off-site migration of dust containing Site constituents of concern. However, such exposures would be of short duration limited only to intrusive activities. Working in accordance with a Health and Safety Plan, a Soil Management Plan, and a Community Air Monitoring Plan, including such measures as conducting an air monitoring program, donning personal protective equipment, and applying vapor and dust suppression measures to prevent off-site migration of contaminants during construction would make this potential migration pathway incomplete.

Proposed Future Conditions

Upon completion of the proposed construction activities, the Site will be completely covered by the proposed high school building, which will prevent direct human exposure to impacted soil and groundwater left in place.

The presence of VOCs in the groundwater represents a potential for VOC vapors to volatilize and potentially accumulate under the proposed building. Likewise, the soil vapor which contains elevated levels of certain VOCs can potentially accumulate under the proposed building. These vapors could enter the proposed structures through penetrations or cracks in the floor slab or foundation walls and impact future users. Potential exposure to VOCs in soil vapor will be mitigated through the installation of a soil vapor barrier and an active sub-slab depressurization system (SSDS) underneath the building foundation.

Potential Exposure Pathways – Off-Site

The Site is not considered a source for the VOC-impacted groundwater off-site. Pfizer Inc. is currently addressing the source of the VOCs and any potential off-site exposure through investigation and remediation activities for OU-1.

Summary

Complete on-site exposure pathways may exist between the contaminated media and human receptors during current conditions and construction and remediation activities. The exposure pathways under the proposed conditions will be addressed through mitigation measures (i.e., impermeable surface cover, vapor barrier, and SSDS). The pathways include direct contact (dermal absorption), ingestion, and inhalation of soil and groundwater contaminants. The tables below summarize the exposure pathways for the Site.

Source	Contaminant/ Release Transport Mechanism	Receptor	Exposure Pathway
Contaminated Soil	- Historic fill and soil contamination	Current: Site Vacant – No Exposure Construction: Construction/ remediation workers, Local population Future: High school student, school employees, visitors	Current: Dermal absorption and ingestion of soil Construction: Inhalation of dusts/vapors, Dermal absorption and ingestion of soil (workers only) Future: Inhalation of indoor air vapors (addressed through mitigation measures)
Contaminated Groundwater	- Releases associated with off-site historical petroleum contamination - Releases associated with off-site commercial and manufacturing	Current: Site Vacant – No Exposure Construction: Construction/ remediation workers, Local population Future: High school	Current: No on-site structures – no exposure Construction: Inhalation of vapors, Dermal absorption and ingestion of groundwater

Source	Contaminant/ Release Transport Mechanism	Receptor	Exposure Pathway
	usage	student, school employees, visitors	(workers only) Future: Inhalation of indoor air vapors (addressed through mitigation measures)

Evaluation of Human Health Exposure

Based upon the conceptual site model and the review of environmental data, complete on-site exposure pathways appear to be present based on current conditions, and during the construction and remediation phase. The complete exposure pathways indicate there is a risk of exposure to humans from Site contaminants.

Complete exposure pathways have the following five elements: 1) a contaminant source; 2) a contaminant release and transport mechanism; 3) a point of exposure; 4) a route of exposure; and 5) a receptor population. A discussion of the five elements comprising a complete pathway as they pertain to the Site is provided below.

Current Conditions

Contaminant sources include the historic fill and groundwater contamination. Contaminant release and transport mechanisms include volatilization of contaminants from the groundwater matrices to the soil vapor phase. Points of exposure include those areas on-site where contaminated soil is present with no surface cover. Routes of exposure may include ingestion and dermal absorption of contaminated soil. Because the Site is vacant, there is no receptor population.

Construction/Remediation Activities

Contaminant sources and contaminant release and transport mechanisms are those identified for the current conditions. Points of exposure include the disturbed and exposed contaminated soil during excavation, contaminated dust and organic vapors arising from the excavation activities, and contaminated groundwater encountered during excavation and dewatering operations. Routes of exposure include ingestion and dermal absorption of contaminated soil and groundwater, inhalation of organic vapors arising from contaminated groundwater, and inhalation of dust arising from contaminated soil. The receptor population includes the construction and remediation workers and, to a lesser extent, the local population. All five

elements exist; therefore, completed exposure pathways are present. However, the risk can be minimized by applying appropriate health and safety measures, such as monitoring the air for organic vapors and dust, using vapor and dust suppression measures, maintaining site security, and wearing the appropriate personal protective equipment.

Proposed Future Conditions

Contaminant sources and contaminant release and transport mechanisms are those identified for the current conditions. Points of exposure include cracks in the foundation or subgrade walls. Routes of exposure may include inhalation of vapors entering the building; these routes will be addressed through mitigation measure (i.e., vapor barrier and SSDS). The receptor population includes the high school students, school employees, and visitors. The effectiveness of the SSDS and soil vapor barrier need to be verified with indoor air samples following completion of the building.

Ecological Risks

The Site is located in an urban fully developed area. The current surface cover on the Site provides minimal habitat for wildlife. Because of the lack of suitable habitat, the ecological risks are negligible.

Human Health Exposure Assessment Conclusions

The following conclusions were developed from this human health exposure assessment:

1. There may be complete exposure pathways for Site contaminants to human receptors for current conditions. Because the Site is vacant and without structures, there are no current receptors at the Site.
2. There is a moderate risk of exposure during the construction and remediation activities. This risk can be minimized by following the appropriate health and safety, vapor and dust suppression, and Site security measures.
3. The existence of a complete exposure pathway for Site contaminants to human receptors during proposed conditions is unlikely, since metals and SVOC-contaminated soils and some contaminated groundwater will be removed during remediation activities, the entire Site will be capped with an impermeable cover, and a soil vapor mitigation system will be installed. Indoor air samples will be collected upon completion of the remediation to further evaluate potential exposure pathways.

4. Off-site contamination due to groundwater migration is being addressed by Pfizer Inc in accordance with the VCA.
5. There are negligible risks to the ecological environment based on current conditions. The future conditions at the Site will not impact the ecological conditions at the Site.

2.7 REMEDIAL ACTION OBJECTIVES

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

2.7.1 Groundwater

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.

2.7.2 Soil

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.

2.7.3 Soil Vapor

RAOs for Public Health Protection

- Prevent contact inhalation of volatiles emanating from contaminated groundwater or soil.

3.0 DESCRIPTION OF REMEDIAL ACTION PLAN

3.1 EVALUATION OF REMEDIAL ALTERNATIVES

Two alternatives are considered to achieve the remedial goals and remedial action objectives that are defined in Section 2.7. The two alternatives are:

- Alternative I – Unrestricted Use (Track 1)

    a. Includes the removal of all fill and soil exceeding the Track 1 – Part 375 Unrestricted Use SCOs.

    b. Per ECL § 27-1415, alternative I does not allow restrictions on the use of the site (e.g. commercial, industrial), and does not allow the reliance on long-term institutional or engineering controls.

- Alternative II –Restricted Residential Use with site-specific soil cleanup objectives (Track 4)

    a. Includes the removal of fill and soil exceeding the SSSCOs. The SSSCOs established for this site are the restricted residential use SCOs with the exception of:

        • characteristic lead hazardous soils (i.e., 5 mg/l TCLP);

        • metals exceeding Part 375 Commercial Use SCOs; and

        • total SVOCs above 500 mg/kg.

    b. Includes installation of soil vapor membrane and active SSDS in the proposed building.

    c. Includes long-term Engineering and Institutional Controls in the form of a Site Management Plan and deed restriction.

Following a detailed description of each alternative in the next two sections, the two alternatives are evaluated against NYSDEC BCP remedy evaluation criteria listed below.

A. Protection of Human Health and Environment
B. Standards, Criteria, and Guidance (SCG);
C. Short-Term Effectiveness and Permanence;
D. Long-Term Effectiveness and Permanence;
E. Reduction of Toxicity, Mobility, or Volume;
F. Implementability
G. Cost Effectiveness
H. Community Acceptance
I. Land Use

Alternative I: Unrestricted Use

Achieving a Track 1 Unrestricted Use status for the site will require the remediation of all contaminated soil that exceeds the NYSDEC 6 NYCRR Part 375 Track 1 SCOs. The only long-term institutional or engineering control that may be considered is a groundwater-use restriction placed upon the site. This may be considered if the groundwater contamination has been reduced to asymptotic levels that are protective of health and the environment, and all contaminated soil has been remediated.

Alternative I Concept

Alternative I would be executed by accomplishing the following tasks:

- Removal of all Site fill and soil that exceeds Track 1 SCOs
- Backfilling of all excavation/removal areas with acceptable soil ; and
- Development and execution of plans for the protection of on-site workers, community, and environment during remediation and construction activities.

The requirements for each of the above tasks are described below.

Targeted Fill and Soil Removal

All historical fill samples analyzed as part of the RI and earlier sub-surface investigations contained Track 1 SCOs exceedances. Therefore, it is assumed that the entire site, which according to field observations is covered with historic fill, would have to be excavated to remove the contaminated soil. The estimated total volume of targeted (exceeding Track 1 SCOs) fill and soil that would be required to be removed and properly disposed off-site under Alternative I is 6,000 cubic yards. This estimate was developed under the assumption that the targeted fill and soil would have to be removed, on average, to 10 feet bgs. These vertical excavation limits were derived from the findings of the completed sub-surface environmental and geotechnical investigations.

Access to the targeted fill and soil would require extensive dewatering across the entire Site. As the excavation would extend up to 5 feet below the groundwater table, multiple dewatering wells and a groundwater treatment system would need to be installed under a New York City Department of Environmental Protection (NYCDEP) dewatering permit.

The streets, sidewalks, and other adjacent structures would need to be supported along the property line from the potential destabilizing effects of the remedial excavation. Excavation support measures would include some combination of underpinning, sloped excavation, and installation of sheet piles supported with anchors and walers. The excavation support controls for the Track I concept are described below.

Excavation Backfill

After an area has been successfully excavated of all the targeted materials, end-point samples collected, and proper closure documentation generated, the excavation area would be backfilled and compacted with imported soil that meets the requirements of Part 375-6.7(d) and is obtained from a NYSDEC-permitted or registered recycling facility or other acceptable fill source. The Site would be filled with acceptable fill material to the sub-grade elevation of the proposed development. The quantity of off-site fill material required to be imported is estimated at 4,500 cubic yards.

On-Site Worker, Public Health, and Environmental Protection

A site-specific health and safety plan would be developed and enforced to protect on-site workers from accidents and acute and chronic exposures from the identified contaminated media on site. The public health would be ensured by implementing and enforcing dust, odor, and organic vapor control and monitoring procedures, including a Community Air Monitoring Program (CAMP). However, it is not expected that the implementation of odor and organic vapor control measures would be required based on the findings of the remedial investigation. The environment would be protected by implementing and enforcing the appropriate soil erosion prevention measures.

Alternative II: Restricted Residential Use with Site-Specific Soil Cleanup Objectives (SSSCOs)

For a cleanup that does not meet the criteria for unrestricted use, the restricted residential use category is the appropriate use category for elementary or secondary schools as per DER-10. Achieving the Track 4 - Restricted Residential Use status for the site, which would be protective of public health and the environment, would require the removal of source areas defined by the analytically-identified atypical mercury-, lead-, arsenic-,barium-, and SVOC-contaminated fill that exceeds the Track 4 SSSCOs. The SSSCOs established for this site are the restricted residential use SCOs with the exception of:

- characteristic lead hazardous soils (i.e., 5 mg/l TCLP);
- metals exceeding Part 375 Commercial Use SCOs; and
- total SVOCs above 500 mg/kg.

Alternative II would also require the implementation of institutional and engineering controls.

Alternative II Concept

Alternative II could be executed by accomplishing the following tasks:

- Targeted removal of soil and fill which exceeds Track 4 SSSCOs. The proposed SSSCOs are the Part 375 Commercial Use SCOs for metals, hazardous levels of lead and mercury, 500 mg/kg for total SVOCs, and the Part 375 Restricted Residential Use SCOs for other contaminants
- Treatment, as necessary, of groundwater that is pumped as part of construction-related dewatering.
- Backfilling all excavation/removal areas with imported fill that contains no exceedances of Part 375 Restricted Residential Use SCOs.
- Installation of a vapor proofing membrane and active SSDS in the proposed building.
- Construction of a cover system consisting of the proposed structure (school building), concrete, and/or asphalt.
- Imposing Institutional Controls, which include a deed restriction and "notice of use restrictions" on the land and groundwater.

- Implementation of a HASP and CAMP for protection of on-site workers, community, and environment during remediation and construction activities
- Implementation of a Site Management Plan to ensure the continued integrity of engineering and institutional controls

The requirements for each of the above tasks are described below, with areas of remediation shown in Figure 16.

Targeted Fill and Soil Removal

There are seven areas of concern containing contaminated soil that exceeds the Track 4 SSSCOs below the construction excavation of 2 feet bgs. NYSDEC will be consulted on any proposed deviation from excavation as detailed in this RAWP.

Remediation areas are further detailed in Section 2.4.2. The entire Site will be excavated to a minimum depth of 2 feet bgs for construction of the foundation slab and SSDS. Remediation of the NYCBCP Parcel is addressed in a separate RAWP, which has been submitted by Congregation YGS to NYCOER as part of the E-Designation and NYCBCP requirements. Excavation areas for the Site are shown in Figure 16. The map shows the estimated final lateral and vertical extent of the Track 4 excavation areas, barring any newly discovered contaminated areas or unplanned limitations to excavation extents. Excavation areas will change based on field delineation and evaluation of the limitations discussed above during the remedial action. The estimated volume of targeted fill and soil (exceeding Track 4 SSSCOs) that would be required to be removed and properly disposed under Alternative II is approximately 3,000 cubic yards.

Soil will be excavated in the AOCs to, at a minimum, the maximum depth of confirmed Track 4 SSSCO exceedances. Removal inspection will consist of a visual, olfactory, and instrument screening process to evaluate for indications of contamination. Additional excavation below the confirmed Track 4 SSSCO exceedance depth may be conducted, based on observations of cinders or other potentially contaminated waste. Following excavation of the target hot spot areas containing elevated concentrations of lead, remaining soil will be screened with an x-ray fluorescence (XRF) analyzer calibrated to measure lead concentrations. Soil in lead-contaminated AOCs will be excavated, where feasible, until the remaining soil exhibits

XRF lead concentrations below 400 mg/kg. Post excavation confirmation sampling will be conducted in accordance with DER-10 section 5.4(b).

Groundwater Treatment

Construction for the new development may require dewatering in those work areas that are excavated below the groundwater table (e.g., elevator pit and AOC excavation deeper than 8 feet bgs). Treatment of the dewatering effluent during construction would be considered part of the remediation work. Treatment methods would include, as necessary, an oil/water separator tank, settling tank and carbon filtration. Effluent that is discharged to the sewer system would meet NYCDEP quality standards; a permit for this discharge would be obtained from NYCDEP.

Excavation Backfill

After an area has been successfully excavated of all the targeted materials, with proper laboratory documentation generated, the excavation area would be backfilled and compacted to an elevation required for construction of the school building. The backfill material will consist of imported fill that meets Part 375-6.7(d) requirements for Restricted Residential use. It is estimated that the quantity of required fill material will be approximately 1,400 cubic yards.

Installation of Vapor Mitigation System (Engineering Control)

Exposure to potentially contaminated soil vapor will be prevented by installation of an engineered vapor barrier membrane and an active SSDS. The vapor barrier will be a minimum of 20 mil thickness and installed as a continuous sub-slab membrane. The vapor barrier is a permanent engineering control for the Site. The SSDS will remain operational until sub-slab soil vapor and indoor air testing can demonstrate, to the satisfaction of the NYSDEC, NYSDOH, and NYCOER, that soil vapor infiltration into the high school building is not longer a concern.

Cover System (Engineering Control)

The entire Site will be covered by the proposed building and concrete or asphalt pavement. This engineering control would prevent complete exposure pathways for dermal absorption and ingestion related to the contaminated material that would be left in-place as part of Alternative II.

Institutional Controls – Deed restriction

A deed restriction would be recorded referencing any institutional or engineering controls that are part of the selected remedy, which would be binding upon all subsequent owners and

occupants of the property. The institutional controls would restrict the Site's use to restricted residential, commercial, or industrial use and include notice-of-use restrictions of the Site's soil and groundwater. The engineering controls that would be included in the easement are the requirements for the maintenance of the appropriate surface cover (cap) previously described in this alternative, and maintenance of the soil vapor barrier and SSDS.

Institutional Controls - Site Management Plan

Since this alternative does not allow for unrestricted use of the Site, a Site Management Plan will be prepared to ensure the long-term integrity of the remedy. The Site Management Plan will include: an Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary to ensure that the institutional and engineering controls remain in place and effective; and a Monitoring Plan to assess the performance and effectiveness of the remedy.

On-Site Worker, Public Health, and Environmental Protection

A site-specific health and safety plan (HASP) has been developed and will be enforced to protect on-site workers from accidents and acute and chronic exposures from the identified contaminated media on site. The HASP is included in Appendix D. The public health would be ensured by implementing and enforcing dust, odor, and organic vapor control and monitoring procedures, including a CAMP. However, it is not expected that the implementation of odor and organic vapor control measures would be required based on the findings of the remedial investigation. The environment would be protected by implementing and enforcing the selected soil erosion plans.

Evaluation of Alternatives

The following is an evaluation of Alternatives I and II based on the NYSDEC VCP remedy evaluation criteria listed below.

A. Protection of Human Health and Environment
B. Standards, Criteria, and Guidance (SCG);
C. Short-Term Effectiveness and Permanence;
D. Long-Term Effectiveness and Permanence;
E. Reduction of Toxicity, Mobility, or Volume;
F. Implementability
G. Cost Effectiveness
H. Community Acceptance
I. Land Use

Each criterion evaluation is prefaced by the NYSDEC description as provided in the DER-10 guidance document.

Overall Protection of Public Health and the Environment

> "This criterion is an evaluation of the remedy's ability to protect public health and the environment, assessing how risks posed through each existing or potential pathway of exposure are eliminated, reduced or controlled through removal, treatment, engineering controls or institutional controls. The remedy's ability to achieve each of the RAOs is evaluated."

Alternative I

Remediating the site to the unrestricted use standard would result in the elimination of all soil with Track 1 SCO exceedances. Therefore, the remedy would result in the elimination of all pathways of exposure from on-site contaminated soil. COCs in groundwater and soil vapor would persist, due to migration of contaminated groundwater from an off-site, up-gradient source. Contaminated groundwater would not be expected to complete an exposure pathway, as the groundwater in the area is not used as a source of drinking water and is not expected to be used for that purpose in the future. Contaminated soil vapor would not be expected to complete an exposure pathway, as soil vapor would be mitigated through the installation of a soil vapor barrier and SSDS. The public health during remediation activities would be protected by implementing and enforcing dust, odor, and organic vapor control and monitoring procedures when needed. The environment would be protected by implementing and enforcing the selected soil erosion plans.

The RAOs for public health and environmental protection would be met through the removal of all contaminated soil at the Site and the mitigation of potential groundwater and soil vapor exposures, which would eliminate any possible ingestion, inhalation or dermal contact.

Alternative II

Remediating the site to the Restricted Residential use standard would result in the removal of all site material that exceeds the Track 4 SSSCOs described above. This will result in the removal of a significant quantity of impacted soil at the site. The remaining historic fill and soil will be covered by barriers including concrete, asphalt, and the proposed building. The cover

system will prevent dermal contact or ingestion exposure pathways for the impacted historic fill and soil to be left in-place. The Site cover system will be considered an engineering control to be enforced via the institutional controls imposed for this alternative to ensure that the cover system is maintained.

The RI has demonstrated that metals- and SVOC-contaminated soil at the Site is not impacting groundwater. As such, the remaining impacted soil will not adversely impact groundwater. VOC-impacted groundwater on OU-1 will be addressed through a Remedial Action Work Plan for that portion of the Site. Similarly to Alternative I, the contaminated groundwater and soil vapor are not expected to complete exposure pathways, as groundwater at the Site is not a drinking water source and soil vapor will be mitigated through installation of a soil vapor barrier and an SSDS. In summary, implementing the Alternative II remediation concept will meet the stated remedial goals and remedial action objectives. The remediated site and the new construction will together be protective of the public health and environment by eliminating or controlling potential pathways of exposure.

Standards, Criteria, and Guidance (SCG)

> "Compliance with SCGs addresses whether or not a remedy will meet applicable environmental laws, regulations, standards, and guidance. All SCGs for the site will be listed along with a discussion of whether or not the remedy will achieve compliance. For those SCGs that will not be met, provide a discussion and evaluation of the impacts of each, and whether waivers are necessary."

Alternative I

Remediating the Site soil to unrestricted-use standards will ensure compliance with all SCGs for soil. It is likely that groundwater contaminants exceeding the TOGS AWQS/GV would remain on-site due to the presence of up-gradient contaminant sources. Implementation of engineering controls (i.e., soil vapor barrier and SSDS) will ensure that COC concentrations in indoor air are below the NYSDOH AGVs.

Alternative II

Discussed below are implications of the Alternative 2 remedy's compliance with SCGs.

NYSDEC Draft Brownfield Cleanup Program Guide (2004) and 6 NYCRR Part 375

The Alternative II remedy would meet the requirements of a Track 4 remedy for Restricted Residential Use; including the use of engineering and institutional controls. Therefore, this remedy meets the requirements of these guidance documents.

NYSDEC TOGS 1.1.1 – Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations (1998);

Groundwater on the eastern portion of the Site contains COCs above the TOGS AWQS/GV. The source of the groundwater contamination is from an up-gradient, off-site location, which is being addressed through a remedial program for OU-1. Groundwater will only be treated under this alternative when construction dewatering will be required. Because of this, there is a possibility that the groundwater under the site will not meet the TOGS AWQS/GV at the conclusion of the remedy. Potential exposure to the groundwater will be prevented with institutional controls to prohibit the use of groundwater and control disturbance of the Site cap.

NYSDOH – Guidance for Evaluating Soil Vapor Intrusion in the State of New York (2006)

This alternative will meet the requirements of this guidance as the soil vapors will be mitigated through installation of a soil vapor membrane and SSDS.

Short-Term Effectiveness and Permanence

> "The potential for short-term adverse impacts and risks of the remedy upon the community, the workers, and the environment during the construction and/or implementation are evaluated. A discussion of how the identified adverse impacts and health risks to the community or workers at the site will be controlled, and the effectiveness of the controls, should be presented. Provide a discussion of engineering controls that will be used to mitigate short term impacts (i.e. dust control measures). The length of time needed to achieve the remedial objectives is also estimated."

Alternative I

The most significant short-term adverse impact and risk to the community would be the large volumes of truck traffic required to haul out the targeted fill and soil and haul in the backfill. The excavated soil and fill will require approximately 300 30-ton-capacity truck trips, and the incoming backfill will require approximately 225 30-ton-capacity truck trips. Considered together, the large truck volume will result in an increase in diesel emissions, increase in traffic

and wear and tear to the local roadways. Implementing the Alternative I concept could require approximately 4 months of effort (assuming normal work hours).

Although the resulting dust, odors, and organic vapor from the excavation and traffic would be controlled by implementing their respective control plans, the risk of exposure to these contaminants to the public, on-site workers, and environment would be increased due to the increased excavation and duration of the remedial action under this Alternative. The dust would be controlled by the application of water spray on the local roads, and on site, when and where needed. Work will be modified or stopped according to the action levels set in the CAMP. However, even under the best of circumstances, the dust may become an issue of contention to the local community.

The on-site workers would be exposed longer to the contaminated media than if a more limited remediation plan were implemented. However, the exposures will be controlled through the site specific HASP.

Alternative II

The amount of excavated contaminated soil that is to be removed under Alternative II is less than 40 percent that of Alternative I, which would reduce the truck traffic required under the first alternative by a corresponding amount. The resulting traffic from this alternative should have much less impact on the local roads than would be experienced under Alternative 1. Implementing the Alternative II concept could require approximately 1 to 2 months of effort (assuming normal work hours).

The dust, odors, and organic vapor from the excavation and traffic would be controlled by implementing their respective control plans. It is anticipated that the dust would pose the greatest adverse effect on the public, on-site workers, and environment. The dust would be controlled by the continuous application of water spray on the local roads and on site, when and where needed. Work will be modified or stopped according to the action levels set in the CAMP. The limited contaminated soil excavations under this alternative would result in relatively less exposure than with Alternative I. Exposure will be controlled through a site-specific HASP.

Long-Term Effectiveness and Permanence

"This criterion evaluates the long-term effectiveness of the remedy after implementation. If wastes or treated residuals remain on-site after the selected remedy has been implemented, the following items are evaluated:

i. The magnitude of the remaining risks;
ii. The adequacy of the engineering control and institutional controls intended to limit the risk;
iii. The reliability of these controls; and,
iv. The ability of the remedy to continue to meet the RAOs in the future."

Alternative I

The Alternative I remedy will remove from the Site all contaminated soil exceeding Track 1 SCOs. Therefore this alternative would be effective in the long-term..

Alternative II

The magnitude of risks remaining in the long-term would be minimal if this alternative is implemented. Exposure pathways to the contaminated soil, groundwater, and soil vapor would be eliminated for the removed soils or controlled for the remaining contaminated soil, groundwater and soil vapor through the engineering controls described above.

The potential exposure pathways for the contaminated soil will be adequately controlled with surface barriers to the contamination (i.e., asphalt, concrete, and the building foundation). The institutional controls (to be included in deed restriction) will require maintenance of the engineering controls and restricted use of the Site and groundwater. The institutional controls are passive, meaning they will be low maintenance. An annual certification of the institutional control would be required for this alternative, due to the use of long-term engineering and institutional controls.

Long term maintenance of the engineering controls for soil vapor mitigation, the soil vapor membrane and SSDS, will be managed through implementation of a Site Management Plan. An annual certification, signed by the Remediation Engineer, will be provided to NYSDEC certifying that the institutional and engineering controls are still in place, un-altered, and effective. Because the engineering controls are either passive or subject to periodic inspections through implementation of the Site Management Plan, their reliability will be high.

Barrier maintenance, soil vapor mitigation, and groundwater use-restrictions will ensure that the RAOs for this remediation will continue to be met in the future.

Reduction of Toxicity, Mobility, or Volume of Contaminated Material

"The remedy's ability to reduce the toxicity, mobility, or volume of site contamination is evaluated. Preference should be given to remedies that permanently and significantly reduce the toxicity, mobility, or volume of the wastes at the site."

Alternative I

The Alternative I remedy will remove from the Site all contaminated soil exceeding Track 1 SCOs. Therefore, the criterion is satisfied.

Alternative II

Alternative II will reduce the toxicity of the contaminated site soils by removing the most contaminated soils, including those that are hazardous and those that exceed the Track 4 SSSCOs. . Based on the RI, the SVOC and metal contaminants in soil have not impacted groundwater. VOCs have not been detected in on-site soils, and metals and SVOCs which would remain in soil at concentrations that meet the Track 4 SSSCOs but exceed UUSCOs will have a negligible impact on soil vapor. The remaining contaminated soil is largely historic fill material containing contaminant levels that are typical of fill in New York City.

Implementability

"The technical and administrative feasibility of implementing the remedy is evaluated. Technical feasibility includes the difficulties associated with the construction and the ability to monitor the effectiveness of the remedy. For administrative feasibility, the availability of the necessary personnel and material is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, etc."

Alternative I

The technical feasibility of implementing the remedy is generally moderate, given that a site-wide excavation to a minimum depth of 10 feet bgs can be accomplished in stages, and a site-wide dewatering system can be constructed. Technical issues that could make the Alternative I remediation problematic are the excavations along the Wallabout Street, Harrison Avenue, and Gerry Street sidewalk perimeters, and the excavations along the adjoining poultry

market building. Excavations in these areas will require underpinning, sheeting, or another stabilization measure to prevent undermining the sidewalks and building foundation.

The groundwater will be treated, as needed, using industry standard settling tanks and carbon filtration systems. As all the identified contaminated soil will have been removed as part of this Alternative I remediation, there is no need to monitor the effectiveness of the remedy.

The administrative feasibility is high for the availability of experienced personnel and equipment within the New York City area, as this type of remediation is common in the region. The administrative feasibility in obtaining specific regulatory approvals is high, as sidewalk modifications can be negotiated with the NYCDOT. Other problematic issues stem from the approximately 1,000 high capacity truck trips that may be required to transport the material on and off the Site over the remediation period. The potential for community opposition, as well as environmental impacts, exists due to the expected volume of diesel emissions, congested traffic, and other dangers these trucks pose while operating in a residential area. These factors may lessen the probability of the required local approvals being granted or could result in restrictions that may increase the cost of the remedy and/or the length of the remedy construction process.

Alternative II

The technical feasibility of implementing the Alternative II remedy is high. This alternative would consist mostly of excavation with standard bucket excavators of the targeted fill and soil. The long-term effectiveness of the remedy will require proper maintenance on the constructed structures to ensure the integrity of the soil barriers and the thickness of the imported soil cover. Maintenance of the soil vapor barrier and SSDS can be accomplished by a Site Management Plan that can be implemented by the on-site maintenance personnel. Alternative II would also not require the extensive structural support of perimeter sidewalks and the poultry market building as Alternative I. The dewatering system under Alternative II would also be significantly less extensive and generate a significantly lower volume of water.

The administrative feasibility is high for the availability of experienced personnel and equipment within the New York City area, as this type of remediation is common in the region. The administrative feasibility in obtaining specific regulatory approvals is higher than for Alternative I, because this alternative requires significantly fewer truck trips.

Cost Effectiveness

> "Capital, operation, maintenance, and monitoring costs are estimated for the remedy and presented on a present worth basis".

Alternative 1

Based on the assumptions detailed for Alternative I, excluding the costs for shoring and sheeting, Langan estimates that the total capital cost to complete the remediation for unrestricted use is estimated at $ 2.6 million. As contaminated groundwater will remain at the Site, the costs to implement and maintain the engineering controls described for Alternative II also apply to Alternative I. Table 5 lists the individual cost components that were incorporated into the estimate. The additional costs associated with Alternative I would render the project infeasible.

Alternative II

Based on the assumptions detailed for Alternative II, excluding the costs for shoring and sheeting, Langan estimates that the total capital costs to complete the remediation for Track 4 SSSCOs is estimated at $ 1.7 million. Table 6 lists the individual cost components that were incorporated into the estimate.

Community Acceptance

> "Provide a summary of the public participation program that was followed for the project, see section 1.10 for requirements. The public's comments, concerns, and overall perception of the remedy are evaluated in a format that responds to all the questions that were raised."

For both alternatives, public comments that are provided during the draft RAWP 30-day public comment period would be evaluated and could result in a modified RAWP.

Land Use

The land use factors are the same for both alternatives. The current, intended, and reasonably anticipated future land use of the Site and its surroundings are compatible with the selected remedy of soil remediation. The proposed use is educational, and this remedy is being designed to meet metals cleanup levels for commercial use and total SVOC concentrations below 500 mg/kg.

3.2 SELECTION OF THE PREFERRED REMEDY

3.2.1 Zoning

The Site and properties south and north of the Site are currently located in an R7A residential district with a C2-4 commercial overlay. Properties west of the Site across Harrison Avenue are located in a manufacturing district. The use proposed for the Site currently conforms to applicable zoning laws.

3.2.2 Applicable comprehensive community master plans or land use plans

The Site is within the area known as Broadway Triangle, which underwent a rezoning action in 2009. The intent of the action was to encourage the development of affordable housing, commercial space, and community facility space within the Broadway Triangle. In accordance with the conditions of the rezoning, the Site is subject to a restricted E-Designation (E-238) for hazardous materials and air quality. In compliance with the E-Designation, a RAWP for the Site development (including the NYCBCP Parcel) is also being submitted by Congregation YGS to the NYCOER for review and approval. The proposed project is in accord with the intentions of the NYCHPD rezoning action.

3.2.3 Surrounding property uses

Surrounding property uses include residential buildings, commercial activities, and parking lots. Residential occupancy and community facility usage in the area has demonstrated a recent increase. As such, the proposed use conforms to recent development patterns in the area.

3.2.4 Citizen participation

In accordance with DER-23, the proposed remedy will be subject to mandatory, 30-day public comment period.

3.2.5 Environmental justice concerns

There are no environmental justice concerns associated with the proposed use, which will not cause or increase a disproportionate burden on the community in which the Site is located, and will not result in a disproportionate concentration of commercial use.

3.2.6 Land use designations

The Site does not fall within an area with targeted land-use designations.

3.2.7 Population growth patterns

The proposed use conforms to recent development patterns in the area.

3.2.8 Accessibility to existing infrastructure

The Site is accessible to existing infrastructure (i.e., Metropolitan Transit Authority subway and bus lines).

3.2.9 Proximity to cultural resources

Some properties in the immediate area surrounding the Site were used in connection with the former operations of the Pfizer's pharmaceutical manufacturing facility. Following the closure of the facility in 2008, the area has been undergoing redevelopment. The Site is located within proximity of a neighborhood that is host to Brooklyn's growing Satmar Hasidic community. The proposed redevelopment will provide a valuable resource to that community, which is in need of accessible educational facilities due to the growing residential population.

3.2.10 Proximity to natural resources

The Site is located in an urban area, and not proximal to natural resources.

3.2.11 Off-Site groundwater impacts

Municipal water supply wells are not present in Brooklyn, New York, and the Site is located approximately one mile from the nearest body of water. Groundwater from the Site therefore cannot affect either municipal water supply wells or surface water bodies. Investigation indicates that soil contamination on-Site is not acting as a source to groundwater contamination.

Groundwater contamination detected on-Site has been determined to be coming from up-gradient sources.

3.2.12 Proximity to floodplains

The Site is not located within or near a floodplain.

3.2.13 Geography and geology of the Site

The Site geography, geology and hydrology are discussed in Sections 1.1 and 2.3.

3.2.14 Current Institutional Controls

Development of the Site is subject to review and approval by the NYSDEC and NYSDOH, in accordance with the VCA for Site B. Other institutional controls do not apply to the Site.

3.3 SUMMARY OF SELECTED REMEDIAL ACTIONS

The proposed plan achieves all of the remedial action goals established for the redevelopment project. The proposed remedial action is effective in both the short-term and long-term and reduces mobility, toxicity and volume of contaminants and uses standard methods that are well established in the industry.

The proposed remedial action will consist of:

1. Implementation of a Community Air Monitoring Program for particulates and volatile organic compounds.
2. Soil excavation, as required, to a minimum depth of 2 feet bgs to bring the Site to the development grade and accommodate foundation elements and a sub-slab depressurization system for the school building development. Construction excavation to approximately 9 feet bgs will be required to accommodate an elevator pit on the northeastern portion of the Site.
3. Targeted excavation of seven (7) AOCs to depths below construction sub-grade to remove all soil containing exceeding the site-specific SCOs (SSSCOs). The SSSCOs established for this site are the restricted residential use SCOs with the exception of:
    - characteristic lead hazardous soils (i.e., 5 mg/l TCLP);

- metals exceeding Part 375 Commercial Use SCOs; and
- total SVOCs at a concentration above 500 mg/kg.

4. Construction and maintenance of an engineered composite cover consisting of a building slab to prevent human exposure to soil/fill on the Site.
5. Installation of a vapor barrier system beneath the building slab and along exterior foundation sidewalls to prevent contaminated soil vapors from migrating into the building.
6. Installation of an active SSDS to prevent accumulation and potential migration of contaminated soil vapors into the building.
7. Import of materials to be used for backfill beneath the composite cover system in compliance with this plan and in accordance with applicable laws and regulations. Imported soil will be sampled and analyzed in accordance with NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation (May 2010) section 5.4(e) prior to import to the Site, and will meet the criteria established in Part 375-6.7(d), i.e., the lower of the protection of groundwater or protection of public health SCOs for restricted residential use.
8. Sampling and analysis of excavated soil/fill in accordance with the requirements of the selected disposal facilities. The excavated soil/fill will be classified and segregated, based on the analytical results of the soil characterization sampling.
9. Collection and analysis of soil end-point samples in accordance with DER-10 section 5.4(b).
10. Transportation and off-site disposal of soil/fill material at permitted facilities in accordance with this plan, disposal facility requirements, and applicable laws and regulations for handling, transport, and disposal.
11. Screening of imported soil and excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a photoionization detector (PID).
12. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas.
13. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations.

14. Performance of activities required for the remedial action, including permitting requirements and dewatering pretreatment requirements, in compliance with applicable laws and regulations.
15. Submittal of a Construction Completion Report (CCR) that describes the remedial activities, certifies that the remedial requirements have been achieved, describes all Engineering and Institutional Controls to be implemented at the Site, and lists any deviations from this RAWP.

Remedial activities will be performed at the Site in accordance with this NYSDEC-approved RAWP and the Department-issued Decision Document. All deviations from the RAWP will be promptly reported to NYSDEC for approval and fully explained in the CCR.

4.0 REMEDIAL ACTION PROGRAM

4.1 GOVERNING DOCUMENTS

4.1.1 Site Specific Health & Safety Plan (HASP)

The site-specific Construction Health and Safety Plan (HASP) is included in Appendix D. The Site Safety Coordinator has not yet been determined. A resume will be provided to NYSDEC prior to the start of remedial construction. All field personnel involved in remedial activities and handling petroleum-contaminated or hazardous soil, if encountered, will participate in training required under 29 CFR 1910.120, including 40-hour hazardous waste operator training and annual 8-hour refresher training. The Site Safety Officer will be responsible for maintaining workers training records.

Personnel entering any exclusion zone will be trained in the provisions of the HASP and be required to sign a HASP acknowledgment. Site-specific training will be provided to field personnel. Additional safety training may be added depending on the tasks performed. Emergency telephone numbers will be posted at the site location before any remedial work begins. A safety meeting will be conducted before each shift begins. Topics to be discussed include task hazards and protective measures (physical, chemical, environmental); emergency procedures; PPE levels and other relevant safety topics. Meetings will be documented in a log book or specific form. An emergency contact sheet with names and phone numbers is included in the HASP. That document will define the specific project contacts for use in case of emergency.

All remedial work performed under this plan will be in full compliance with governmental requirements, including Site and worker safety requirements mandated by Federal OSHA. Confined space entry will comply with all OSHA requirements to address the potential risk posed by combustible and toxic gasses. Congregation YGS and associated parties preparing the remedial documents submitted to the State and those performing the construction work, are completely responsible for the preparation of an appropriate Health and Safety Plan and for the appropriate performance of work according to that plan and applicable laws.

The Health and Safety Plan (HASP) and requirements defined in this Remedial Action Work Plan pertain to all remedial and invasive work performed at the Site until the issuance of a Certificate of Completion.

4.1.2 Quality Assurance Project Plan (QAPP)

The Remediation Engineer has prepared a QAPP that describes the quality control components that will ensure that the proposed remedy accomplishes the remedial goals, remedial action objectives, and is completed in accordance with the design specifications. The QAPP is attached in Appendix E. The components include:

- Responsibilities of key personnel and their organizations for the proposed remedy;
- Qualifications of the quality assurance officer;
- Sampling requirements including methodologies, quantity, volume, locations, frequency, acceptance and rejection criteria;
- Description of the reporting requirements for quality assurance activities including weekly quality assurance review reports, periodic QAPP audits, and other report and data submissions.

4.1.3 Construction Quality Assurance Plan (CQAP)

The CQAP is provided in Appendix F, and provides a detailed description of the observation and testing activities that will be used to monitor construction quality and confirm that remedy construction is in conformance with the remediation objectives and specifications. The CQAP includes:

- Responsibilities and authorities of the organizations and key personnel involved in the design and construction of the remedy.
- The observations and tests 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.

- A detailed description of field equipment decontamination and management of investigation derived waste.
- Field instrument calibration procedures and sample identification and custody guidelines.

Additional information on Quality Assurance and Quality Control of sampling activities is included in the CQAP. The CQAP also provides information about the qualifications of the quality assurance personnel that demonstrate they possess the proper training and experience necessary to fulfill project-specific responsibilities.

4.1.4 Soil/Materials Management Plan (SoMP)

This document is included in Section 5.4 of the RAWP. The SoMP includes detailed plans for managing all soils/materials that are disturbed at the Site, including excavation, handling, storage transport, and disposal. It also includes plans for importation of backfill from off-site sources, fluid management, and controls applied to assure effective, nuisance-free performance in compliance with all applicable Federal, State and local laws and regulations.

4.1.5 Erosion and Sediment Control Plan (ESCP)

An ESCP is provided in Appendix K. The ESCP describes the 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 during implementation of the RAWP. The erosion and sediment controls will be in conformance with requirements presented in the New York State Guidelines for Urban Erosion and Sediment Control.

4.1.6 Community Air Monitoring Plan (CAMP)

A CAMP is incorporated into the HASP, which is provided in Appendix D. Real-time air monitoring for volatile organic compounds (VOCs) and particulate levels at the perimeter of the exclusion zone or work area will be performed. Continuous monitoring will be performed for all ground intrusive activities and during the handling of contaminated or potentially contaminated media. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling and test pit excavation or trenching.

Periodic monitoring for VOCs will be performed during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. Periodic monitoring during sample collection, for instance, will consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. Depending upon the proximity of potentially exposed individuals, continuous monitoring may be performed during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence. Exceedences of action levels observed during performance of the Community Air Monitoring Plan (CAMP) will be reported to the NYSDEC Project Manager and included in the Daily Report.

VOC Monitoring, Response Levels, and Actions

VOCs will be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis during invasive work. Upwind concentrations will be measured at the start of each workday and periodically thereafter to establish background conditions. The monitoring work will be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment will be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment will be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities will be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities will resume with continued monitoring.
- If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities will resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or

half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities will be shutdown.

All 15-minute readings must be recorded and be available for NYSDEC personnel to review. Instantaneous readings, if any, used for decision purposes will also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations will be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring will be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment will be equipped with an audible or visual alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques will be employed. Work will continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.
- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work will be stopped and a re-evaluation of activities initiated. Work will resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

All readings will be recorded and be available for NYSDEC personnel to review.

4.1.7 Contractor Site Operations Plan (SOP)

The Remediation Engineer will review all plans and submittals for this remedial project (including those listed above and contractor and sub-contractor document submittals) and confirm that they are in compliance with this RAWP. The Remediation Engineer is responsible to ensure that all later document submittals for this remedial project, including contractor and sub-contractor document submittals, are in compliance with this RAWP. All remedial documents will be submitted to NYSDEC and NYSDOH in a timely manner and prior to the start of work. Design drawings and specifications for the SSDS are provided in Appendix J.

4.1.8 Citizen Participation Plan

A certification of mailing will be sent by Pfizer Inc. to the NYSDEC project manager following the distribution of all 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, (4) a list of recipients (contact list); and (5) a statement that the repository was inspected on (specific date) and that it contained all of applicable project documents.

No changes will be made to approved Fact Sheets authorized for release by NYSDEC without written consent of the NYSDEC. No other information, such as brochures and flyers, will be included with the Fact Sheet mailing. The approved Citizen Participation Plan for this project is attached in Appendix G.

Document repositories will be established at the following locations and contain all applicable project documents:

Brooklyn Public Library – Williamsburg Branch

240 Division Avenue

Brooklyn, NY 11211

Phone No.: (718) 302-3485

Hours of Operation:
Sun: Closed
Mon: 10:00 AM – 6:00 PM
Tues: 1:00 PM – 8:00 PM
Wed: 1:00 PM – 6:00 PM
Thurs: 1:00 PM – 6:00 PM
Fri: 10:00 AM – 6:00 PM
Sat: Closed

4.2 GENERAL REMEDIAL CONSTRUCTION INFORMATION

4.2.1 Project Organization

The Remedial Engineer (RE) and Qualified Environmental Professionals (QEP) for this project are Joel Landes, PE, and Stuart Knoop, PG, respectively. Principal personnel who will participate in the remedial action include an on-site environmental scientist or engineer (name TBD). The on-site environmental scientist/engineer will document that the remedial actions are implemented in accordance with this RAWP, HASP, SoMP, and supporting documents, and promptly report any deviations from these documents to the appropriate team members, the RE, and the QEP so that the issue can be rectified in a timely manner. The environmental scientist/engineer will report directly to the QEP and RE, and will provide daily summary reports of the site remedial activities. An organization chart is included in Figure 17. Resumes of key personnel involved in the Remedial Action are included in Appendix H.

4.2.2 Remedial Engineer

The Remedial Engineer (RE) for this project will be Joel Landes, PE. The RE is a registered professional engineer licensed by the State of New York. The RE will have primary direct

responsibility for implementation of the remedial program for the 177 Harrison Avenue Site (NYSDEC VCA Index No. D2-0010-0703 Site No. V-00350-2). The RE will certify in the Construction Completion Report (CCR) that the remedial activities were observed by QEPs under his 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 in full conformance with that Plan. Other certification requirements are listed later in this RAWP.

The RE will coordinate the work of other contractors and subcontractors involved in all aspects of remedial construction, including soil excavation, stockpiling, characterization, removal and disposal, air monitoring, emergency spill response services, import of back fill material, and management of waste transport and disposal. The RE will be responsible for all appropriate communication with NYSDEC and NYSDOH.

The RE will review all pre-remedial plans submitted by contractors for compliance with this Remedial Action Work Plan and will certify compliance in the CCR.

The RE will provide the certifications listed in Section 10.1 in the CCR.

4.2.3 Remedial Action Construction Schedule

The table below presents an anticipated schedule for the proposed remedial action and reporting. If the schedule for remediation and development activities changes, it will be updated and submitted to NYSDEC. The schedule accounts for an approximately one-year remediation period, including approximately three months of earthwork and foundation construction and seven months for construction of the super structure.

Estimated completion dates for remediation and development activities appropriate to this project are provided in the table below.

Schedule Milestone	Weeks from RAWP Submittal	Weeks from RAWP Approval	Duration (weeks)
NYSDEC Approval of RAWP	8		-
Mobilization	-	-	2
Construction and Hot Spot Excavation	-	2	4
Installation of Vapor Barrier and SSDS	-	5	8
Demobilization	-	13	2
Testing of Soil Vapor Mitigation System	-	40	2
Submit Construction Completion Report	-	44	-

4.2.4 Work Hours

The hours for operation of remedial construction will conform to the New York City Department of Buildings construction code requirements or according to specific variances issued by that agency. DEC will be notified by Congregation YGS of any variances issued by the Department of Buildings. NYSDEC reserves the right to deny alternate remedial construction hours.

4.2.5 Site Security

Site access will be controlled through secured, gated entrances to the fenced property.

4.2.6 Traffic Control

Drivers of trucks leaving the Site with soil/fill will be instructed to proceed without stopping in the vicinity of the site to prevent neighborhood impacts. The planned truck route from the Site is attached as Figure 20.

4.2.7 Contingency Plan

This contingency plan is developed for the remedial construction to address the discovery of unknown structures or contaminated media during excavation. Identification of unknown contamination source areas during invasive Site work will be promptly communicated to NYSDEC's Project Manager. Petroleum spills will be reported to the NYSDEC Spill Hotline. These findings will be included in the daily report. If previously unidentified contaminant sources are found during on-Site remedial excavation or development-related excavation, sampling will be performed on contaminated source material and surrounding soils and reported to NYSDEC. Chemical analytical testing will be performed for Full List volatiles and semi-volatiles, pesticides/PCBs, and TAL/TCLP metals, as appropriate.

4.2.8 Worker Training and Monitoring

Site workers will be required, at a minimum, to have completed 29 CFR 1910.120 HAZWOPER, site safety training and medical monitoring for site workers. HAZWOPER training completion certificates will be submitted to the Remediation Engineer before commencement of site work.

4.2.9 Agency Approvals

Congregation YGS has addressed all SEQRA requirements for this Site. All permits or government approvals required for remedial construction have been, or will be, obtained prior to the start of remedial construction. A Notice to Proceed will be obtained from the NYCOER prior to commencement of construction, in accordance with the requirements of the restrictive E-Designation.

The planned end use for the Site is in conformance with the current zoning for the property as determined by New York City Department of Planning. A Certificate of Completion will not be issued for the project unless conformance with zoning designation is demonstrated.

A complete list of all local, regional and national governmental permits, certificates or other approvals or authorizations required to perform the remedial and development work is attached in Table 7. 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 list will be updated in the Final Remediation Report.

All planned remedial or construction work in regulated wetlands and adjacent areas will be specifically approved by the NYSDEC Division of Natural Resources to ensure that it meets the requirements for substantive compliance with those regulations prior to the start of construction. Nothing in the approved Remedial Action Work Plan or its approval by NYSDEC should be construed as an approval for this purpose.

4.2.10 NYSDEC VCP Signage

A project sign will be erected at the main entrance to the Site prior to the start of any remedial activities. The sign will indicate that the project is being performed under the New York State Voluntary Cleanup Program. The sign will meet the detailed specifications provided by the NYSDEC Project Manager and contained in Appendix I.

4.2.11 Pre-Construction Meeting with NYSDEC

A Pre-Construction meeting will take place prior to the start of major construction activities.

4.2.12 Emergency Contact Information

An emergency contact sheet with names and phone numbers is included in Table 8. That document will define the specific project contacts for use by NYSDEC and NYSDOH in the case of a day or night emergency.

4.2.13 Remedial Action Costs

Langan estimates that the total estimated cost of the remedial action is approximately $1.7 million. An itemized summary of estimated costs for the remedial activity is provided in Table 6. An itemized and detailed summary of actual costs for all remedial activity will be submitted as an Appendix to the Construction Completion Report.

4.3 SITE PREPARATION

4.3.1 Mobilization

The remediation contractor will mobilize all necessary materials and equipment on Site directly prior to the initiation of any remedial activities. Soil stockpile, equipment decontamination areas and truck egress points will be designated.

4.3.2 Erosion and Sedimentation Controls

An Erosion and Sediment Control Plan (ESCP) has been developed in conformance with requirements presented in the New York State Guidelines for Urban Erosion and Sediment Control. Best Management Practices (BMPs) for soil erosion shall be selected to minimize erosion and sedimentation off-site from the start of the remediation to the completion of the development. The ESCP includes the following information:

1. Descriptions of the selected BMPs that will be used to control erosion and sedimentation for each stage of remediation and construction.

2. Map showing the location of the proposed BMPs.

3. Implementation schedule and maintenance requirements for the proposed BMPs.

4. For active remediation and construction work zones such as excavation pits, stockpile areas and truck wash down areas, a perimeter BMP system will be installed and maintained to contain soil and sediment.

Accumulated sediment in the BMPs that is removed will be screened for the presence of petroleum and disposed of properly if found. A copy of the ESCP is provided in Appendix K.

4.3.3 Stabilized Construction Entrance(s)

During site remediation, continuity will be achieved between the truck wash and the stone-based egress path by placing the truck wash system right before the egress path of the Site. Egress points for truck and equipment transport will be kept clean of dirt and other materials during site remediation and development, so that trucks will be decontaminated prior to departure from the Site.

4.3.4 Utility Marker and Easements Layout

Congregation YGS and its contractors are solely responsible for the identification of utilities that might be affected by work under the RAWP and implementation of all required, appropriate, or necessary health and safety measures during performance of work under this RAWP. Congregation YGS and its contractors are solely responsible for safe execution of all invasive and other work performed under this RAWP. Congregation YGS and its contractors must obtain any local, State or Federal permits or approvals pertinent to such work that may be required to perform work under this RAWP. Approval of this RAWP by NYSDEC does not constitute satisfaction of these requirements.

The presence of utilities and easements on the Site has been investigated by the Remedial Engineer. It has been determined that no risk or impediment to the planned work under this Remedial Action Work Plan is posed by utilities or easements on the Site.

4.3.5 Sheeting and Shoring

Appropriate management of structural stability of on-Site or off-Site structures during on-Site activities including excavation is the sole responsibility of Congregation YGS and its contractors. Congregation YGS and its contractors are solely responsible for safe execution of all invasive and other work performed under this Plan. Congregation YGS and its contractors must obtain any local, State or Federal permits or approvals that may be required to perform work under this Plan. Further, Congregation YGS and its contractors are solely responsible for the implementation of all required, appropriate, or necessary health and safety measures during performance of work under the approved Plan.

4.3.6 Equipment and Material Staging

Equipment and materials staging areas will be designated during the remediation activities, in coordination with the Construction Manager, to facilitate remediation work and prevent cross-contamination.

4.3.7 Decontamination Area

A temporary decontamination area lined with polyethylene sheeting will be constructed for steam-cleaning or washing excavation and drilling equipment. The location of the decontamination area will be coordinated with the Construction Manager. At a minimum, the decontamination pad will have a 30 mil low-permeability liner, be bermed and sloped to a collection sump to contain and collect fluids, and have side walls to mitigate, to the extent practicable, errant overspray, especially when decontaminating large equipment. Wash waters will be collected and properly disposed as described in the CQAP.

4.3.8 Site Fencing

The entire Site (plus the NYCBCP Parcel) will be secured with an 8-foot high fence at the start of the remedial and construction activities.

4.3.9 Demobilization

After remedial work is complete, all site areas disturbed to accommodate support areas (e.g., staging areas, decontamination areas, storage areas, temporary water management areas, and access area), will be restored to pre-remediation conditions. Temporary access areas (on-Site and off-Site) will be removed and disturbed access areas will be restored to pre-remediation conditions. All sediment and erosion control measures will be removed and materials will be disposed in accordance with acceptable rules and regulations. All excavation equipment will be decontaminated, and general refuse will be disposed, in accordance with the procedures set forth in the HASP.

4.4 REPORTING

Daily and monthly reports will be submitted throughout the remedial action. The Remedial Engineer responsible for certifying all reports will be an individual licensed to practice engineering in the State of New York. Joel B. Landes, PE of Langan Engineering and Environmental Services, P.C., will have this responsibility. All daily and monthly Reports will be included in the Construction Completion Report.

4.4.1 Daily Reports

Daily reports will be submitted to NYSDEC and NYSDOH Project Managers by the end of each day of major excavation and backfill work following the reporting period and will include:

- An update of progress made during the reporting day;
- Locations of work and quantities of material imported and exported from the Site;
- References to alpha-numeric map for Site activities;
- A summary of any and all complaints with relevant details (names, phone numbers);
- A summary of CAMP finding, including excursions;
- An explanation of notable Site conditions.

Daily reports are not intended to be the mode of communication for notification to the NYSDEC of emergencies (accident, spill), requests for changes to the RAWP or other sensitive or time critical information. However, such conditions must also be included in the daily reports. Emergency conditions and changes to the RAWP will be addressed directly to NYSDEC Project Manager via personal communication.

Daily Reports will include a description of daily activities keyed to an alpha-numeric map for the Site that identifies work areas. These reports will include a summary of air sampling results, odor and dust problems and corrective actions, and all complaints received from the public.

A Site map that shows a predefined alpha-numeric grid for use in identifying locations described in reports submitted to NYSDEC is attached in Figure 18. The NYSDEC assigned project number will appear on all reports.

4.4.2 Monthly Reports

Monthly reports will be submitted to NYSDEC and NYSDOH Project Managers within one week following the end of the month of the reporting period and will include:

- Activities relative to the Site during the previous reporting period and those anticipated for the next reporting period, including a quantitative presentation of work performed (i.e. tons of material exported and imported, etc.);
- Description of approved activity modifications, including changes of work scope and/or schedule;
- Sampling results received following internal data review and validation, as applicable; and,
- An update of the remedial schedule including the percentage of project completion, unresolved delays encountered or anticipated that may affect the future schedule, and efforts made to mitigate such delays.

4.4.3 Other Reporting

Photographs will be taken of all remedial activities and submitted to NYSDEC in digital (JPEG) format. Photos will illustrate all remedial program elements and will be of acceptable quality. Representative photos of the Site prior to any Remedial Actions will be provided. Representative photos will be provided of each contaminant source, source area and Site structures before, during and after remediation. Photos will be submitted to NYSDEC on CD or other acceptable electronic media and will be sent to NYSDEC's Project Manager (2 copies) and to NYSDOH's Project Manager (1 copy). CD's will have a label and a general file inventory structure that separates photos into directories and sub-directories according to logical Remedial Action components. A photo log keyed to photo file ID numbers will be prepared to provide explanation for all representative photos. For larger and longer projects, photos should be submitted on a monthly basis or another agreed upon time interval.

Job-site record keeping for all remedial work will be appropriately documented. These records will be maintained on-Site at all times during the project and be available for inspection by NYSDEC and NYSDOH staff.

4.4.4 Complaint Management Plan

Complaints from the public regarding nuisance or other Site conditions will be reported directly to the NYSDEC project manager, and included in the daily reports.

4.4.5 Deviations from the Remedial Action Work Plan

In case where the Remedial Action requires deviations from the RAWP due to unforeseen Site conditions, a detailed description of the conditions and required deviations from the RAWP will be submitted to the NYSDEC project manager. The description will include the reasons that dictate deviation from the RAWP, any changes/editions to the RAWP, and how the proposed remedy is affected.

5.0 REMEDIAL ACTION: MATERIAL REMOVAL FROM SITE

The material to be removed from the Site includes soil that exceeds the Track 4 SSSCOs. The extent of removal will be sufficient, when combined with engineering and institutional controls, to be protective of human health and the environment. Material removal also includes planned development cuts in historic fill and soils regulated by NYS. The estimated extent of contamination is shown in Figure 16.

The entire Site will be excavated to a minimum depth of 2 feet bgs to accommodate construction of the foundation and SSDS for the proposed building. Hot spot excavation of the following AOCs will be required to achieve the Track 4 SSSCOs and will require excavation below construction sub-grade. Waste characterization samples will be collected to determine the nature of the material. If the waste characterization analytical results indicate that the material is hazardous, the material will be isolated, properly hauled, and disposed off-site at an appropriate facility.

AOC 1 (SBB-08)

This area will address soils contaminated with lead and barium. The proposed excavation is approximately 750 square feet and will extend to approximately 8 feet bgs, resulting in the removal of approximately 250 cubic yards of lead- and barium-impacted soil.

AOC 2 (SBB-28)

This area will address soils contaminated with arsenic, lead, barium, and SVOCs. The proposed excavation is approximately 625 square feet and will extend to approximately 9 feet bgs, resulting in the removal of approximately 230 cubic yards of metals- and SVOC-impacted soil.

AOC 3 (MW-26)

This area will address soils contaminated with lead, mercury, and arsenic, as well as soils containing hazardous concentrations of lead. The proposed excavation is approximately 1,225 square feet and will extend to approximately 11 feet bgs, resulting in the removal of approximately 500 cubic yards of metals-impacted soil.

AOC 4 (MW-25)

This area will address soils contaminated with lead, mercury, barium, and SVOCs, as well as soils containing hazardous concentrations of lead. The proposed excavation is approximately 1,050 square feet and will extend to approximately 11 feet bgs, resulting in the removal of approximately 450 cubic yards of metals- and SVOC-impacted soil.

AOC 5 (SBB-01)

This area will address soils contaminated with lead and barium. The proposed excavation is approximately 400 square feet and will extend to approximately 8 feet bgs, resulting in the removal of approximately 150 cubic yards of metals-impacted soil.

AOC 6 (SBB-07)

This area will address soils contaminated with lead, mercury, barium, and SVOCs. The proposed excavation is approximately 400 square feet and will extend to approximately 8 feet bgs, resulting in the removal of approximately 500 cubic yards of metals- and SVOC-impacted soil.

AOC 7 (SBB-27)

This area will address soils contaminated with barium. The proposed excavation is approximately 625 square feet and will extend to approximately 8 feet bgs, resulting in the removal of approximately 200 cubic yards of barium-impacted soil.

5.1 SOIL CLEANUP OBJECTIVES

The Soil Cleanup Objectives for this Site are listed in Table 9. Soil and materials management on-Site and off-Site will be conducted in accordance with the Soil Management Plan as described below. Table 10 summarizes all soil samples that exceed the SCOs proposed for this Remedial Action. Spider maps that show all soil samples that exceed the SCOs proposed for this Remedial Action are shown in Figures 11 and 12. UST closures will, at a minimum, conform to criteria defined in DER-10.

5.2 REMEDIAL PERFORMANCE EVALUATION (POST EXCAVATION END-POINT SAMPLING)

Endpoint samples will be taken for soil to confirm the efficacy of the remedial actions. The QAPP (Appendix E) was developed to define the methods and procedures for conducting the endpoint sampling. The QAPP includes general field guidelines, sample equipment decontamination, soil and groundwater sampling procedures, and field instrument descriptions and calibration procedures. The following subsections detail the endpoint sampling plan for soil. Groundwater monitoring is being addressed by Pfizer Inc. under the remedial action program for OU-1.

5.2.1 End-Point Sampling Frequency

The number of endpoint soil samples collected within the excavations is based on one bottom sample for every 900 square feet of excavation area and one sidewall sample for every 30 linear feet of perimeter. Samples collected during the RI may be used to supplement the required sampling frequency upon approval from the NYSDEC. Each excavation will have a minimum of one bottom sample and three sidewall samples.

5.2.2 Methodology

The soil endpoint samples will be taken within the excavation areas. The samples will be collected when the limits of the remediation excavation have been reached and will be analyzed for the COCs of the particular remedial excavation. Twenty percent (i.e., 1 of every 5) of the endpoint samples will be analyzed for VOCs, PCBs, pesticides, and herbicides, in addition to the target COCs. The soil endpoint sampling plan for the soil is summarized in Table 11. End point samples will be submitted for laboratory analyses under standard chain of custody protocol to an NYSDOH ELAP accredited laboratory.

5.2.3 Reporting of Results

Data collected during the field investigation will be reduced and reviewed by the laboratory QA personnel, and a report on the findings will be tabulated in a standard format. The criteria used to identify and quantify the analytes will be those specified for the applicable methods in

the USEPA SW-846 and subsequent updates. The data package provided by the laboratory will contain all items specified in the USEPA SW-846 appropriate for the analyses to be performed, and be reported in standard format. Data will also be submitted to NYSDEC's Environmental Information Management System (EIMS) in the standardized electronic data deliverable format.

5.2.4 QA/QC

Each set of samples will be analyzed concurrently with calibration standards, method blanks, matrix spikes (MS), matrix spike duplicates (MSD) or laboratory duplicates, and QC check samples (if required by the protocol). MS/MSD samples, as applicable, will be designated by the field personnel. If no MS/MSD samples have been designated, the laboratory will contact the Langan Project Manager for corrective action. Refer to the QAPP in Appendix E for further details on QA/QC procedures.

5.2.5 DUSR

A DUSR will be prepared by a third party and will be reviewed by the Remedial Engineer before issuance. The DUSR will present the results of data assessment, including a summary assessment of laboratory data packages, sample preservation and COC procedures, and a summary assessment of precision, accuracy, representativeness, comparability, and completeness for each analytical method. Refer to the QAPP in Appendix E for further details on DUSRs.

5.2.6 Reporting of End-Point Data in CCR

Chemical labs used for all end-point sample results and contingency sampling will be NYSDOH ELAP certified. End point sampling, including bottom and side-wall sampling, will be performed in accordance with DER-10 sample frequency requirements. Side-wall samples will be collected a minimum of every 30 linear feet. Bottom samples will be collected at a rate of one for every 900 square feet. The CCR will provide a tabular and map summary of all end-point sample results and exceedances of SCOs.

5.3 ESTIMATED MATERIAL REMOVAL QUANTITIES

The following are material types to be disposed or reused during remediation:

- **Track 4 Contaminated Material**: This material will be excavated from the remediation areas described in the proposed Alternative: Excavation Areas AOC 1 through AOC 7 (Figure 16). The defining characteristics of the material are the presence of levels of lead, arsenic, mercury, barium, and/or total SVOCs (primarily carcinogenic PAHs) that exceed the Track 4 SSSCOs. No Track 4 contaminated material will be reused on-site; it will be sampled for characterization, transported off-site, and disposed at a facility certified to accept the material. Sampling will be undertaken in conformance with the requirements of the disposal facility.

- **Hazardous-lead contaminated material**: A portion of the material removed from Excavation Areas AOC 3 and AOC 4 will be hazardous for lead. Prior to excavation in these areas, waste characterization samples (TCLP) will be collected to properly determine the nature of the material. Handling and disposal will be conducted as per the procedures outlined in this RAWP.

- **Site Fill Material**: This material is considered contaminated by NYS, but does not contain exceedances of the Track 4 SSSCOs and includes materials in planned development cuts or overburden soil that must be removed in order to access the Track 4 contaminated material. The material within the planned development cut or overburden areas will be sampled for characterization, transported off-site, and disposed at a facility certified to accept the material. Sampling will be undertaken in conformance with the requirements of the disposal facility. Fill material below the planned development cut and outside of the AOC excavation areas will remain in place.

The estimated quantity of soil/fill to be removed from the Site is 4,200 tons/2,800 cubic yards. The estimated quantity of soil to be imported into the Site for backfill and cover soil is 2,700 tons/1,800 cubic yards. The estimated quantity of soil/fill expected to be reused/relocated on Site is 0 tons/cubic yards.

5.4 Soil/Materials Management Plan

This section presents the approach to managing, disposing, and reusing soil, fill, and debris excavated from the Site. This plan is based on the current knowledge of Site conditions, and will be augmented with the additional data collected during remediation. The Remediation Engineer

will monitor and document the handling and transporting of material removed from the Site to a proper disposal facility as a regulated waste or as an unregulated waste, as applicable. The Remediation Engineer will assist the remedial contractor in identifying impacted materials during excavation, determining materials suitable for direct load out versus temporary on-site stockpiling, selection of samples for waste characterization, and determining the proper off-site disposal facility. Separate stockpile areas will be constructed as needed for the various materials to be excavated or generated, with the intent to most efficiently manage and characterize the materials and to avoid co-mingling impacted materials with non-impacted soil. The following sections provide a detailed description of the Materials Management Plan.

5.4.1 Soil Screening Methods

Visual, olfactory and PID soil screening and assessment will be performed by a qualified environmental professional during all remedial and development excavations into known or potentially contaminated material (Residual Contamination Zone). Lead-contaminated remediation areas will also be screened with an XRF unit. Soil screening will be performed regardless of when the invasive work is done and will include all excavation and invasive work performed during the remedy and during development phase, such as excavations for foundations and utility work, prior to issuance of the COC.

All primary contaminant sources (including but not limited to tanks and hotspots) identified during Site Characterization, Remedial Investigation, and Remedial Action will be surveyed by a surveyor licensed to practice in the State of New York. This information will be provided on maps in the Construction Completion Report.

Screening will be performed by qualified environmental professionals. Resumes will be provided for all personnel responsible for field screening (i.e. those representing the Remedial Engineer) of invasive work for unknown contaminant sources during remediation and development work.

5.4.2 Stockpile Methods

Soil stockpile areas, if needed, will be constructed for staging of site soil, pending loading or characterization testing. Separate stockpile areas will be constructed to avoid co-mingling materials of differing types. All stockpile areas will meet the following minimum requirements:

- The 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.
- Equipment and procedures will be used to place and remove the soil that will minimize the potential to jeopardize the integrity of the liner.
- Stockpiles will be covered at the designated times (see below) with minimum 8-mil plastic sheeting or tarps which will be securely anchored to the ground. Stockpiles will be routinely inspected and broken sheeting covers will be promptly replaced.
- Stockpiles will be covered upon reaching their capacity of approximately 2,000 cu. yards until ready for loading. Stockpiles that have not reached their capacity will be covered at the end of each work day.
- Each pile will be staked and labeled with a number to coincide with labeling on the associated sample container for proper correlation of the analytical results to the pile.
- Stockpiles will be inspected at a minimum once each week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by NYSDEC.
- Stockpiles will be kept covered at all times with appropriately anchored tarps. Stockpiles will be routinely inspected and damaged tarp covers will be promptly replaced.
- Soil stockpiles will be continuously encircled with silt fences. Hay bales will be used as needed near catch basins, surface waters and other discharge points.
- A dedicated water truck equipped with a water cannon will be available on-Site for dust control.

5.4.3 Materials Excavation and Load Out

The Remediation Engineer or a qualified environmental professional under his/her supervision will oversee all invasive work and the excavation and load-out of all excavated material.

Congregation YGS and its contractors are solely responsible for safe execution of all invasive and other work performed under this Plan.

The presence of utilities and easements on the Site has been investigated by the Remedial Engineer. It has been determined that no risk or impediment to the planned work under this Remedial Action Work Plan is posed by utilities or easements on the Site.

Loaded vehicles leaving the Site will be appropriately lined, tarped, securely covered, manifested, and placarded in accordance with appropriate Federal, State, local, and NYSDOT requirements (and all other applicable transportation requirements).

A truck wash will be operated on-Site. The Remediation Engineer will be responsible for ensuring that all outbound trucks will be washed at the truck wash before leaving the Site until the remedial construction is complete.

Locations where vehicles enter or exit the Site shall be inspected daily for evidence of off-Site sediment tracking.

The Remedial Engineer will be responsible for ensuring that all egress points for truck and equipment transport from the Site will be clean of dirt and other materials derived from the Site during Site remediation and development. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to Site -derived materials.

Congregation YGS and associated parties preparing the remedial documents submitted to the State, and parties performing this work, are completely responsible for the safe performance of all invasive work, the structural integrity of excavations, and for structures that may be affected by excavations (such as building foundations and bridge footings).

The Remedial Engineer will ensure that Site development activities will not interfere with, or otherwise impair or compromise, remedial activities proposed in this Remedial Action Work Plan.

Each hotspot and structure to be remediated (USTs, vaults and associated piping, transformers, etc.) will be removed and end-point remedial performance sampling completed before excavations related to Site development commence proximal to the hotspot or structure.

Development-related grading cuts and fills will not be performed without NYSDEC approval and will not interfere with, or otherwise impair or compromise, the performance of remediation required by this plan.

Mechanical processing of historical fill and contaminated soil on-Site is prohibited.

All primary contaminant sources (including but not limited to tanks and hotspots) identified during Site Characterization, Remedial Investigation, and Remedial Action will be surveyed by a surveyor licensed to practice in the State of New York. The survey information will be shown on maps to be reported in the Final Engineering Report.

5.4.4 Materials Transport Off-Site

All transport of materials will be performed by licensed haulers in accordance with appropriate local, State, and Federal regulations, including 6 NYCRR Part 364. Haulers will be appropriately licensed and trucks properly placarded.

Truck transport routes are as follows: trucks will exit onto Gerry Street, turn left onto Broadway, turn right onto Rodney Street, and merge onto I-278 (Brooklyn-Queens Expressway) heading north towards the RFK Bridge, Major Degan Expressway, and George Washington Bridge. All trucks loaded with Site materials will exit the vicinity of the Site using only these approved truck routes.

Proposed in-bound and out-bound truck routes to the Site are shown in Figure 19. This is the most appropriate route and takes into account: (a) limiting transport through residential areas and past sensitive sites; (b) use of city mapped truck routes; (c) prohibiting off- Site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport.

Trucks will be prohibited from stopping and idling in the neighborhood outside the project Site.

Egress points for truck and equipment transport from the Site will be kept clean of dirt and other materials during Site remediation and development.

Queuing of trucks will be performed on-Site in order to minimize off-Site disturbance. Off-Site queuing will be prohibited.

Material transported by trucks exiting the Site will be secured with tight-fitting covers. Loose-fitting canvas-type truck covers will be prohibited. If loads contain wet material capable of producing free liquid, truck liners will be used.

All trucks will be washed prior to leaving the Site. Truck wash waters will be collected and disposed of off-Site in an appropriate manner.

5.4.5 Materials Disposal Off-Site

The disposal locations have not yet been determined. Disposal locations will be established at a later date and reported to the NYSDEC Project Manager.

The total quantity of material expected to be disposed off-Site is 500 cubic yards of hazardous lead-contaminated soil, 1,600 cubic yards of metals- and SVOC-contaminated soil, and 700 cubic yards of historic fill with COC concentrations below the Track 4 SSSCOs.

All soil/fill/solid waste excavated and removed from the Site will be treated as contaminated and regulated material and will be disposed in accordance with all local, State (including 6NYCRR Part 360) and Federal regulations. If disposal of soil/fill from this Site is proposed for unregulated disposal (i.e. clean soil removed for development purposes), a formal request with an associated plan will be made to NYSDEC's Project Manager. Unregulated off-Site management of materials from this Site is prohibited without formal NYSDEC approval.

Material that does not meet Track 1 unrestricted SCOs is prohibited from being taken to a New York State recycling facility (6NYCRR Part 360-16 Registration Facility).

The following documentation will be obtained and reported by the Remedial Engineer for each disposal location used in this project to fully demonstrate and document that the disposal of material derived from the Site conforms with all applicable laws: (1) a letter from the Remedial Engineer or Congregation YGS to the receiving facility describing the material to be disposed and requesting formal written acceptance of the material. This letter will state that material to be

disposed is contaminated material generated at an environmental remediation Site in New York State. The letter will provide the project identity and the name and phone number of the Remedial Engineer. The letter will include as an attachment a summary of all chemical data for the material being transported (including Site Characterization data); and (2) a letter from all receiving facilities stating it is in receipt of the correspondence (above) and is approved to accept the material. These documents will be included in the CCR.

Non-hazardous historic fill and contaminated soils taken off-Site will be handled, at minimum, as a Municipal Solid Waste per 6NYCRR Part 360-1.2

Historical fill and contaminated soils from the Site are prohibited from being disposed at Part 360-16 Registration Facilities (also known as Soil Recycling Facilities).

Soils that are contaminated but non-hazardous and are being removed from the Site are considered by the Division of Solid & Hazardous Materials (DSHM) in NYSDEC to be Construction and Demolition (C/D) materials with contamination not typical of virgin soils. These soils may be sent to a permitted Part 360 landfill. They may be sent to a permitted C/D processing facility without permit modifications only upon prior notification of NYSDEC Region 2 DSHM. This material is prohibited from being sent or redirected to a Part 360-16 Registration Facility. In this case, as dictated by DSHM, special procedures will include, at a minimum, a letter to the C/D facility that provides a detailed explanation that the material is derived from a DER remediation Site, that the soil material is contaminated and that it must not be redirected to on-Site or off-Site Soil Recycling Facilities. The letter will provide the project identity and the name and phone number of the Remedial Engineer. The letter will include as an attachment a summary of all chemical data for the material being transported.

The Construction Completion Report will include an accounting of the destination of all material removed from the Site during this Remedial Action, including excavated soil, contaminated soil, historic fill, solid waste, and hazardous waste, non-regulated material, and fluids. Documentation associated with disposal of all material must also include records and approvals for receipt of the material. This information will also be presented in a tabular form in the CCR.

Bill of Lading system or equivalent will be used for off-Site movement of non-hazardous wastes and contaminated soils. This information will be reported in the Construction Completion Report.

Hazardous wastes derived from on-Site will be stored, transported, and disposed of in full compliance with applicable local, State, and Federal regulations.

Appropriately licensed haulers will be used for material removed from this Site and will be in full compliance with all applicable local, State and Federal regulations.

Waste characterization will be performed for off-Site disposal in a manner suitable to the receiving facility and in conformance with applicable permits. Sampling and analytical methods, sampling frequency, analytical results and QA/QC will be reported in the CCR. All data available for soil/material to be disposed at a given facility must be submitted to the disposal facility with suitable explanation prior to shipment and receipt.

5.4.6 Materials Reuse On-Site

Due to the presence of waste material entrained in historic fill material in the upper 2 feet of soil at the Site, excavated material will not be re-used on-Site. The Remedial Engineer will ensure that unacceptable material will not remain on-Site.

Acceptable demolition material proposed for reuse on-Site, if any, will be sampled for asbestos. Concrete crushing or processing on-Site is prohibited.

Organic matter (wood, roots, stumps, etc.) or other solid waste derived from clearing and grubbing of the Site is prohibited for reuse on-Site.

Contaminated on-Site material, including historic fill and contaminated soil, removed for grading or other purposes will not be reused within a cover soil layer, within landscaping berms, or as backfill for subsurface utility lines. This will be expressed in the final Site Management Plan.

5.4.7 Fluids Management

All liquids to be removed from the Site, including dewatering fluids, will be handled, transported and disposed in accordance with applicable local, State, and Federal regulations.

Liquids discharged into the New York City sewer system will be addressed through approval by NYCDEP. Dewatered fluids will not be recharged back to the land surface or subsurface of the Site. Dewatering fluids will be managed off-Site. Discharge of water generated during remedial construction to surface waters (i.e. a local pond, stream or river) is prohibited without a SPDES permit.

5.4.8 Demarcation

After the completion of soil removal and any other invasive remedial activities and prior to backfilling with clean imported material, a land survey will be performed by a New York State licensed surveyor. The survey will define the top elevation of residual contaminated soils. A physical demarcation layer, consisting of orange snow fencing material or equivalent material will be placed on this surface to provide a visual reference. This demarcation layer will constitute the top of the 'Residuals Management Zone', the zone that requires adherence to special conditions for disturbance of contaminated residual soils defined in the Site Management Plan. The survey will measure the grade covered by the demarcation layer before the placement of cover soils, pavement and sub-soils, structures, or other materials. This survey and the demarcation layer placed on this grade surface will constitute the physical and written record of the upper surface of the 'Residuals Management Zone' in the Site Management Plan. A map showing the survey results will be included in the Construction Completion Report and the Site Management Plan.

5.4.9 Backfill from Off-Site Sources

All materials proposed for import onto the Site will be approved by the Remedial Engineer and will be in compliance with provisions in this RAWP prior to receipt at the Site.

Material from industrial sites, spill sites, other environmental remediation sites or other potentially contaminated sites will not be imported to the Site.

The Construction Completion Report will include the following certification by the Remedial Engineer: "I certify that all import of soils from off-Site, including source evaluation, approval and sampling, has been performed in a manner that is consistent with the methodology defined in the Remedial Action Work Plan".

All imported soils will meet NYSDEC approved backfill or cover soil quality objectives for this Site. These NYSDEC approved backfill or cover soil quality objectives are the lower of the protection of groundwater or the protection of public health soil cleanup objectives for restricted residential use as set forth in Table 375-6.8(b) of 6 NYCRR Part 375. Non-compliant soils will not be imported onto the Site without prior approval by NYSDEC. Nothing in the approved Remedial Action Work Plan or its approval by NYSDEC should be construed as an approval for this purpose. Prior to being allowed on-site, imported soils will be sampled at a frequency of 1 sample per 250 cubic yards and analyzed for TCL VOCs, TCL SVOCs, TCL pesticides, TAL metals, and PCBs. Full TCLP analysis (organic and inorganic) will be conducted at a frequency of 1 sample per 1,000 cubic yards. The analytical results of backfill sampling and a copy of the soil sample and stockpile location map will be provided to the Remediation Engineer.

Soils that meet 'exempt' fill requirements under 6 NYCRR Part 360, but do not meet backfill or cover soil objectives for this Site, will not be imported onto the Site without prior approval by NYSDEC. Nothing in this Remedial Action Work Plan should be construed as an approval for this purpose.

Solid waste will not be imported onto the Site.

Trucks entering the Site with imported soils will be securely covered with tight fitting covers.

5.4.10 Stormwater Pollution Prevention

Barriers and hay bale checks will be installed and inspected once a week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by NYSDEC. All necessary repairs shall be made immediately.

Accumulated sediments will be removed as required to keep the barrier and hay bale check functional.

All undercutting or erosion of the silt fence toe anchor shall be repaired immediately with appropriate backfill materials.

Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

Erosion and sediment control measures identified in the RAWP shall be observed to ensure that they are operating correctly. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters

Silt fencing or hay bales will be installed around the entire perimeter of the remedial construction area.

5.4.11 Contingency Plan

If underground tanks or other previously unidentified contaminant sources are found during on-Site remedial excavation or development related construction, sampling will be performed on product, sediment and surrounding soils, etc. Chemical analytical work will be for full scan parameters (TAL metals; TCL volatiles and semi-volatiles, TCL pesticides and PCBs). These analyses will not be limited to STARS parameters where tanks are identified without prior approval by NYSDEC. Analyses will not be otherwise limited without NYSDEC approval.

Identification of unknown or unexpected contaminated media identified by screening during invasive Site work will be promptly communicated by phone to NYSDEC's Project Manager. These findings will be also included in daily and periodic electronic media reports.

5.4.12 Community Air Monitoring Plan

VOC Monitoring, Response Levels, and Actions

VOCs must be monitored at the downwind perimeter of an active work zone on a continuous basis during remediation and construction activities until the ground is completely capped with clean soil or impervious barrier. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions. The monitoring work will be performed using equipment appropriate to the known VOC contaminants on the Site. This equipment should be calibrated daily and should be capable of calculating 15-minute running averages. All 15-minute readings will be recorded and be available for State personnel to review. Instantaneous readings, if any, used for decision purposes will also be recorded. The measured 15-minute averages will be compared to the levels below:

- If the ambient air concentration of total VOCs at the downwind perimeter of the work area exceeds 5 parts per million (ppm) above background for the 15 minute average, work activities must be halted until the levels readily decreases below 5 ppm (per instantaneous readings).
- If the total VOCs at the downwind perimeter of the work area persist at levels in excess of 5 ppm over background but less than 25 ppm, work must be halted. The source of vapors must be identified and corrective actions must be taken to abate the emissions. Work activities can only resume provided that the concentration is less than 5 ppm over a 15 minute average period.
- If the total VOC level is above 25 ppm at the perimeter of the work area, all activities must be shut down and work methods and controls will be re-evaluated.

Particulate Monitoring, Response Levels, and Actions

Dust or particulate concentrations should be monitored continuously at the upwind and downwind perimeters at the site perimeter and active work zones. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes or less for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate an exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities. All readings will be recorded and be available for state personnel review. Corrective action is determined by the following levels:

- If the downwind PM-10 at a site perimeter location is 100 micrograms per cubic meter (µg/m3) greater than background for the 15 minute period of if airborne dust is observed at the site perimeter from excavation activity, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that the downwind PM-10 particulate level does not exceed 150 μg/m3 above the upwind level and provided that no visible dust is migrating from the excavation work area.
- If, after implementing dust suppression techniques, downwind PM-10 particulate levels are greater than 150 µg/m3 above the upwind level, work must be stopped and re-evaluation of work activities initiated. Work can resume provided that dust suppression

measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 µg/m3 of the upwind level and in preventing visible dust migration.

A map showing the location of fixed and mobile sampling stations is shown in Figure 20.

Exceedances observed in the CAMP will be reported to NYSDEC and NYSDOH Project Managers and included in the Daily Report.

5.4.13 Odor, Dust and Nuisance Control Plan

The Construction Completion Report will include the following certification by the Remedial Engineer: "I certify that all invasive work during the remediation and all invasive development work were conducted in accordance with dust and odor suppression methodology defined in the Remedial Action Work Plan."

5.4.13.1 Odor Control Plan

This odor control plan is capable of controlling emissions of nuisance odors off-Site. Specific odor control methods to be used on a routine basis will include the application of foam suppressants or traps over the odor or VOC source areas, if such areas are uncovered. Foam suppressants may include biodegradable foams that are applied over the source material for short-term control of the odor and VOCs. Long-term control of source material can be accomplished using a non-hazardous and nonflammable compound that cures to form a hard surface. Tarps, properly anchored, may also be used to offer long term control of odors and VOCs. If nuisance odors are identified, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and NYSDOH will be notified of all odor events and of all other complaints about the project. Implementation of all odor controls, including the halt of work, will be the responsibility of the Remedial Engineer, who is responsible for certifying the Construction Completion Report.

All necessary means will be employed to prevent on- and off-Site nuisances. At a minimum, procedures will include: (a) limiting the area of open excavations; (b) shrouding open excavations with tarps and other covers; and (c) using foams to cover exposed odorous soils. If odors develop and cannot be otherwise controlled, additional means to eliminate odor nuisances

will include: (d) direct load-out of soils to trucks for off-Site disposal; (e) use of chemical odorants in spray or misting systems; and, (f) use of staff to monitor odors in surrounding neighborhoods.

Where odor nuisances have developed during remedial work and cannot be corrected, or where the release of nuisance odors cannot otherwise be avoided due to on-Site conditions or close proximity to sensitive receptors, odor control will be achieved by sheltering excavation and handling areas under tented containment structures equipped with appropriate air enting/filtering systems.

5.4.13.2 Dust Control Plan

A dust suppression plan that addresses dust management during invasive on-Site work, will include, at a minimum, the items listed below:

- Dust suppression will be achieved though the use of a dedicated on-Site water truck for road wetting. The truck will be equipped with a water cannon capable of spraying water directly onto off-road areas including excavations and stockpiles.
- Clearing and grubbing of larger sites will be done in stages to limit the area of exposed, unvegetated soils vulnerable to dust production.
- Gravel will be used on roadways to provide a clean and dust-free road surface.
- On-Site roads will be limited in total area to minimize the area required for water truck sprinkling.

5.4.13.3 Other Nuisances

A plan for rodent control will be developed and utilized by the contractor prior to and during Site clearing and Site grubbing, and during all remedial work.

A plan will be developed and utilized by the contractor for all remedial work and will conform, at a minimum, to NYCDEP noise control standards.

6.0 RESIDUAL CONTAMINATION TO REMAIN ON-SITE

Site fill material will remain on-site after completion of the remediation. This material includes site soil that does not contain exceedances of the Track 4 SSSCOs, but may contain exceedances of NYS Unrestricted Use Criteria. This type of material is found in planned development cuts or overburden soil that must be removed in order to access the Track 4 contaminated material.

Since residual contaminated soil and groundwater/soil vapor will exist beneath the Site after the remedy is complete, Engineering and Institutional Controls (ECs and ICs) are required to protect human health and the environment. These ECs and ICs are described hereafter. Long-term management of EC/ICs and of residual contamination will be executed under a Site specific Site Management Plan (SMP) that will be developed and included in the CCR.

ECs will be implemented to protect public health and the environment by appropriately managing residual contamination. The Controlled Property (the Site) will have three primary EC systems. These are (1) a composite cover system; (2) a soil vapor barrier; and (3) an active sub-slab depressurization system.

The CCR will report residual contamination on the Site in tabular and map form. This will include presentation of exceedances of both Track 1 and Track 4 SCOs.

7.0 ENGINEERING CONTROLS: COMPOSITE COVER SYSTEM

Exposure to residual contaminated soils will be prevented by an engineered, composite cover system that will be built on the Site. This composite cover system will be comprised of concrete covered sidewalks and the concrete building slab.

The entire Site will be covered with a concrete building slab. A diagram showing the design detail for each cover type and a map showing the aerial distribution of each of the cover types to be built at the Site are included in Figure 21.

A Soil Management Plan will be included in the Site Management Plan and will outline the procedures to be followed in the event that the composite cover system and underlying residual contamination are disturbed after the Remedial Action is complete. Maintenance of this composite cover system will be described in the Site Management Plan in the CCR.

8.0 ENGINEERING CONTROLS: TREATMENT SYSTEMS

Previous investigations confirmed the presence of VOC-contaminated soil vapor at the Site. Soil vapor samples at the Site contained PCE at elevated concentrations and petroleum VOCs at concentrations above background database levels. Contaminated soil vapor will be mitigated through the installation of a soil vapor barrier and active SSDS. The combination of the foundation concrete slab, vapor membrane, and SSDS will effectively prevent migration of soil vapors into the proposed school building

8.1 VAPOR BARRIER MEMBRANE

As a precaution against potential infiltration of soil vapors into the proposed building, a soil vapor barrier will be installed between the concrete foundation slab and underlying soil and gravel. The barrier/membrane system will be installed along the entire footprint of the Site beneath the foundation slab, and will extend along the sides of the foundation slab from the base of the excavation to surface grade level. The vapor barrier will be a minimum of 20 mil thickness and will be installed as a continuous sub-slab membrane. The system will provide complete protection against vapor infiltration into the building. Appendix J shows the typical design diagrams for the vapor barrier membrane type proposed for use on this Site. The vapor barrier membrane is a permanent engineering control for the Site. OM&M requirements for the vapor barrier will be established in the Site Management Plan, which will be included in the Construction Completion Report.

8.2 SUB-SLAB DEPRESSURIZATION SYSTEM

In addition to the soil vapor barrier, an active sub-slab depressurization system (SSDS) will be installed beneath the foundation slab of the building in accordance with the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York, dated October 2006. The system will consist of a 6-inch layer of ¾-inch aggregate that underlies the entire foundation slab, foundation footings, and soil vapor barrier. Vapors that accumulate under the slab will migrate into suction pits filled with a 1 foot layer of 1.5-inch angular aggregate. Vapors will exit the suction pits through a 6-inch, black steel pipe, which rises to a roof-mounted discharge stack. A roof-mounted blower system will maintain a constant negative pressure through the vertical

piping, and vapors will be channeled away from the interior of the structure into the suction pits. The vacuum blowers will operate continuously after initial startup.

Prior to initial start-up of the SSDS, the system will be inspected to confirm that all system components are in place. The system will be implemented in accordance with the manufacturer's recommendations. System testing will be performed, as follows:

- While the system is operating, smoke tubes will be used to check for leaks through concrete cracks, floor joints, and at the suction points. Any identified leaks will be properly sealed.
- The sub-slab pressure field will be tested by operating the SSDS 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 will be performed to ensure that at least 0.001 inches WC of vacuum is being created throughout the building footprint. When conditions of inadequate depressurization are observed, the source or cause (e.g., improper fan operation) will be identified and corrected.
- The warning device indicating blower malfunction will be tested to confirm proper operation.
- Shortly after installation of the system and completion of building construction, indoor and outdoor air sampling will be performed. Samples will be analyzed for the constituents of concern (i.e., VOCs) to confirm that concentrations are below background levels. 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 NYSDOH ELAP certified laboratory.
- If the sampling results indicate elevated concentrations, the source or cause (e.g., indoor or outdoor sources, improper operation of the SSDS, etc.) will be identified and corrected as necessary.

System OM&M requirements will be established in the Site Management Plan, which will be submitted with the Construction Completion Report.

All reports, forms, and other relevant information generated during testing of the SSDS will be (1) available upon request to the NYSDEC, NYSDOH, and NYCOER, and (2) submitted with the Construction Completion Report, following completion of remedial activities. Inspection of the blower 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 SSDS has been reported or an emergency occurs that is deemed likely to affect the operation of the system. The details and layout of the SSDS are provided in Appendix J.

9.0 CRITERIA FOR COMPLETION OF REMEDIATION/TERMINATION OF REMEDIAL SYSTEMS

9.1 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.

9.2 Vapor Barrier

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.

9.3 Sub-slab Depressurization System [SSDS]

The active SSD system will not be discontinued without written approval by NYSDEC and NYSDOH. A proposal to discontinue the active SSD system may be submitted by the property owner based on confirmatory data that justifies such request. Systems will remain in place and operational until permission to discontinue use is granted in writing by NYSDEC and NYSDOH. A proposal for termination of the SSDS 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. 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.

10.0 INSTITUTIONAL CONTROLS

After the remedy is complete, the Site will have residual contamination remaining in place. Engineering Controls (ECs) for the residual contamination have been incorporated into the remedy to render the overall Site remedy protective of public health and the environment. Two elements have been designed to ensure continual and proper management of residual contamination in perpetuity: a Deed restriction and a Site Management Plan. These elements are described in this Section. A Site -specific Deed restriction will be recorded with Kings County to provide an enforceable means of ensuring the continual and proper management of residual contamination and protection of public health and the environment in perpetuity or until released in writing by NYSDEC. It requires that the grantor of the Deed restriction and the grantor's successors and assigns adhere to all Engineering and Institutional Controls (ECs/ICs) placed on this Site by this NYSDEC-approved remedy. ICs provide restrictions on Site usage and mandate operation, maintenance, monitoring and reporting measures for all ECs and ICs. The Site Management Plan (SMP) describes appropriate methods and procedures to ensure compliance with all ECs and ICs that are required by the Deed restriction. Once the SMP has been approved by the NYSDEC, compliance with the SMP is required by the grantor of the Deed restriction and grantor's successors and assigns.

10.1 DEED RESTRICTION

A Deed restriction, as defined in Article 71 Title 36 of the Environmental Conservation Law, is required when residual contamination is left on-Site after the Remedial Action is complete. If the Site will have residual contamination after completion of all Remedial Actions than a Deed restriction is required. As part of this remedy, a Deed restriction approved by NYSDEC will be filed and recorded with the Kings County Clerk. The Deed restriction will be submitted as part of the Final Remediation Report.

The Deed restriction renders the Site a Controlled Property. The Deed restriction must be recorded with the Kings County Clerk before the Certificate of Completion can be issued by NYSDEC. A series of Institutional Controls are required under this remedy to implement, maintain and monitor these Engineering Control systems, prevent future exposure to residual contamination by controlling disturbances of the subsurface soil and restricting the use of the

Site to restricted residential and commercial uses only. These Institutional Controls are requirements or restrictions placed on the Site that are listed in, and required by, the Deed restriction. Institutional Controls can, generally, be subdivided between controls that support Engineering Controls, and those that place general restrictions on Site usage or other requirements. Institutional Controls in both of these groups are closely integrated with the Site Management Plan, which provides all of the methods and procedures to be followed to comply with this remedy.

The Institutional Controls that support Engineering Controls are:

- Compliance with the Deed restriction by the Grantee and the Grantee's successors and adherence of all elements of the SMP is required;
- All Engineering Controls must be operated and maintained as specified in this SMP;
- A composite cover system consisting of 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 soil vapor barrier and sub-slab depressurization system under all building structures 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 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;
- Engineering Controls may not be discontinued without an amendment or extinguishment of the Deed restriction.

Adherence to these Institutional Controls for the Site is mandated by the Deed restriction and will be implemented under the Site Management Plan (discussed in the next section). The Controlled Property (Site) will also have a series of Institutional Controls in the form of Site restrictions and requirements. The Site restrictions that apply to the Controlled Property are:

- Vegetable gardens and farming on the Controlled Property are prohibited;
- Use of 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 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 or commercial use only, provided the long-term Engineering and Institutional Controls included in the Site Management Plan are employed;
- The Controlled Property may not be used for a higher level of use, such as unrestricted or non-restricted residential use without an amendment or extinguishment of this deed restriction;
- Grantor agrees 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.

10.2 SITE MANAGEMENT PLAN

Site Management is the last phase of remediation and begins with the approval of the Construction Completion Report and issuance of the Certificate of Completion (COC) for the Remedial Action. The Site Management Plan is submitted as part of the CCR but will be written in a manner that allows its removal and use as a complete and independent document. Site Management continues in perpetuity or until released in writing by NYSDEC. The property

owner is responsible to ensure that all Site Management responsibilities defined in the Deed restriction and the Site Management Plan 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 VCA 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) submittal of Site Management Reports, performance of inspections and certification of results, (4) demonstration of proper communication of Site information to NYSDEC; and (5) defining criteria for termination of treatment system operation.

To address these needs, this SMP will include three plans: (1) an Engineering and Institutional Control Plan for implementation and management of EC/ICs; (2) a Monitoring Plan for implementation of Site Monitoring; and (3) a Site Management Reporting Plan for submittal of data, information, recommendations, and certifications to NYSDEC. The SMP will be prepared in accordance with the requirements in NYSDEC Draft DER-10 Technical Guidance for Site Investigation and Remediation, dated 2010, and the guidelines provided by NYSDEC.

Site management activities, reporting, and EC/IC certification will be scheduled on a certification period basis. The certification period will be annually. The Site Management Plan will be based on a calendar year and will be due for submission to NYSDEC by March 1 of the year following the reporting period.

The Site Management Plan in the Final Remediation Report will include a monitoring plan for groundwater at the down-gradient Site perimeter to evaluate Site -wide performance of the remedy. No exclusions for handling of residual contaminated soils will be provided in the Site Management Plan (SMP). All handling of residual contaminated material will be subject to provisions contained in the SMP.

11.0 CONSTRUCTION COMPLETION REPORT

A Construction Completion Report (CCR) will be submitted to NYSDEC following implementation of the Remedial Action defined in this RAWP. The CCR provides the documentation that the remedial work required under this RAWP has been completed and has been performed in compliance with this plan. The CCR will provide a comprehensive account of the locations and characteristics of all material removed from the Site including the surveyed map(s) of all sources. The Construction Completion Report will include as-built drawings for all constructed elements, certifications, manifests, bills of lading as well as the complete Site Management Plan (formerly the Operation and Maintenance Plan). The CCR will provide a description of the changes in the Remedial Action from the elements provided in the RAWP and associated design documents. The CCR will provide a tabular summary of all performance evaluation sampling results and all material characterization results and other sampling and chemical analysis performed as part of the Remedial Action. The CCR will provide test results demonstrating that all mitigation and remedial systems are functioning properly. The CCR will be prepared in conformance with DER-10, and will become a component of the Final Engineering Report which will be submitted by Pfizer at the completion of remedial actions on OU-1.

Where determined to be necessary by NYSDEC, a Financial Assurance Plan will be required to ensure the sufficiency of revenue to perform long-term operations, maintenance and monitoring tasks defined in the Site Management Plan and Deed restriction. This determination will be made by NYSDEC in the context of the Construction Completion Report review.

The CCR will include written and photographic documentation of all remedial work performed under this remedy.

The CCR will include an itemized tabular description of actual costs incurred during all aspects of the Remedial Action.

The CCR will provide a thorough summary of all residual contamination left on the Site after the remedy is complete. Residual contamination includes all contamination that exceeds the Track 1 Unrestricted Use SCO in 6NYCRR Part 375-6. A table that shows exceedances from Track 1 Unrestricted SCOs for all soil/fill remaining at the Site after the Remedial Action and a

map that shows the location and summarizes exceedances from Track 1 Unrestricted SCOs for all soil/fill remaining at the Site after the Remedial Action will be included in the CCR.

The CCR will provide a thorough summary of all residual contamination that exceeds the SCOs defined for the Site in the RAWP and must provide an explanation for why the material was not removed as part of the Remedial Action. A table that shows residual contamination in excess of Site SCOs and a map that shows residual contamination in excess of Site SCOs will be included in the CCR.

The Construction Completion Report will include an accounting of the destination of all material removed from the Site, including excavated contaminated soil, historic fill, solid waste, hazardous waste, non-regulated material, and fluids. Documentation associated with disposal of all material must also include records and approvals for receipt of the material. It will provide an accounting of the origin and chemical quality of all material imported onto the Site.

Before approval of a CCR and issuance of a Certificate of Completion, all project reports must be submitted in digital form on electronic media (PDF).

11.1 CERTIFICATIONS

The following certification will appear in front of the Executive Summary of the Construction Completion Report. The certification will be signed by the Remedial Engineer, Joel B. Landes, who is a Professional Engineer registered in New York State This certification will be appropriately signed and stamped. The certification will include the following statements:

I _____certify that I am currently a NYS registered professional engineer, I had primary direct responsibility for the implementation of the subject construction program, and I certify that the Remedial Work Plan (or Remedial Design or Plans and Specifications) was implemented and that all construction activities were completed in substantial conformance with the DER-approved Remedial Work Plan (or Remedial Design or Plans and Specifications).

If the Remedial Action Work Plan (or Remedial Design or Plans and Specifications) identifies time frames to be achieved by the remedial program, the certification must include: The data submitted to DER demonstrates that the remediation requirements set forth in the Remedial Work Plan (or Remedial Design or Plans and Specifications) and all applicable statutes and regulations have been or will be achieved in accordance with the time frames, if any, established in the work plan (or Remedial Design or Plans and Specifications).

All use restrictions, institutional controls, engineering controls and/or any operation and maintenance requirements applicable to the site are contained in a deed restriction created and recorded pursuant to ECL 71-3605 and that any 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 for the continual and proper operation, maintenance, and monitoring of any engineering controls employed at the site including the proper maintenance of any remaining monitoring wells, and that such plan has been approved by DER.

If the remedial program requires financial assurance, the certification must include: *Any financial assurance mechanisms required by DEC pursuant to Environmental Conservation Law have been executed.*

It is a violation of Article 145 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 145, New York State Education Law.

12.0 SCHEDULE

The following table outlines the schedule for completing the remedial actions.

Schedule Milestone	Weeks from RAWP Submittal	Duration (weeks)
NYSDEC Approval of RAWP	8	-
Mobilization	8	2
Construction and Hot Spot Excavation	10	4
Installation of Vapor Barrier and SSDS	13	8
Demobilization	21	2
Testing of Soil Mitigation System	48	2
Submit Construction Completion Report	52	-