Queens West (Hunter's Point) Parcel 8

QUEENS, NEW YORK

Site Management Plan

NYSDEC Site Number: C241087

Prepared for:
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and

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Revisions to Final Approved Site Management Plan:

Revision #	Submitted Date	Summary of Revision	DEC Approval Date

DECEMBER 2011

CERTIFICATIONS

I, Arnold F. Fleming, PE, certify that I am currently a NYS registered professional engineer and that this Site Management 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).

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.

050411
NYS Professional Engineer #

12/21/11
Date

Signature

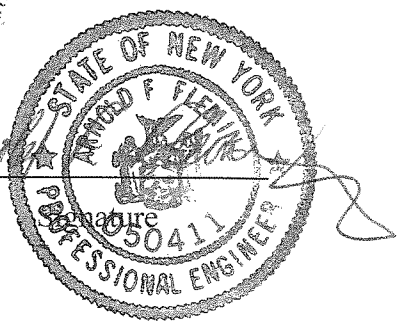

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

SITE MANAGEMENT PLAN

1.0 INTRODUCTION AND DESCRIPTION OF REMEDIAL PROGRAM

1.1 INTRODUCTION

This document is required as an element of the remedial program at the Queens West (Hunter's Point) Parcel 8 (hereinafter referred to as the Site) under the New York State (NYS) Brownfield Cleanup Program (BCP) administered by New York State Department of Environmental Conservation (NYSDEC). The site was remediated in accordance with Brownfield Cleanup Agreement (BCA) Index # W2-1059-05-03, Site # C241087, which was executed on March 30, 2005 and last amended on March 10, 2010.

1.1.1 General

Avalon Riverview II LLC and Avalon Riverview North[1] LLC and Queens West Development Corp., or QWDC (collectively, the Volunteer) entered into a BCA with the NYSDEC to remediate a 0.73-acre property located in Long Island City, Queens County, New York. This BCA required the Volunteer to investigate and remediate contaminated media at the site. A figure showing the site location and boundaries of this 0.73-acre site is provided in Figure 1. The boundaries of the site are more fully described in the metes and bounds site description (Appendix B) that is part of the Environmental Easement.

After completion of the remedial work described in the Remedial Action Work Plan (RAWP), some contamination was left in the subsurface at this site, which is hereafter referred to as "remaining contamination." This Site Management Plan (SMP) was prepared to manage remaining contamination at the site until the Environmental

[1] Avalon Riverview North, LLC was previously known and listed on the March 30, 2005 BCA as Avalon Riverview III, LLC. The name change was reflected in the Amended BCA dated 3/10/2010.

Easement is extinguished in accordance with ECL Article 71, Title 36. All reports associated with the site can be viewed by contacting the NYSDEC or its successor agency managing environmental issues in New York State.

This SMP was prepared by Arnold Fleming, P.E. and Fleming-Lee Shue, Inc. (FLS), on behalf of the Volunteer in accordance with the requirements in NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation, dated May 2010, and the guidelines provided by NYSDEC. This SMP addresses the means for implementing the Institutional Controls (ICs) and Engineering Controls (ECs) that are required by the Environmental Easement for the site.

1.1.2 Purpose

The site contains contamination left after completion of the remedial action. Engineering Controls have been incorporated into the site remedy to control exposure to remaining contamination during the use of the site to ensure protection of public health and the environment. An Environmental Easement (Appendix B) granted to the NYSDEC, and recorded with the Office of the City Register, will require compliance with this SMP and all ECs and ICs placed on the site. The ICs place restrictions on site use, and mandate operation, maintenance, monitoring and reporting measures for all ECs and ICs. This SMP specifies the methods necessary ensure compliance with all ECs and ICs required by the Environmental Easement for contamination that remains at the site. This plan has been approved by the NYSDEC, and compliance with this plan is required by the grantor of the Environmental Easement and the grantor's successors and assigns. This SMP may only be revised with the approval of the NYSDEC.

This SMP provides a detailed description of all procedures required to manage remaining contamination at the site after completion of the Remedial Action, including: (1) implementation and management of all Engineering and Institutional Controls; (2) media monitoring; (3) operation and maintenance of all treatment, collection, containment, or recovery systems; (4) performance of periodic inspections, certification of results, and submittal of Periodic Review Reports; and (5) defining criteria for termination of treatment system operations.

To address these needs, this SMP includes 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; (3) an Operation and

Maintenance Plan for implementation of remedial collection, containment, treatment, and recovery systems (including, where appropriate, preparation of an Operation and Maintenance Manual for complex systems).

This plan also includes a description of Periodic Review Reports for the periodic submittal of data, information, recommendations, and certifications to NYSDEC.

It is important to note that:

- This SMP details the site-specific implementation procedures that are required by the Environmental Easement. Failure to properly implement the SMP is a violation of the environmental easement, which is grounds for revocation of the Certificate of Completion (COC);
- Failure to comply with this SMP is also a violation of Environmental Conservation Law, 6NYCRR Part 375 and the BCA Index # W2-1059-05-03; Site #C210487 for the site, and thereby subject to applicable penalties.

1.1.3 Revisions

Revisions to this plan will be proposed in writing to the NYSDEC's project manager. In accordance with the Environmental Easement for the site, the NYSDEC will provide a notice of any approved changes to the SMP, and append these notices to the SMP that is retained in its files.

1.2 SITE BACKGROUND

1.2.1 Site Location and Description

The site is located at 4-56 47th Road, Long Island City, County of Queens, New York and is identified as Block 19 and Lot 19 on the Queens Tax Map. The site is an approximately 0.73-acre area bounded by 47th Road to the north, 48th Avenue to the south, Center Boulevard to the east, and Peninsula Park to the west (see Figure 1). The boundaries of the site are more fully described in Appendix B – Metes and Bounds.

The site is to be developed with a library and park ranger station. Parcel 8 is part of a larger multi-acre shoreline tract of land known as the Queens West Development (QWD) that extends along the East River from Anable Basin to the north to 50th Avenue to the south. A portion of the QWD, south of 50th Avenue, was sold to the City of New York for an affordable housing project known as the Hunters Point South Development.

Surrounding parcels include Parcel 9 of the QWD to the east (Site #C241049), which received a Certificate of Completion (COC) for Restricted Residential Use in December 2006; Stage II of the QWD to the north (Sites V00505A and B), which completed remediation and received Voluntary Cleanup Agreement (VCA) releases in 2008 and 2006, respectively; Peninsula Park and the East River to the west; and mixed uses to the south, including residential, commercial, a day care center, a public school and Gantry Plaza State Park.

1.2.2 Site History

The Site history was developed from several sources including Sanborn maps, historical photographs, previous AKRF and TRC Engineers, Inc. reports, and a detailed history of Long Island City (Seyfried 1984).

The Site was originally part of the East River and was man-made by extensive filling, which raised the surface elevation and expanded the shoreline into the river. The Site historically housed industrial operations and was occupied by the Warren Chemical Co. (Warren) from circa 1855 until 1915. Warren produced roofing materials, tar paper and asphalt. Pumps, tanks, condensers, dryers, steam stills, and stacked drums associated with the production of these products are known to have been used on Site. Following Warren, the Site was used by the Liquid Carbonic Company, which produced liquefied carbon dioxide for soda fountains, from the 1930s until the 1950s. In 1970 the Site was occupied by a metal storage warehouse. Hallen Contractors occupied the Site from the 1970s until 1999. The Site was vacated in 2001. Parcel 9, adjacent to the east of the Site, was occupied by a portion of the Warren Chemical Company facilities. Varnish and paint manufacturers occupied the eastern portion of Parcel 9 and a variety of manufacturing uses were on the western portion, including the Blau Gas Company, an asphalt company, the Harlem Chemical Co., a plumbing supply manufacturer, a refrigeration equipment manufacturer, a barrel manufacturer, and an auto repair shop.

Parcel 8, along with Parcels 9 and 11, and the Center Boulevard VCP Site No. V00194A were the subject of a single Voluntary Cleanup Agreement (VCA), dated August 17, 1999 (Index No. D2-0003-98-10). In July 2000, that VCA was amended to remove Parcels 8, 9 and 11, and separate VCAs were executed for each parcel by the

designated developer for the parcel. Parcels 8 and 9 were subsequently transitioned into the Brownfield Cleanup Program (BCP), as BCP Site Nos. C241087 and C241049, respectively. Parcel 9 has since been remediated under a BCA (Site No. C241049) and received its Certificate of Completion for Restricted Residential use (Track 4) on December 29, 2006. On April 6, 2010, an Agreement Amendment was signed for Parcel 8, which added QWDC as a Volunteer.

A Phase I report was not prepared separately for Parcel 8. Prior investigations were conducted in 1985, 1989, 1998, and 2000. Sampling was performed in 2006 as part of an off-Site investigation for Parcel 9. Elevated levels of coal tar compounds were detected in groundwater, and in soils exceeding Unrestricted Use Soil Cleanup Objectives. Abandonment-in-place of a 1,000-gallon underground storage tank was completed under a FDNY citation in 2007. An Interim Remedial Measure (IRM) for removal of a large soil and construction and demolition debris pile was completed in June 2008. A Supplemental Remedial Investigation Work Plan (SRIWP) was approved by NYSDEC in July 2008. Off-Site investigations to the south and west of the Site were conducted during the summer of 2009 and a pilot study tested a new remedial technology in February-March 2010. The remedial action work plan (RAWP) was submitted in April 2010 and remediation began in October 2010.

1.2.3 Geologic Conditions

LITHOLOGY

The top four to five feet of soil was removed across the entire Site as part of the remediation. Soil was excavated to seven feet in Grid Cell 7 to address a hot spot. Soil boring data collected by AKRF and FLS during the remedial investigations showed that the Site contained historic urban fill, consisting of brown medium to coarse sands intermixed with concrete, brick and ash, from ground surface to predominantly 7 to 13 ft-bg, although it reached to 19 to 25 ft-bg in a few places. Underlying the fill are brown medium to coarse sands, silts and clays, to approximately 29 to 35 ft ft-bg, where a heavily consolidated grey silt/till begins. The till lies beneath most of Parcel 8 and

typically begins at 28 to 31 ft-bg. The top of bedrock is anticipated to begin at 30 to 35 ft-bg.

A lens of silt and silty clay was found over approximately 85 percent of Parcel 8. The silty layer begins at 15 to 18 feet below grade and ends at 18 to 25 feet below grade, although the bottom depth of the unit varies. A geologic cross section is shown in Figure 2.

Of particular importance to non-aqueous phase liquid (NAPL) behavior, discussed further in Section 1.3, is the silty clay layer and the increasing bulk density with depth. Bulk density increases from 1.18 g/ml near the water table to 1.57 g/ml near the till layer, an increase of nearly 25 percent.

HYDROGEOLOGY

Groundwater occurs in two zones: a shallow zone, extending from the water table at approximately 8 to 10 ft-bg to approximately 17 to 24 ft-bg and a deeper zone, from approximately 24 to 36 ft-bg. Net groundwater flow in the shallow zone is towards the west. Groundwater appears to mound slightly near the center of Parcel 8 and diverges in its westerly flow, with a portion flowing towards the inlets that surround Peninsula Park on the north and south. One component flows northwest toward the Northern Embayment at the end of 47th Road and the other flows southwest towards the Southern Embayment. Groundwater gradients also trend toward the sewer bordering the northern side of Parcel 8 that leads to the 47th Road Outfall. Groundwater in the deeper zone follows the same pattern as the shallow groundwater flow, although there is a greater component of flow towards northwest and there are local deflections in other directions, but the net deep groundwater flow is to the surface water bodies.

The average horizontal hydraulic gradient (based on three rounds of measurements) in the shallow zone is 0.0032 and 0.0035 in the deep zone. While these average gradients are about the same, the gradient measurements were more variable in the deeper zone.

The net vertical hydraulic gradient is downward, from the shallow to the deeper groundwater zone and a downward hydraulic gradient, measured during both low and high tide measurements, was evident in all eight well pairs. The average vertical gradient measured 0.06. The ratio of horizontal to vertical gradient is slightly less than 20 horizontal to 1 vertical.

Hydraulic conductivity, based on slug tests, in the shallow groundwater zone ranged from 3.0×10^{-4} cm/sec to 1.7×10^{-2} cm/sec and averaged 5.1×10^{-3} cm/sec. In the deep groundwater zone this parameter ranged from 2×10^{-4} cm/sec to 2.1×10^{-3} cm/sec and averaged 8.8×10^{-4} cm/sec. On average, hydraulic conductivity in the shallow groundwater zone was approximately 6 times greater than in the deeper zone.

Seepage velocity, using effective porosities for medium and coarse sands of 0.25 to 0.35 ranged from 2.7×10^{-6} cm/sec to 2.2×10^{-4} cm/sec and averaged 3.4×10^{-5} cm/sec in the shallow groundwater zone. In the deeper groundwater zone, seepage velocity ranged from 2.8×10^{-6} cm/sec to 2.9×10^{-5} cm/sec and averaged 1.1×10^{-5} cm/sec.

A geologic section is shown in Figure 2.

A groundwater flow figure is shown in Figure 3.

1.3 SUMMARY OF REMEDIAL INVESTIGATION FINDINGS

Remedial Investigations (RIs) were performed to characterize the nature and extent of contamination at the site and adjacent areas. The results of the RIs are described in detail in the following reports:

- TRC Engineers, December 2004. Supplemental Investigation Report No. 11. Queens West Development – Stage 2, 46-00 5th Street, Long Island City, New York. TRC Project Number 35204-2010-00000.
- AKRF, April 2005. Supplemental Remedial Investigation Report, Queens West Parcel 9.
- AKRF, June 2005. Supplemental Remedial Investigation Work Plan Parcel 8 and Offsite. Project Number 10516.

- AKRF, June 2005. Additional Delineation Testing Report, Queens West Development-Parcel 9, Queens, New York, Project Number 10516.
- TRC Engineers, June 2005. Operable Units One & Two Remedial Investigation Report. Queens West Development – Stage 2, 46-00 5th Street, Long Island City, New York. TRC Project Number 35204-2200-00000.
- AKRF, July 2006. Off-Site Investigation Report, Queens West Development-Parcel 9, Queens, New York, Project Number 10516.
- FLS, 2008, Parcel 8 Supplemental Remedial Investigation Work Plan, July 2008. Project No. 10011-007-1.
- FLS, 2009. Parcel 8 Remedial Investigation Report, April 2009. FLS Project No. 10011-007-1.

Generally, the RIs determined that the majority of on-Site contamination existed beneath the former main operational footprint of Warren Chemical between the capillary fringe (approximately 10 ft-bg) and approximately 22 ft-bg. Some dense non-aqueous phase liquid (DNAPL) existed near the till layer at approximately 30 ft-bg, albeit at a much smaller amount than in the overlying strata. There are several instances where DNAPL is present atop medium to coarse sands, unable to penetrate because of the capillary resistance. NAPL and staining were also observed atop the silty clay lens.

All of the DNAPL was residual. Numerous attempts to gauge DNAPL accumulation in wells failed to identify measurable NAPL. Visible NAPL occurred in soil borings throughout Parcel 8, mainly in sandy lenses, but the bulk of the contaminant mass is near the contaminant source, the former operational foot print on the southwest and west central part of Parcel 8. This area also corresponds to areas where NAPL thickness is greatest. The DNAPL seems to have remained in the area of the original release, and has not migrated in any horizontal direction in any significant quantity.

Due to the limited size of the Site (0.73 acres) and the prevalence of soil and groundwater impacts across the Site, all of Parcel 8 is considered an Area of Concern (AOC). The RI did uncover a number of scattered soil “Hot Spot” areas. Hot Spots are

those soil locations where copper, barium, or arsenic, and PCBs exceeded the Commercial Use Soil Cleanup Objectives (SCOs) in soils below 4 ft-bg.

Below is a summary of site conditions when the RIs were performed between 1985 and 2010:

Soil

Soils on Parcel 8 were impacted by PAHs from the surface to depth. The shallow surface soils contained some debris and PAHs from a combination of the historic waste and the fill that was brought in to grade the land for development. The surface soil also contained a few scattered areas of metals and PCB contamination. Subsequent to Warren Chemical, historic Site operations resulted in scattered small-scale solvent spills that did not impact groundwater or result in elevated soil gas concentrations. A summary of soil boring sample results which exceeded the Part 375 Commercial use SCOs is shown on Figure 4. Soil analytical summary tables from the RIR are included in Appendix C.

Volatile Organic Compounds (VOCs)

Soil boring analytical results indicated a single location (SB-29 at 13-15 ft-bg) where the benzene concentration (115,000 ug/kg) exceeded the Commercial Use SCO of 44,000 ug/kg. None of the analytical results for ethylbenzene or toluene in soil exceeded their respective Commercial Use SCOs and only one total xylene result, [QW-SB-15B (16-18') Dup], at 520,000 ug/kg, exceeded the Commercial Use SCO of 500,000 ug/kg. Chlorinated compounds were predominantly non-detect (ND) and in the few instances where they were detected, concentrations were below their respective Commercial Use SCOs.

Semi-Volatile Organic Compounds (SVOCs)

SVOCs were reported at concentrations above the Commercial Use SCOs in several soil borings at varying depths. The SVOCs reported above the Commercial Use SCOs are the polycyclic aromatic hydrocarbons (PAHs), which are combustion products

and typical components of historic urban fill, but are also components of products such as fuel oils, and coal tars.

PAHs above the Commercial Use SCOs were reported in all samples collected from the 2 to 4 ft-bg depth interval, which consists of historic urban fill.

In general, the highest elevated concentrations of PAHs were in soils exhibiting visual indications of NAPL contamination. Soil samples containing elevated concentrations of PAHs largely consisted of medium to coarse sands collected from the depth interval of approximately 12 to 31 ft-bg, within the saturated zone. In particular, soil samples SB-29 (13-15 ft), SB-29 (19-20 ft), SB-35 (18-20 ft), MW-22 (12-13 ft), MW-22 (17.5-18.5 ft), SB-26 (13-14.5 ft), and SB-26 (19-21 ft), which exhibited visual indications of coal tar, were reported as containing the highest concentrations of PAHs.

Metals

Below 2 ft-bg, arsenic exceeded the Commercial Use SCO of 16 mg/kg in four locations: SB-40 (2-4'), 17.5 mg/kg; SB-35 (2-4'), 17.8 mg/kg; MW-22 (12-13'), 24 mg/kg; and QW-SB-7 (7-9'), 19.5 mg/kg. Below 2 ft-bg, copper exceeded the Commercial Use SCO of 270 mg/kg in one location: SB36 (2-4'), at 325 mg/kg. Barium exceeded the Commercial Use SCO of 400 mg/kg below two ft-bg in two samples, SB32 (422 mg/kg) and SB36 (75 mg/kg). All other toxic metal results were below the Commercial Use SCOs.

PCBs

Total PCB concentrations at depths beneath 2 ft-bg, exceeded the Commercial Use SCO of 1,000 ug/kg at one location, SB-31 (2-4') at 55,100 ug/kg.

Pesticides

All pesticide results were below the Commercial Use SCOs.

Site-Related Groundwater

Groundwater analytical summary tables from the RIR are included in Appendix C. A summary of groundwater conditions are described in the following sections. Shallow and deep monitoring wells were installed during the remedial investigation with screens across the lower and upper water-bearing strata, respectively, to provide discreet groundwater analytical results.

VOCs

Benzene, toluene, ethylbenzene, and total xylenes (BTEX) exceeded the Class GA criteria in groundwater at all but two locations, at MW-10 on the northwest corner, and MW-20 in the northwest quadrant (Figure 5), where benzene was below detection levels. The highest benzene concentrations were detected in well cluster MW-16(S)/MW-9 where benzene was detected at 5,050 µg/L and 1,210 µg/L, respectively, and in well cluster MW-14(S)/MW-22(D), where benzene measured 3,720 µg/L and 1,020 µg/L. BTEX concentrations were highest between approximately 18 and 24 feet below grade. VOCs in groundwater above Technical Operational Guidance Series (TOGS) Class GA Ambient Water Quality standards (AWQS) were summarized in Matrix 1.

Matrix 1

Summary of VOCs in Groundwater above TOGS Class GA AWQS, ug/L

Sample	Benzene	Toluene	Ethyl-benzene	Total Xylenes	MTBE
MW20(S)	nd	1.2	11.2	27.7	nd
MW17(S)	8.2	1.1	34.6	39.2	nd
MW19(D)	29.4	50.2	1,050	1,610	nd
MW15(D)	40.2	8.5	675	679	nd
MW13(S)	64.5	46.2	402	730	nd
MW23(S)	140	31.2	714	916	nd
MW12(D)	157	50.4	617	568	17.9
MW11(D)	163	445	1,340	2,380	37.1
MW18(D)	215	23.2	587	569	2.2
MW21(S)	441	115	531	2,310	nd
MW22(D)	1,010	254	1,050	1,720	2.3
MW9 (Deep)	1,210	14,000	1,280	5,120	nd
MW14(S)	3,720	6,150	3,150	11,100	nd
MW16(S)	5,050	9,690	1,260	5,220	nd

Matrix 1

Summary of VOCs in Groundwater above TOGS Class GA AWQS, ug/L

Sample	Benzene	Toluene	Ethyl-benzene	Total Xylenes	MTBE
MW7R (Deep)	5,120	671	904	2,510	nd
TOGS GA AWQS*	1	5	5	5	10

nd – Below detection limits; * or guidance value

SVOCs

Acenaphthene concentrations ranged from 1 µg/L to 405 µg/L with a median concentration of 227 µg/L. Acenaphthene exceeded the TOGS Class GA criterion of 20 µg/L in all samples except in MW-10. Benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, and benzo(g,h,i)perylene exceeded their TOGS Class GA criterion of 0.002 µg/L in four wells (MW-14[S], MW-16[S], MW-20[S], and MW-23[S]). Chrysene and benzo(a) anthracene each exceeded their TOGS Class GA criterion of 0.002 µg/L in six and eight wells, respectively. Naphthalene concentrations ranged from ND to 17,300 µg/L in MW-11(D). SVOCs in groundwater above TOGS Class GA AWQS are summarized in Matrix 2.

Matrix 2

Summary of SVOCs in Groundwater above TOGS Class GA AWQS, ug/L

Sample	Acenap-hthene	Benzo a anthra-cene	Benzo a pyrene	Benzo-b fluoran-thene	Benzo k-fluorant hene	Chry-sene	Fluor-anthe ne	Fluor-ene	Indeno cd-pyrene	Naph-thalene	Phena n-threne	Pyre-ene
MW7R	89	0.53	nd	nd	nd	nd	5	44.9	nd	nd	51.2	3.3
MW17(S)	173	0.68	nd	nd	nd	0.65	10.7	51.3	nd	387	77.1	6.5
MW15(D)	388	0.41	nd	nd	nd	nd	5.6	47.1	nd	nd	62.8	3.2
MW12(D)	405	nd	nd	nd	nd	nd	7.2	85.8	nd	nd	99.3	3.6
MW22(D)	127	nd	nd	nd	nd	nd	2.0	65.7	nd	12,900	36.1	0.91
MW21(S)	173	0.75	nd	nd	nd	0.65	7.5	80.5	nd	9,400	72.7	5
MW9	166	nd	nd	nd	nd	nd	3.0	47.4	nd	6,640	38.1	1.2
MW11(D)	383	nd	nd	nd	nd	nd	6.5	139	nd	17,300	85.3	3.7
MW13(S)	248	nd	nd	nd	nd	nd	4.8	71	nd	10,300	56.4	2.9
MW18(D)	206	nd	nd	nd	nd	nd	5.0	40.1	nd	5,640	60.3	2.3
MW23(S)	334	6.8	5.6	4.5	3.7	7.1	34.9	130	2.8	nd	192	27.8
MW20(S)	45.5	27	22.2	15.2	15.7	27.3	62.5	38.6	9.7	486	128	53.1
MW19(D)	299	0.44	nd	nd	nd	nd	4.5	128	nd	11,200	74.6	3
MW16(S)	155	6.5	5.8	3.6	3	5.5	20.9	84.6	2.7	12,500	92.7	18.1
MW14(S)	187	5	3.7	2.7	2.7	4.4	21.3	81	1.8	12,700	95.2	17.2
TOGS GA AWQS*	20	0.002	nd	0.002	0.002	0.002	50	50	0.002	10	50	50

nd – Below detection limits; * or guidance value

Metals

Arsenic concentrations in on-Site wells were below the TOGS criterion of 25 µg/L. Lead exceeded the TOGS criterion of 25 µg/L in two samples: MW-20(S) and MW-14(S). Lead exceeded the TOGS criterion of 25 µg/L in two samples: MW-20(S), 27.9 µg/L and MW-14(S), 66 µg/L. Manganese exceeded 300 µg/L in several wells.

Site-Related Soil Vapor Intrusion

The results of the soil gas survey conducted as part of the RI indicated that the body of contaminant mass is located in the southwest corner, arcing from the southeast corner to southwest corner and along the western boundary of Parcel 8. The soil gas results are consistent with the results of the soil samples collected from borings.

Benzene concentrations ranged from ND (in two of the 11 samples) to 119.3 ug/m3. Toluene was detected in 10 of the 11 samples at concentrations ranging from ND to 79.9 ug/m3. Naphthalene was detected in 2 out of 11 samples, up to a concentration of 15.7 ug/m3.

Tetrachloroethylene (PCE) was detected in all samples at concentrations ranging from 7.5 ug/m3 to 216.3 ug/m3. It should be noted that PCE concentrations in groundwater at all monitoring well locations were below detection limits. Trichloroethene (TCE) was detected at two locations at concentrations ranging from ND to 29 ug/m3. Methylene chloride was detected in one sample at a concentration of 13.9 ug/m3.

Underground Storage Tanks

One former 1,000-gallon fuel oil tank, previously abandoned in place, was allowed to remain. The UST had previously been abandoned in place by filling with concrete. All piping had been previously removed as well. The UST was allowed to remain following a discussion between FLS and NYSDEC on 11/30/11, after several unsuccessful attempts to locate the tank. A second tank, an empty riveted, 550-gallon tank, was uncovered during excavation in the southwest quadrant of grid cell 2 and removed. Two additional USTs were uncovered in Grid Cell 7, one riveted, 550-gallon UST and one 1,000-gallon steel UST encased in a concrete vault. Two tanks, a 30-gallon steel UST and a 750-gallon UST were also uncovered in Grid Cell 6, removed and disposed as scrap metal.

1.4 SUMMARY OF REMEDIAL ACTIONS

The site was remediated in accordance with the NYSDEC-approved Remedial Action Work Plan dated October 10, 2010.

The following is a summary of the Remedial Actions performed at the Site:

1. Excavation of the top four to five feet of soil over the entire area of the Site. The shallow soil excavation was done in the open without an enclosure, and odor suppressant foam was on hand and utilized as needed.

2. Hot Spots of metals and PCBs in Grid Cell 7 identified during the RI were removed to a depth of 7 feet below grade, where endpoint samples met the

Commercial Use SCOs. Soil removal identified in remedial components 1 and 2 removed approximately 3 percent of the total organic contaminant mass from the Site. The remedial performance goals for shallow soil removal were the Part 375 Commercial use SCOs.

Soils which were not grossly contaminated below approximately 4-5 ft-bg, and below the Hot Spot excavation in Grid Cell 7 remained in place.

Excavation (components 1 and 2) was completed in lifts or strips so that the existing soil cover remained in place and minimized exposure of subsurface soils. Only a small portion was excavated at a time. The strips were approximately 10 to 20 feet wide with a length that accommodated "load and go" removal of soils into trucks. Alternatively, no more than a 60-foot by 60-foot excavation (3,600 ft^2) was made in any one day so as to accommodate up to 30 truckloads per day. In this manner, only soil that could be removed without stockpiling was excavated. Post excavation samples were collected for expedited turn around and the results forwarded to the Department for review. If the results were acceptable, clean cover was placed over the excavation to grade and the next strip was begun. The process continued until excavation was complete. The clean cover is recycled concrete aggregate which had been stockpiled on Stage 3 approximately ¼ mile south of the Site.

3. Screening for indications of gross contamination (by visual means, odor, and monitoring with PID) of all excavated soil during any intrusive Site work.

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

   A total of 7,665.3 tons of soil were removed from the Site, including 7,340.8 tons of non-hazardous, petroleum-impacted soil/historic fill was removed and transported to Soil Safe, Inc. in Logan Township, NJ for disposal.

   There was one PCB hot spot area within Grid Cell 7. Hazardous PCB-contaminated soil was excavated to a depth of five feet and a total of 18.4 tons removed and transported to CWM Waste Management, LLC in Model City, NY.

   A total of 306.1 tons of non-hazardous PCB-contaminated soils from 5 to 7 ft-bg within Grid Cell 7 were transported to the Atlantic County Utility Authority (ACUA) landfill in Egg Harbor Township, New Jersey.

   A total of approximately 85 yd^3 of general trash including metal, tires, and general non-soil debris was unearthed and removed from the excavation. This was disposed as normal solid waste or recycled at Evergreen Recycling, TNT Scrap, D.F. Allen, and S&M Tire Recycling.

5. Collection and analysis of end-point samples subsequent to removal of shallow soil, Hot Spots and gross contamination. Endpoint samples were collected at 4 to 5 ft-bg, and along the Site sidewalls and analyzed for VOCs, SVOCs, metals, PCBs, and pesticides/herbicides. In the areas of Hot Spot and

gross contamination excavation, endpoint samples were collected at the bottom of the Hot Spot and/or gross contamination excavation and along the sidewalls of each excavation in accordance with the procedures in DER-10, and similarly analyzed.

6. Import of materials to be used for backfill and cover in compliance with: (1) Part 375-6.7(d) and, (2) all Federal, State and local rules and regulations for handling and transport of material;
7. Installation of a demarcation barrier between the residual soil and approved fill material. Hot Spot and gross contamination excavations were filled to 4 ft-bg with soils meeting Part 375-6.7(d) prior to installation of the demarcation barrier.
8. One former 1,000-gallon fuel oil tank, previously abandoned in place, was allowed to remain. The UST had previously been abandoned in place by filling with concrete. All piping had been previously removed as well. The UST was allowed to remain following a discussion between FLS and NYSDEC on 11/30/11, after several unsuccessful attempts to locate the tank. A second tank, an empty riveted, 550-gallon tank, was uncovered in the southwest quadrant of grid cell 2 and removed. Two additional USTs were uncovered in Grid Cell 7, one riveted, 550-gallon UST and one 1,000-gallon steel UST encased in a concrete vault. Two tanks, a 30-gallon steel UST and a 750-gallon UST were also uncovered in Grid Cell 6, removed and disposed as scrap metal. All USTs, except the one left in place, were excavated and disposed at TNT Scrap LLC, Maspeth, NY.
9. Installation of a composite cover system consisting of, at a minimum, 2 feet of clean soil and/or 6 inches of asphalt or concrete. The final composite cover system will include the library and park ranger station foundations, which will be slab-on-grade with a shallow pile-cap grade-beam system, not expected to extend beneath the demarcation layer. Additionally, there may be ancillary buildings of similar construction. Proposed stone walkways underlain by a gravel substrate, landscaped pervious areas, and a possible water element with an impervious concrete slab foundation are also part of the composite cover system.
10. S-ISCO™ addressed the bulk of the contaminant source mass. The greater part of the mass occurred from approximately 10 ft-bg to 22 ft-bg, (i.e., the treatment zone) and encompassed about 67 percent of the contaminant mass (53,600 pounds). Combined with the removal of the top four to five feet of soil and the Hot Spot and gross contamination removal, over 90 percent of the total contaminant mass was removed or destroyed in place. Additional S-ISCO™ treatment addressed deep contamination atop the till layer near the southwest corner of Parcel 8.
11. All activities associated with the remedial action, including permitting requirements, were conducted in accordance with the applicable Federal, State and local rules and regulations.

12. Recording of an Environmental Easement requiring implementation of engineering and institutional controls described in a Department-approved Site Management Plan (SMP) to manage residual contamination.
13. Publication of this SMP for long term management of residual contamination, as required by the Environmental Easement, that: (i) requires installation of a sub-slab depressurization system and vapor barrier for any occupied buildings constructed on the Site, (ii) details procedures for future maintenance of engineering controls and management of any residual Site contamination and (iii) addresses procedures for future Oxygen Release Compound Advanced™ (ORCA) application, if necessary, including monitoring parameters to prevent migration of contaminated groundwater off Site.

Remedial activities were completed at the Site in December 2011.

1.4.1 Removal of Contaminated Materials from the Site

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

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.
- The cleanup objectives for groundwater are the TOGS Class GA AWQS and/or achievement of asymptotic levels for VOCs and naphthalene during the proposed eight quarters of post-remedial monitoring.

RAOs for Environmental Protection

- Restore groundwater aquifer, to the extent practicable, to pre-disposal/pre-release conditions and/or to a level commensurate with Site use.
- Prevent the discharge of contaminants to surface water.
- Prevent further off-Site migration of contaminated groundwater.
- Remove the source of groundwater contamination.

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.

There is no surface water on Site, so the remedial action did not address this medium. There were no material adverse impacts to sediment stemming from Parcel 8, so the remedial action did not address this medium.

A list of the soil cleanup objectives (SCOs) for the primary contaminants of concern (COCs) and applicable land use for this site is provided in Table 1.

A figure showing areas where excavation was performed is shown in Figure 6.

1.4.2 Site-Related Treatment Systems

A sub-slab depressurization system (SSDS) and vapor barrier will be installed to mitigate soil vapors and prevent their entry into any future structures. It should be noted that these are a precaution only, as soil vapor sampling completed before remediation demonstrated that the contamination posed no source of adverse soil vapors.

The vapor barrier will be a heavy grade (20 mil minimum thickness), impervious plastic that surrounds the building basement floor and walls. The SSDS will lie beneath the library building footprint and park ranger station and consist of a series of perforated polyvinyl chloride (PVC) pipes connected to a manifold that connects to a PVC pipe that leads to the roof whereupon a fan will discharge soil vapors to the air. The SSDS will be an active system. Refer to Appendix K for SSDS details and the location of the SSDS (to be provided upon SSDS design).

1.4.3 Remaining Contamination

Table 2 and Figure 7 summarize the results of all soil samples remaining at the site after completion of Remedial Action that exceed the Track 1 (unrestricted) SCOs. Table 2 and Figure 8 summarize the results of all soil samples remaining after remediation above the Site-specific action levels.

2.0 ENGINEERING AND INSTITUTIONAL CONTROL PLAN

2.1 INTRODUCTION

2.1.1 General

Since remaining contaminated soil and groundwater exists beneath the site, Engineering Controls and Institutional Controls (EC/ICs) are required to protect human health and the environment. This Engineering and Institutional Control Plan describes the procedures for the implementation and management of all EC/ICs at the site. The EC/IC Plan is one component of the SMP and is subject to revision by NYSDEC.

2.1.2 Purpose

This plan provides:

- A description of all EC/ICs on the site;
- The basic implementation and intended role of each EC/IC;
- A description of the key components of the ICs set forth in the Environmental Easement;
- A description of the features to be evaluated during each required inspection and periodic review;
- A description of plans and procedures to be followed for implementation of EC/ICs, such as the implementation of the Excavation Work Plan for the proper handling of remaining contamination that may be disturbed during maintenance or redevelopment work on the site; and
- Any other provisions necessary to identify or establish methods for implementing the EC/ICs required by the site remedy, as determined by the NYSDEC.

2.2 ENGINEERING CONTROLS

2.2.1 Engineering Control Systems

2.2.1.1 Composite Cover System

Exposure to remaining contamination in soil/fill at the site is prevented by a composite cover system placed over the site. This cover system is comprised of a minimum of two feet of NYSDEC-approved fill and/or six inches of asphalt paving or concrete underlain by a demarcation layer to delineate the cover soil from the subsurface soil. The final composite cover system will include the library and park ranger station foundations, which will be slab-on-grade with a shallow pile-cap grade-beam system, not expected to extend beneath the demarcation layer. Additionally, there may be ancillary buildings of similar construction. Proposed stone walkways underlain by a gravel substrate, landscaped pervious areas, and a possible water element with an impervious concrete slab foundation are also part of the composite cover system. Once Site construction is complete, a figure showing the composite cover system will be appended to this SMP as Figure 12.

The Excavation Work Plan that appears in Appendix A outlines the procedures required to be implemented during construction activities or in the event the cover system is breached, penetrated or temporarily removed, and any underlying remaining contamination is disturbed. Procedures for the inspection and maintenance of this cover are provided in the Monitoring Plan included in Section 4 of this SMP.

2.2.1.2 Vapor Barrier

Vapor barriers will be installed beneath all occupied buildings to be constructed on the Site. The vapor barriers will be installed below the concrete floor slabs and have continuous water stops at the construction joints or utility openings. The vapor barriers will consist of either a minimum 20 mil PVC sheet sealed at all penetrations, spray on Liquid Boot, or equivalent means approvable by NYSDEC.

2.2.1.3 Sub-Slab Depressurization Systems

All occupied buildings to be constructed on the Site will have an active SSDS below the vapor barrier in order to further minimize potential vapor intrusion. The SSDS will include the following elements:

- Suction pits under floor slab
- Layer of gas permeable material beneath the concrete floor slab(s)
- Perforated horizontal pipe(s) running from each suction pit to a common header
- A vertical riser extending from the common header to a discharge point above the roof. This pipe will be at least six (6) inches in diameter
- A fan on the roof to provide negative pressure to the sub-slab area
- Monitoring points located throughout the building, which are installed at the lowest level floor slab
- Piping to connect the occupied buildings so as to have one SSDS system for the two separate buildings
- Control panel
- Alarms / remote telemetry system

The operation, maintenance and monitoring (OM&M) requirements for the SSDS consist of start-up testing, routine maintenance and monitoring, and non-routine maintenance as described in Section 4.

Operation of the active SSDS will not be discontinued without written approval by NYSDEC and NYSDOH. A proposal to discontinue the active SSDS and operate in passive mode may be submitted by the property owner based on confirmatory data that justify such a request. In this case, a proposed sampling plan will be presented to NYSDEC and NYSDOH for consideration; however the SSDS will remain in place and operational until permission to discontinue operating actively and operate in passive mode is granted by NYSDEC and NYSDOH.

Procedures for operating and maintaining the SSDS are documented in the Operation and Maintenance Plan (Section 4 of this SMP). Procedures for monitoring the system are included in the Monitoring Plan (Section 3 of this SMP). The Monitoring Plan also addresses severe condition inspections in the event that a severe condition, which may affect controls at the site, occurs.

2.2.2 Criteria for Completion of Remediation/Termination of Remedial Systems

Generally, remedial processes are considered completed when effectiveness monitoring indicates that the remedy has achieved the remedial action objectives identified by the decision document. The framework for determining when remedial processes are complete is provided in Section 6.6 of NYSDEC DER-10.

2.2.2.1 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.

2.2.2.2 Sub-Slab Depressurization System (SSDS)

The active SSDS will not be discontinued unless prior written approval is granted by the NYSDEC. In the event that monitoring data indicates that the active SSDS is no longer required, a proposal to switch to a passive SSDS will be submitted by the property owner to the NYSDEC and NYSDOH.

2.3 INSTITUTIONAL CONTROLS

A series of Institutional Controls is required by the RAWP to: (1) implement, maintain and monitor Engineering Control systems; (2) prevent future exposure to remaining contamination by controlling disturbances of the subsurface contamination; and, (3) limit the use and development of the site to commercial uses only. Adherence to these Institutional Controls on the site is required by the Environmental Easement and will be implemented under this Site Management Plan. These Institutional Controls that support Engineering Controls are:

- Compliance with the Environmental Easement and this SMP by the Grantor and the Grantor's successors and assigns;
- All Engineering Controls must be operated and maintained as specified in this SMP;
- All Engineering Controls on the Controlled Property (i.e., the site) must be inspected at a frequency and in a manner defined in this SMP.
- Groundwater, soil vapor and other environmental or public health monitoring must be performed as defined in this SMP;
- Data and information pertinent to Site Management of the Controlled Property must be reported at the frequency and in a manner defined in this SMP;
- A soil vapor mitigation system consisting of an SSDS under all occupied building structures must be inspected, certified, operated and maintained as required by the SMP;
- On-Site environmental monitoring devices, including but not limited to, groundwater monitoring wells, must be protected and replaced as necessary to ensure proper functioning in the manner specified in the SMP;
- Engineering Controls may not be discontinued without an amendment or extinguishment of the Environmental Easement.

The Site has a series of Institutional Controls in the form of site restrictions. Adherence to these Institutional Controls is required by the Environmental Easement.

Site restrictions that apply to the Controlled Property are:

- The property may only be used for commercial use provided that the long-term Engineering and Institutional Controls included in this SMP are employed.
- The property may not be used for a higher level of use, such as unrestricted or restricted residential, use without additional remediation and amendment of the Environmental Easement, as approved by the NYSDEC;
- All future activities on the property that will disturb remaining contaminated material must be conducted in accordance with this SMP;
- The use of the groundwater underlying the property is prohibited without treatment rendering it safe for intended use;

- The potential for vapor intrusion must be evaluated for any new buildings or extensions to the proposed library or park ranger station and any potential impacts that are identified must be monitored or mitigated;
- Vegetable gardens and farming on the property are prohibited;
- The site owner or remedial party will 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 and will be made by an expert that the NYSDEC finds acceptable.

Institutional Controls identified in the Environmental Easement may not be discontinued without an amendment to or extinguishment of the Environmental Easement.

2.3.1 Excavation Work Plan

The site has been remediated for commercial use. Any future intrusive work that will penetrate the soil cover or cap, or encounter or disturb the remaining contamination, including any modifications or repairs to the existing cover system will be performed in compliance with the Excavation Work Plan (EWP) that is attached as Appendix A to this SMP. Any work conducted pursuant to the EWP must also be conducted in accordance with the procedures defined in a Health and Safety Plan (HASP) and Community Air Monitoring Plan (CAMP) prepared for the site. A sample HASP is attached as Appendix D and a sample CAMP is attached as Appendix E to this SMP that is in current compliance with DER-10, and 29 CFR 1910, 29 CFR 1926, and all other applicable Federal, State and local regulations. Based on future changes to State and federal health and safety requirements, and specific methods employed by future contractors, the HASP

and CAMP will be updated and re-submitted with the notification provided in Section A-1 of the EWP. Any intrusive construction work will be performed in compliance with the EWP, HASP and CAMP, and will be included in the periodic inspection and certification reports submitted under the Site Management Reporting Plan (See Section 5).

The site owner 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 intrusive work, the structural integrity of excavations, proper disposal of excavation de-water, control of runoff from open excavations into remaining contamination, and for structures that may be affected by excavations (such as building foundations and bridge footings). The site owner will ensure that site development activities will not interfere with, or otherwise impair or compromise, the engineering controls described in this SMP.

2.3.2 Soil Vapor Intrusion Evaluation

Soil Vapor Intrusion (SVI) evaluation is not needed at the Site as a vapor barrier and an active SSDS will be installed as an element of the building foundation.

2.4 INSPECTIONS AND NOTIFICATIONS

2.4.1 Inspections

Inspections of all remedial components installed at the site will be conducted at the frequency specified in the SMP Monitoring Plan schedule. A comprehensive site-wide inspection will be conducted annually, regardless of the frequency of the Periodic Review Report. The inspections will determine and document the following:

- Whether Engineering Controls continue to perform as designed;
- If these controls continue to be protective of human health and the environment;
- Compliance with requirements of this SMP and the Environmental Easement;
- Achievement of remedial performance criteria;
- Sampling and analysis of appropriate media during monitoring events;
- If site records are complete and up to date; and

- Changes, or needed changes, to the remedial or monitoring system;

Inspections will be conducted in accordance with the procedures set forth in the Monitoring Plan of this SMP (Section 3). The reporting requirements are outlined in the Periodic Review Reporting section of this plan (Section 5).

If an emergency, such as a natural disaster or an unforeseen failure of any of the ECs occurs, an inspection of the site will be conducted within 5 days of the event to verify the effectiveness of the EC/ICs implemented at the site by a qualified environmental professional as determined by NYSDEC.

2.4.2 Notifications

Notifications will be submitted by the property owner to the NYSDEC as needed for the following reasons:

- 60-day advance notice of any proposed changes in site use that are required under the terms of the Brownfield Cleanup Agreement (BCA), 6NYCRR Part 375, and/or Environmental Conservation Law.
- 7-day advance notice of any proposed ground-intrusive activities pursuant to the Excavation Work Plan.
- Notice within 48-hours of any damage or defect to the foundation structures that reduces or has the potential to reduce the effectiveness of other Engineering Controls and likewise any action to be taken to mitigate the damage or defect.
- Verbal notice by noon of the following day of any emergency, such as a fire, flood, or earthquake that reduces or has the potential to reduce the effectiveness of Engineering Controls in place at the site, with written confirmation within 7 days that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.
- Follow-up status reports on actions taken to respond to any emergency event requiring ongoing responsive action shall be submitted to the NYSDEC within 45 days and shall describe and document actions taken to restore the effectiveness of the ECs.

Any change in the ownership of the site or the responsibility for implementing this SMP will include the following notifications:

- At least 60 days prior to the change, the NYSDEC will be notified in writing of the proposed change. This will include a certification that the prospective purchaser has been provided with a copy of the BCA and all approved work plans and reports, including this SMP
- Within 15 days after the transfer of all or part of the site, the new owner's name, contact representative, and contact information will be confirmed in writing.

2.5 CONTINGENCY PLAN

Emergencies may include injury to personnel, fire or explosion, environmental release, or serious weather conditions.

2.5.1 Emergency Telephone Numbers

In the event of any environmentally related situation or unplanned occurrence requiring assistance the Owner or Owner's representative(s) should contact the appropriate party from the contact list below. For emergencies, appropriate emergency response personnel should be contacted. Prompt contact should also be made to Steven E. Panter, FLS. These emergency contact lists must be maintained in an easily accessible location at the site during and after completion of Site development construction.

Table 6: Emergency Contact Numbers

Medical, Fire, and Police:	911
One Call Center:	(800) 272-4480 (3 day notice required for utility markout)
Poison Control Center:	(800) 222-1222
Pollution Toxic Chemical Oil Spills:	(800) 424-8802
NYSDEC Spills Hotline	(800) 457-7362

Table 7: Other Contact Numbers

Steven Panter, FLS Project Manager	(212) 675-3225
Arnold Fleming, P.E. FLS Engineer	(212) 675-3225
Larry Ford, QWDC Engineer	(718) 786-2034; cell (646) 315-0450
Simon Wynn, QWDC (Empire State Development) Senior Counsel/Environmental Affairs	(212) 803-3755
Philip Wharton, Avalon Bay Communities Vice President	(212) 309-1607
Queens Library Center Boulevard	TBD
Karen Phillips, NY State Parks Dept.	(212) 866-3100
Sondra Martinkat, NYSDEC Project Manager	(718) 482-4891

* Note: Contact numbers subject to change and should be updated as necessary

2.5.2 Map and Directions to Nearest Health Facility

Site Location: 4-56 47th Road, Long Island City, New York

Nearest Hospital Name: Mount Sinai of Queens

Hospital Location: 25-10 30th Avenue, Astoria, NY 11102

Hospital Telephone: (718) 932-1000

Directions to the Hospital:

1. Start on 5th Street and 47th Avenue — 0.1 mile
2. Turn right onto 46th Road — 0.4 mile
3. Turn left onto 21st Street — 2.1 mile
4. Turn right onto 29th Avenue — 0.2 mile
5. Turn right onto 25th Street/Crescent Street — 0.1 mile
6. Arrive at 25-10 30th Avenue, Astoria

Total Distance: 2.9 miles

Total Estimated Time: 10 minutes

Figure 9 - Map Showing Route from the Site to the Hospital

2.5.3 Response Procedures

As appropriate, the fire department and other emergency response group will be notified immediately by telephone of the emergency. The emergency telephone number list is found at the beginning of this Contingency Plan (Table 6). After construction of the library, the list will also be posted prominently at the site and made readily available to all personnel at all times.

If a spill occurs or is observed, the NYSDEC Spill Hotline should be contacted at (800) 457-7362. Evacuation plans will be developed by the building management and distributed to the building staff as appropriate. Any amendments to this contingency plan will be included in the Annual Report.

3.0 SITE MONITORING PLAN

3.1 INTRODUCTION

3.1.1 General

The Monitoring Plan describes the measures for evaluating the performance and effectiveness of the remedy to reduce or mitigate contamination at the site, the soil cover system, and all affected site media identified below. Monitoring of other Engineering Controls is described in Chapter 4, Operation, Monitoring and Maintenance Plan. This Monitoring Plan may only be revised with the approval of NYSDEC.

3.1.2 Purpose and Schedule

This Monitoring Plan describes the methods to be used for:

- Sampling and analysis of all appropriate media (e.g., groundwater, indoor air, soil vapor, soils);
- Assessing compliance with applicable NYSDEC standards, criteria and guidance, particularly ambient groundwater standards and Part 375 SCOs for soil;
- Assessing achievement of the remedial performance criteria.
- Evaluating site information periodically to confirm that the remedy continues to be effective in protecting public health and the environment; and
- Preparing the necessary reports for the various monitoring activities.

To adequately address these issues, this Monitoring Plan provides information on:

- Sampling locations, protocol, and frequency;
- Information on all designed monitoring systems (e.g., well logs);
- Analytical sampling program requirements;
- Reporting requirements;
- Quality Assurance/Quality Control (QA/QC) requirements;
- Inspection and maintenance requirements for monitoring wells;
- Monitoring well decommissioning procedures; and

- Annual inspection and periodic certification.

Quarterly monitoring of the performance of the remedy and overall reduction in contamination on-site will be conducted for the first two years. The frequency thereafter will be determined by NYSDEC. Trends in contaminant levels in air, soil, and/or groundwater in the affected areas, will be evaluated to determine if the remedy continues to be effective in achieving remedial goals. Monitoring programs are summarized in Table 4 and outlined in detail in Sections 3.2 and 3.3 below.

Table 4: Monitoring/Inspection Schedule

Monitoring Program	Frequency*	Matrix	Analysis
Groundwater	Quarterly for first two years, with frequency thereafter to be determined upon consultation and concurrence of NYSDEC	Groundwater	TCL VOCs, SVOCs & TPH (DRO & GRO), total iron, sulfide, sulfate & alkalinity
Soil Cover	Annually	Soil	Visual Inspection

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

TCL – Target Compound List, USEPA SW-846 Methods: VOCS, 8260B; SVOCs, 8270C, TPH (DRO & GRO), 8015

3.2 COMPOSITE COVER SYSTEM MONITORING

At the completion of remedial activities, a soil cover consisting of a minimum of two feet of clean approved soil and/or RCA underlain by a demarcation layer will be placed across the Site. The final composite cover system will also include stone walkways underlain by a gravel substrate (minimum 2 feet thick), landscaped areas (minimum 2 feet thick), the concrete foundations of buildings and other structures (minimum 6 inches thick). The activities required to repair breaches in the composite cover are to be conducted in accordance with this SMP. The components of the composite cover are described in Section 2.2.1.1. Once construction is complete, a figure showing the cover system will be appended to this report as Figure 12. A qualified environmental professional will conduct a yearly inspection of the composite cover. This inspection will include, at a minimum, visual inspection of the cover to determine if it is

intact and free from damage, and the results will be reported in the Annual Report described in Section 5.1. Any damage to the covers will be repaired in kind.

3.3 MEDIA MONITORING PROGRAM

3.3.1 Groundwater Monitoring

Groundwater monitoring will be performed on a periodic basis to assess the performance of the remedy.

Groundwater flow direction is discussed in detail in Section 1.2.3.

Post-treatment groundwater sampling took place on Parcel 8, Peninsula State Park, and Gantry Plaza State Park between September 12, 2011, and September 16, 2011. Groundwater results exceeding the NYSDEC Class GA standards are shown on Figure 12. The results are summarized below.

VOCs

Benzene concentrations decreased and met the TOGS GA AWQS in three wells where pre-treatment concentrations were above the AWQS of 1 ug/L. Following treatment, benzene concentrations were below detection limits in MW17(S), MW20(S), and MW23(S). This represents one-third of the monitoring wells in the Parcel 8 treatment interval. Benzene decreased in all other wells in the treatment interval, except for MW10, but still remains above the AWQS for all of these wells.

Ethylbenzene met the TOGS AWQS in two wells where pre-treatment concentrations were above the guidance value of 5 ug/L. Following treatment, ethylbenzene concentrations were below 5 ug/L in MW17(S) and MW20(S), the same wells where benzene was below TOGS.

Toluene showed variable changes. Overall, six out of nine wells showed a decrease in toluene and median toluene concentration decreased by 49 percent compared to pre-treatment concentration. Toluene concentrations were below detection limits in two wells, MW17(S) and MW23(S), for the first time since sampling began and exhibited increases in MW9, MW10, and MW20(S). MW17(S) and MW23(S) were the only wells

with post-treatment concentrations below the TOGs toluene guidance value of 5 ug/L. In a third well, MW13(S), toluene dropped appreciably to 6.4 ug/L and came close to the TOGS guidance value.

Overall, seven out of nine wells showed a decrease in total xylenes and the median concentration of total xylenes decreased by 92 percent compared to pre-treatment concentrations. Only one well, MW17(S) reached the TOGS total xylene guidance value of 5 ug/L. Wells MW10 and MW9 showed no appreciable change or a modest increase over pre-treatment concentrations.

SVOCs

Among the SVOCs, naphthalene showed the largest reduction. The median post-treatment naphthalene concentration decreased by 80 percent compared to the pre-treatment concentration. Other SVOC compounds declined as well. Acenaphthene decreased by 46 percent, phenanthrene by 35 percent, and benzo(k)fluoranthene by 100 percent. The remaining PAHs did not show a decrease in median concentrations, and five PAHs exhibited modest increases in concentration. The slight increase is most likely an artifact of residual surfactant and its effect on soils.

The post-treatment median naphthalene concentration showed an overall 80 percent decline compared to the pre-treatment concentration and showed overall decreases in all nine wells. Naphthalene reductions compared to the median results from earlier sampling ranged from 10 percent to 96 percent. A third of the wells experienced naphthalene reductions of 88 percent and higher.

Naphthalene was below the TOGS GA AWQS Guidance value of 10 ug/L in MW17(S). In three previous pre-treatment groundwater sampling events, the naphthalene concentration in MW17(S) ranged from approximately 66 ug/L to 387 ug/L and had a median concentration of 128 ug/L. In the first post-treatment round of sampling, naphthalene measured 4.5 ug/L in this well.

Four sentinel well pairs, each consisting of a shallow and deep well, lie along the western-most part of Parcel 8 for the purpose of monitoring the remedy. The network of on-Site and off-Site wells has been designed to provide ample coverage of the deep and shallow groundwater zones. Monitoring well locations are shown on Figure 11, and hydrogeologic cross sections are shown on Figure 2. Monitoring well construction logs for the newly constructed sentinel wells are included in Appendix F.

The wells will be sampled once per quarter for eight consecutive quarters. Matrix 3 provides the monitoring well details. Monitoring will continue at quarterly intervals until the Volunteer requests a change in schedule. A change may be requested after eight quarters.

Matrix 3
Monitoring Well Details

Well	Screen Top, elev.	Screen Bottom, elev.
MW-1S	1.86	-8.14
MW-1D	-8.14	-18.14
MW-2S	2.53	-7.47
MW-2D	-7.47	-17.47
MW-3S	2.34	-7.66
MW-3D	-7.66	-17.66
MW-4S	2.17	-7.87
MW-4D	-7.83	-17.83

The sampling frequency may be modified with the approval NYSDEC. The SMP will be modified to reflect changes in sampling plans approved by NYSDEC.

Deliverables for the groundwater monitoring program are specified below.

3.3.1.1 Sampling Protocol

Sampling protocols are described in the project's Quality Assurance Project Plan (QAPP) presented in Appendix G. All monitoring well sampling activities will be recorded in a field book and a groundwater-sampling log presented in Appendix H. Other observations (e.g., well integrity, etc.) will be noted on the well sampling log. The well sampling log will serve as the inspection form for the groundwater monitoring well network.

3.3.1.2 Monitoring Well Repairs, Replacement And Decommissioning

If biofouling or silt accumulation occurs in the on-site and/or off-site monitoring wells, the wells will be physically agitated/surged and redeveloped. Additionally, monitoring wells will be properly decommissioned and replaced (as per the Monitoring Plan), if an event renders the wells unusable.

Repairs and/or replacement of wells in the monitoring well network will be performed based on assessments of structural integrity and overall performance.

The NYSDEC will be notified prior to any repair or decommissioning of monitoring wells for the purpose of replacement, and the repair or decommissioning and replacement process will be documented in the subsequent periodic report. Well decommissioning without replacement will be done only with the prior approval of NYSDEC. Well abandonment will be performed in accordance with NYSDEC's "Groundwater Monitoring Well Decommissioning Procedures." Monitoring wells that are decommissioned because they have been rendered unusable will be reinstalled in the nearest available location, unless otherwise approved by the NYSDEC.

3.3.2 Contingency Dissolved Groundwater Remediation

The performance of these remedial actions will be assessed by performing groundwater monitoring, as described above. As a contingency, injection/application of ORCA, or similar material, will be performed at the downgradient boundary of the Site if elevated VOCs in groundwater persist and the NYSDEC requires it. If required, the specific design of the contingency groundwater remediation system will be presented to the NYSDEC in a letter work plan for its review and approval prior to implementation.

3.4 SITE-WIDE INSPECTION

Site-wide inspections will be performed on a regular schedule at a minimum of once a year. Site-wide inspections will also be performed after all severe weather conditions that may affect Engineering Controls or monitoring devices. During these inspections, an inspection form will be completed (Appendix I). The form will compile sufficient information to assess the following:

- Compliance with all ICs, including site usage;
- An evaluation of the condition and continued effectiveness of ECs;
- General site conditions at the time of the inspection;
- The site management activities being conducted including, where appropriate, confirmation sampling and a health and safety inspection;
- Compliance with permits and schedules included in the Operation and Maintenance Plan; and
- Confirm that site records are up to date.

3.5 MONITORING QUALITY ASSURANCE/QUALITY CONTROL

All sampling and analyses will be performed in accordance with the requirements of the QAPP prepared for the site (Appendix G). Main Components of the QAPP include:

- Sampling Protocols
- QA/QC Objectives for Data Measurement;
- Sampling Program:
    - Sample containers will be properly washed, decontaminated, and appropriate preservative will be added (if applicable) prior to their use by the analytical laboratory. Containers with preservative will be tagged as such.
    - Sample holding times will be in accordance with the NYSDEC ASP requirements.
    - Field QC samples (e.g., trip blanks, coded field duplicates, and matrix spike/matrix spike duplicates) will be collected as necessary.
- Sample Tracking and Custody;
- Calibration Procedures:
    - All field analytical equipment will be calibrated immediately prior to each day's use. Calibration procedures will conform to manufacturer's standard instructions.

  - The laboratory will follow all calibration procedures and schedules as specified in USEPA SW-846 and subsequent updates that apply to the instruments used for the analytical methods.

- Analytical Procedures;
- Preparation of a Data Usability Summary Report (DUSR), which will present the results of data validation, including a summary assessment of laboratory data packages, sample preservation and chain of custody procedures, and a summary assessment of precision, accuracy, representativeness, comparability, and completeness for each analytical method.
- Internal QC and Checks;
- QA Performance and System Audits;
- Preventative Maintenance Procedures and Schedules;
- Corrective Action Measures.

3.6 MONITORING REPORTING REQUIREMENTS

During and after construction of the library, forms and any other information generated during regular monitoring events and inspections will be kept on file on-site. All forms, and other relevant reporting formats used during the monitoring/inspection events, will be (1) subject to approval by NYSDEC and (2) submitted at the time of the Periodic Review Report, as specified in the Reporting Plan of this SMP.

All monitoring results will be reported to NYSDEC on a periodic basis in the Periodic Review Report. The report will include, at a minimum:

- Date of event;
- Personnel conducting sampling;
- Description of the activities performed;
- Type of samples collected (e.g., sub-slab vapor, indoor air, outdoor air, etc);
- Copies of all field forms completed (e.g., well sampling logs, chain-of-custody documentation, etc.);

- Sampling results in comparison to appropriate standards/criteria;
- A figure illustrating sample type and sampling locations;
- Copies of all laboratory data sheets and the required laboratory data deliverables required for all points sampled (o be submitted electronically in the NYSDEC-identified format);
- Any observations, conclusions, or recommendations; and
- A determination as to whether groundwater conditions have changed since the last reporting event.

Data will be reported in hard copy or digital format as determined by NYSDEC.

A summary of the monitoring program deliverables are summarized in Table 5 below.

Table 5: Schedule of Monitoring/Inspection Reports

Task	Reporting Frequency*
Groundwater Monitoring	Quarterly for first two years. Frequency thereafter to be determined upon consultation and concurrence of NYSDEC
Composite Cover System Inspections	Annually

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

4.0 OPERATION AND MAINTENANCE PLAN

4.1 INTRODUCTION

This Operation and Maintenance Plan describes the measures necessary to operate, monitor and maintain the mechanical components of the remedy selected for the site. This Operation and Maintenance Plan:

- Includes the steps necessary to allow individuals unfamiliar with the site to operate and maintain the SSDS;
- Includes an operation and maintenance contingency plan; and,
- Will be updated periodically to reflect changes in site conditions or the manner in which the SSDS is operated and maintained.

Information on non-mechanical Engineering Controls (i.e., composite cover system) is provided in Section 3 - Engineering and Institutional Control Plan. A copy of this Operation and Maintenance Plan, along with the complete SMP, will be kept at the site. This Operation and Maintenance Plan is not to be used as a stand-alone document, but as a component document of the SMP.

4.2 ENGINEERING CONTROL SYSTEM OPERATION AND MAINTENANCE

4.2.1 Sub-Slab Depressurization System

All future buildings constructed on the Site will have an active SSDS installed below the vapor barrier in order to mitigate possible soil vapor intrusion and eliminate an exposure pathway. The SSDS will have the following elements:

- Suction pits under floor slab
- Gas permeable aggregate layer beneath the concrete floor slab(s)
- Solid horizontal pipe(s) running from each suction pit to a common header
- A vertical riser extending from the common header to a discharge point above the roof. The exhaust will be located in accordance with NYSDOH Soil Vapor Guidance (October 2006). This pipe will be at least six (6) inches in diameter

- Monitoring points located throughout the buildings, which are installed at the lowest level floor slab. Collection of soil gas samples from the SSDS is not necessary, however, if needed in the future, soil gas samples can be collected through the monitoring points.
- Piping to connect the library and park ranger station so as to have one SSDS system for the two separate buildings

- Blower test on the stub from the basement and application of pressure and/or vacuum to demonstrate that a pressure field extension can be created. Also used as an aid to sizing the vacuum fan.
- Control Panel with warning alarms to indicate system malfunction/shut down.

Operation of the SSDS will continue unless authorized in writing by NYSDEC and NYSDOH. A proposal to discontinue the blower for the active SSDS, leaving a passive system, may be submitted by the property owner based on confirmatory data that justify such a request.

4.2.1.1 Scope

The requirements for the SSDS consist of baseline sampling, initial start-up testing, routine maintenance and monitoring, and non-routine maintenance. Each is described in the following subsections.

4.2.1.2 System Start-Up and Testing

This subsection presents procedures for proper installation and testing of the SSDS prior to use. Start-up testing will ensure that the SSDS is capable of operating effectively. The procedures comply with the post-mitigation/confirmation testing requirements in NYSDOH's *Guidance for Evaluating Soil Vapor Intrusion in the State of New York,* dated October 2006 and Appendix F within the NYSDOH document, entitled *Model Standards and Techniques for Control of Radon in New Residential Buildings* (EPA 402-R-94-009; March 1994), as well as *Radon Prevention in the Design and Construction of Schools and Other Large Buildings* (EPA/625/R-92/016; June 1994).

The objective of an SSDS is to rely on suction propagated by means of a vacuum fan that removes vapors before they reach the building interior. The operational goal is to achieve a minimum differential pressure of 0.01 inches of water column (w.c.) between the sub-slab air and the ambient indoor air (EPA/625/R-92/016; June 1994). The

following will be completed during SSDS start-up testing and/or activation to achieve this objective:

1. Measure the sub-slab pressure at each monitoring point shortly before and after SSDS start-up, using a hand-held Dwyer 475 MARK II-000 digital manometer, or equivalent. The valve box controlling the vacuum at each suction pit will be used to balance the sub-slab air pressure.

2. Smoke tests will be employed after achieving a vacuum of -0.01 inches of water to identify any leaks through the concrete floor (through cracks, floor joints, etc.). Leaks will be sealed until the smoke tests indicate that an effective seal(s) has been made throughout the entire floor slab.

3. Appliances relying on natural draft for exhaust of carbon monoxide and other combustion gasses will be tested for back draft caused by operation of the SSDS. Testing for back draft will entail use of a carbon monoxide meter to detect this compound near appliance exhaust apparatus. If necessary, any back draft attributable to the SSDS will be corrected by sealing any leaks in the floor slab as described in Item 2.

4. Operation of the warning device on the vacuum fan will be confirmed.

The system testing described above will be conducted if, in the course of the SSDS lifetime, significant changes are made to the system, and the system must be restarted.

4.2.1.3 System Operation: Routine Operation Procedures

Routine maintenance and inspection will be conducted to ensure that the SSDS is capable of proper operation.

Quarterly Inspection Procedures

Each quarter, qualified personnel will confirm that the vacuum fan and warning device are operational. Appendix K has a routine SSDS maintenance checklist. Appendix K will also contains an Operations, Maintenance, and Monitoring (OM&M) manual for SSDS vacuum fans and filters once design is complete. Refer to Section 4.3.1.1 Monitoring Schedule.

Annual Inspection Procedures

Qualified personnel will inspect and address the following on an annual basis:

- Visually inspect the entire SSDS system
- Inspect vacuum fan for bearing failures or other indications of wear and tear or abnormal operating, repair or replace, if required
- Inspect vent pipe discharge for obstructions or nearby air intakes, windows, etc.
- Through inquiries with building maintenance and management personnel, determine if any heating, ventilation, or air conditioning (HVAC) changes have occurred that might affect SSDS operation or effectiveness. Inquires should also be made about any other conditions that would warrant investigation of the SSDS.
- Inspect floor slab and foundation walls for evidence of cracks and/or holes and repair, if required
- Measure indoor air combustible gas levels at minimum of three locations per floor. Readings will be collected using a properly calibrated portable instrument. These measurements must be made during the heating season.

4.2.1.4 System Operation: Routine Equipment Maintenance

Follow the manufacturer's maintenance and inspection recommendation presented in the manual in Appendix K.

4.2.1.5 System Operation: Non-Routine Equipment Maintenance

Non-routine maintenance applies when the warning device indicates the SSDS is working improperly or the system becomes damaged, or some other condition arises indicating that inspection or maintenance is required. Non-routine maintenance will vary depending on the nature of the situation.

1. Begin with a discussion with building maintenance and management personnel to identify any potential sources of malfunction or unusual circumstances or events
2. Examine the building for structural, HVAC, or other changes that could affect the SSDS (e.g., new combustion appliances, new fixtures near the vent pipe on the roof, bird or insect nests near vent openings, excessive moisture, construction or other maintenance, abrupt temperature changes in equipment)
3. Examine and address the cause activating the warning device and the vacuum fan, if applicable, and measure the pressure at the monitoring points. (first check for

an electrical switch malfunction as this is often a common cause of improper warning device activation.)

4. Repair or adjust the SSDS as appropriate. If necessary, the SSDS should be restarted.

4.3 ENGINEERING CONTROL SYSTEM PERFORMANCE MONITORING

4.3.1 Sub-Slab Depressurization System

Sub-slab depressurization systems will be installed to mitigate possible soil vapor intrusion into occupied buildings. The SSDS will have the following elements:

- Suction pits under floor slab
- Gas permeable aggregate layer
- Solid horizontal pipe(s) running from each suction pit to a common header
- A vertical riser extending from the common header to a discharge point above the roof. This pipe will be at least six (6) inches in diameter
- Monitoring points located throughout the building, which are installed at the lowest level floor slab
- Piping to connect the library and park ranger station so as to have one SSDS system for the two separate buildings
- Control panel
- Alarms

The SSDS will begin operating following installation and granting of the certificate of occupancy.

4.3.1.1 Monitoring Schedule

Inspection frequency is subject to change with the approval of the NYSDEC. 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. Monitoring deliverables for the SSDS are specified later in this Plan.

Baseline Sampling

Sampling will consist of baseline measurements to gauge 1) sub-slab soil vapor pressures and 2) sub-slab soil vapor VOC concentrations. Baseline sub-slab soil vapor pressures will be collected after construction of the library, principally the concrete floor slab, monitoring points, and vent stack, and before system start-up. Sub-slab soil vapor pressure measurements will be collected from the monitoring points installed in the concrete floor slab. Sub-slab pressure measurements will be collected a minimum of three times before SSDS start-up.

Inspection Frequency

- Initial inspection frequency for first year/month

  Inspections shall occur weekly for the first month following SSDS start-up and once every three months for the remaining first year.

- Long-term inspection frequency

  Inspections will take place annually after the first year of SSDS operation, during the heating season. A log book will be maintained with monthly entries using the Monthly Sub-Slab Depressurization System Inspection form (Appendix K), documenting the proper functioning of the SSDS. Matrix 4 summarizes the inspection and monitoring frequency.

Matrix 4 – Monitoring Schedule	
Inspection/Monitoring Type	Frequency
Baseline Testing	Pre-SSDS start-up soil pressure testing
Start-up & Testing	Initial and weekly SSDS inspections for first month of operation
SSDS Inspection	Quarterly following start-up for the first year. Annually thereafter.
SSDS Warning Device	Monthly log book entry to document its proper function.

Inspection frequency is subject to change with the approval of the NYSDEC. 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. Monitoring deliverables for the SSDS are specified later in this Plan.

4.3.1.2 SSDS Monitoring and Inspection

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

- Vacuum blower; and,
- General system piping.

A complete list of components to be checked is provided in the Inspection Checklist, presented in Appendix I. If any equipment readings are not within their typical range, any equipment is observed to be malfunctioning, or the system is not performing within specifications, maintenance and repair as per the Operation and Maintenance Plan are required immediately, and the SSDS system restarted.

4.3.1.3 System Monitoring Devices and Alarms

The SSDS has a warning device to indicate that the system is not operating properly. The warning device will alert the building superintendant and maintenance staff, who will be trained to trouble shoot the SSDS. A sample documentation log is attached as a form in Appendix K. If additional assistance is needed, the building superintendant will notify the remedial engineer. In the event that the warning device is activated, applicable maintenance and repairs will be conducted, as specified in the Operation and Maintenance Plan, and the SSDS system restarted. Operational problems will be noted in the subsequent Periodic Review Report.

4.4 MAINTENANCE AND PERFORMANCE MONITORING REPORTING REQUIREMENTS

During Site development and after completion of the Site buildings, maintenance reports and any other information generated during regular operations at the site will be kept on-file on-site. All reports, forms, and other relevant information generated will be

available upon request to the NYSDEC and submitted as part of the Periodic Review Report, as specified in the Section 5 of this SMP.

4.4.1 Routine Maintenance Reports

Checklists or forms (see Appendices I and K) will be completed during each routine maintenance event. Checklists/forms will include, but not be limited to the following information:

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

4.4.2 Non-Routine Maintenance Reports

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

- Date;
- Name, company, and position of person(s) conducting non-routine maintenance/repair activities;
- Presence of leaks;
- Date of leak repair;
- Other repairs or adjustments made to the system;

- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents (included either on the form or on an attached sheet); and,
- Other documentation such as copies of invoices for repair work, receipts for replacement equipment, etc. (attached to the checklist/form).

5.0 INSPECTIONS, REPORTING AND CERTIFICATIONS

5.1 SITE INSPECTIONS

5.1.1 Inspection Frequency

All inspections will be conducted at the frequency specified in the schedules provided in Section 3 Monitoring Plan and Section 4 Operation and Maintenance Plan of this SMP. At a minimum, a site-wide inspection will be conducted annually. Inspections of remedial components will also be conducted when a breakdown of any treatment system component has occurred or whenever a severe condition has taken place, such as an erosion or flooding event that may affect the ECs.

5.1.2 Inspection Forms, Sampling Data, and Maintenance Reports

All SSDS inspections and monitoring events will be recorded on the appropriate forms which are contained in Appendices I and K. Additionally, a general site-wide inspection form will be completed during the site-wide inspection (see Appendix I). These forms are subject to NYSDEC revision.

All applicable inspection forms and other records, including all media sampling data and system maintenance reports, generated for the site during the reporting period will be provided in electronic format in the Periodic Review Report.

5.1.3 Evaluation of Records and Reporting

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

- EC/ICs are in place, are performing properly, and remain effective;
- The Monitoring Plan is being implemented;
- Operation and maintenance activities are being conducted properly; and, based on the above items,

- The site remedy continues to be protective of public health and the environment and is performing as designed in the RAWP and FER.

5.2 CERTIFICATION OF ENGINEERING AND INSTITUTIONAL CONTROLS

After the last inspection of the reporting period, a Professional Engineer licensed to practice in New York State will prepare the following certification:

For each institutional or engineering control identified for the site, I certify that all of the following statements are true:

- The inspection of the site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under my direction;
- The institutional control and/or engineering control employed at this site is unchanged from the date the control was put in place, or last approved by the Department;
- Nothing has occurred that would impair the ability of the control to protect the public health and environment;
- Nothing has occurred that would constitute a violation or failure to comply with any site management plan for this control;
- Access to the site will continue to be provided to the Department to evaluate the remedy, including access to evaluate the continued maintenance of this control;
- Use of the site is compliant with the environmental easement;
- The engineering control systems are performing as designed and are effective;
- To the best of my knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program and generally accepted engineering practices; and
- The information presented in this report is accurate and complete.
- I certify that all information and statements in this certification form are true. I understand that a false statement made herein is punishable as a Class “A” misdemeanor, pursuant to Section 210.45 of the Penal Law. I, Arnold F. Fleming,

PE, of Fleming-Lee Shue, Inc., 158 West 29th Street, 9th Floor, New York, NY 10001, am certifying as Owner's Designated Site Representative for the site.

The signed certification will be included in the Periodic Review Report described below.

- No new information has come to my attention, including groundwater monitoring data from wells located at the site boundary, if any, to indicate that the assumptions made in the qualitative exposure assessment of off-site contamination are no longer valid; and

Every five years the following certification will be added:

- The assumptions made in the qualitative exposure assessment remain valid.

The signed certification will be included in the Periodic Review Report described below.

5.3 PERIODIC REVIEW REPORT

An annual Periodic Review Report will be submitted to the Department every year, beginning eighteen months after the Certificate of Completion is issued. In the event that the site is subdivided into separate parcels with different ownership, a single Periodic Review Report will be prepared that addresses the site described in Appendix B (Metes and Bounds). The report will be prepared in accordance with NYSDEC DER-10 and submitted within 45 days of the end of each certification period. Media sampling results will also incorporated into the Periodic Review Report. The report will include:

- Identification, assessment and certification of all ECs/ICs required by the remedy for the site;
- Results of the required annual site inspections and severe condition inspections, if applicable;
- All applicable inspection forms and other records generated for the site during the reporting period in electronic format;
- A summary of any discharge monitoring data and/or information generated during the reporting period with comments and conclusions;

- Data summary tables and graphical representations of contaminants of concern by media (groundwater, soil vapor), which include a listing of all compounds analyzed, along with the applicable standards, with all exceedances highlighted. These will include a presentation of past data as part of an evaluation of contaminant concentration trends;
- Results of all analyses, copies of all laboratory data sheets, and the required laboratory data deliverables for all samples collected during the reporting period will be submitted electronically in a NYSDEC-approved format;
- A site evaluation, which includes the following:
    - The compliance of the remedy with the requirements of the site-specific RAWP;
    - The operation and the effectiveness of all treatment units, etc., including identification of any needed repairs or modifications;
    - Any new conclusions or observations regarding site contamination based on inspections or data generated by the Monitoring Plan for the media being monitored;
    - Recommendations regarding any necessary changes to the remedy and/or Monitoring Plan; and
    - The overall performance and effectiveness of the remedy.
- A performance summary for the SSDS during the calendar year, including information such as:
    - The number of days the system was run for the reporting period;
    - The average, high, and low flows per day;
    - The contaminant mass removed;
    - A description of breakdowns and/or repairs along with an explanation for any significant downtime;
    - A description of the resolution of performance problems;
    - A summary of the performance, effluent and/or effectiveness monitoring; and
    - Comments, conclusions, and recommendations based on data evaluation.

The Periodic Review Report will be submitted, in hard-copy format, to the NYSDEC Central Office and Regional Office in which the site is located, and in electronic format to NYSDEC Central Office, Regional Office and the NYSDOH Bureau of Environmental Exposure Investigation.

5.4 CORRECTIVE MEASURES PLAN

If any component of the remedy is found to have failed, or if the periodic certification cannot be provided due to the failure of an institutional or engineering control, a corrective measures plan will be submitted to the NYSDEC for approval. This plan will explain the failure and provide the details and schedule for performing work necessary to correct the failure. Unless an emergency condition exists, no work will be performed pursuant to the corrective measures plan until it is approved by the NYSDEC.

APPENDIX A – EXCAVATION WORK PLAN

A-1 NOTIFICATION

At least 15 days prior to the start of any activity that is anticipated to encounter remaining contamination, the site owner or their representative will notify the Department. Currently, this notification will be made to:

Jane H. O'Connell
Regional Hazardous Waste Remediation Engineer
NYSDEC Region 2
47-40 21st Street,
Long Island City, NY 11101

This notification will include:

- A detailed description of the work to be performed, including the location and areal extent, plans for site re-grading, intrusive elements or utilities to be installed below the soil cover, estimated volumes of contaminated soil to be excavated and any work that may impact an engineering control,
- A summary of environmental conditions anticipated in the work areas, including the nature and concentration levels of contaminants of concern, potential presence of grossly contaminated media, and plans for any pre-construction sampling;
- A schedule for the work, detailing the start and completion of all intrusive work,
- A summary of the applicable components of this EWP,
- A statement that the work will be performed in compliance with this EWP and 29 CFR 1910.120,
- A copy of the contractor's health and safety plan, in electronic format, if it differs from the sample HASP provided in Appendix D of this document,
- Identification of disposal facilities for potential waste streams,
- Identification of sources of any anticipated backfill, along with all required chemical testing results.

A-2 SOIL SCREENING METHODS

Visual, olfactory and instrument-based soil screening will be performed by a qualified environmental professional during all remedial and development excavations into known or potentially contaminated material (remaining contamination). Soil screening will be performed regardless of when the invasive work is done and will include all excavation and invasive work performed during development, such as excavations for foundations and utility work, after issuance of the COC.

Soils will be segregated based on previous environmental data and screening results into material that requires off-site disposal, material that requires testing, material that can be returned to the subsurface, and material that can be used as cover soil.

A-3 STOCKPILE METHODS

Soil stockpiles will be continuously encircled with a berm and/or silt fence. Hay bales will be used as needed near catch basins, surface waters and other discharge points.

When not in use, 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.

If needed, odor suppressant material will be applied to the stockpiled soil prior to covering. A nearby hydrant serves as a readily available source of water to control dust.

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.

A-4 MATERIALS EXCAVATION AND LOAD OUT

A qualified environmental professional or person under their supervision will oversee all invasive work and the excavation and load-out of all excavated material.

The owner of the property 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 will be investigated by the qualified environmental professional. It will be determined whether a risk or impediment to the planned work under this SMP 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 qualified environmental professional will be responsible for ensuring that all outbound trucks will be washed at the truck wash before leaving the site until the activities performed under this section are complete.

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

The qualified environmental professional will be responsible for ensuring that all egress points for truck and equipment transport from the site are clean of dirt and other materials derived from the site during intrusive excavation activities. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to site-derived materials.

A-5 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.

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.

Proposed in-bound and out-bound truck routes to the Site are shown in Figure 1 of Appendix J.

All trucks loaded with site materials will exit the vicinity of the site using only these approved truck routes. 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; (f) overall safety in transport; and (g) community input.

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.

When possible, queuing of trucks will be performed on-site in order to minimize off-site disturbance. Off-site queuing will be prohibited.

A-6 MATERIALS DISPOSAL OFF-SITE

All soil/fill/solid waste excavated and removed from the site will be treated as contaminated and regulated material and will be transported and 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 off-site disposal (i.e. clean soil removed for development purposes), a formal request with an associated plan will be made to the NYSDEC. Unregulated off-site management of materials from this site will not occur without formal NYSDEC approval.

Off-site disposal locations for excavated soils will be identified in the pre-excavation notification. This will include estimated quantities and a breakdown by class of disposal facility if appropriate, i.e. hazardous waste disposal facility, solid waste landfill, petroleum treatment facility, C/D recycling facility, etc. Actual disposal quantities and associated documentation will be reported to the NYSDEC in the Periodic Review Report. This documentation will include: waste profiles, test results, facility acceptance letters, manifests, bills of lading and facility receipts.

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. 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).

A-7 MATERIALS REUSE ON-SITE

Soil above the demarcation layer may be reused on-Site with no restrictions. All soils imported as part of remediation, other than approved RCA, have met the soil import requirements listed in A-10.

Soil below the demarcation layer may be reused below the demarcation layer only as long as it is free of odors or staining. Soil chemical sampling is not required.

The qualified environmental professional will ensure that procedures defined for materials reuse in this SMP are followed and that unacceptable material does not remain on-site. Contaminated on-site material, including historic fill and contaminated soil, that is acceptable for re-use on-site will be placed below the demarcation layer or impervious surface, and will not be reused within a cover soil layer, within landscaping berms, or as backfill for subsurface utility lines.

Any demolition material proposed for reuse on-site will be sampled for asbestos and the results will be reported to the NYSDEC for acceptance. Concrete crushing or processing on-site will not be performed without prior NYSDEC approval. Organic matter (wood, roots, stumps, etc.) or other solid waste derived from clearing and grubbing of the site will not be reused on-site.

A-8 FLUIDS MANAGEMENT

All liquids to be removed from the site, including excavation dewatering and groundwater monitoring well purge and development waters, will be handled, transported and disposed in accordance with applicable local, State, and Federal regulations. Dewatering, purge and development fluids will not be recharged back to the land surface or subsurface of the site, but will be managed off-site.

Discharge of water generated during large-scale construction activities to surface waters (i.e. a local pond, stream or river) will be performed under a SPDES permit.

A-9 COVER SYSTEM RESTORATION

After the completion of soil removal and any other invasive activities the cover system will be restored in a manner that complies with the RAWP. The demarcation layer, consisting of orange snow fencing material or equivalent material will be replaced to provide a visual reference to the top of the 'Remaining Contamination Zone', the zone that requires adherence to special conditions for disturbance of remaining contaminated soils defined in this Site Management Plan. If the type of cover system changes from that which exists prior to the excavation (i.e., a soil cover is replaced by asphalt), this will constitute a modification of the cover element of the remedy and the upper surface of the 'Remaining Contamination.' A figure showing the modified surface will be included in the subsequent Periodic Review Report and in any updates to the Site Management Plan.

A-10 BACKFILL FROM OFF-SITE SOURCES

This section presents the requirements for imported clean fill. All imported fill will meet the more stringent of the Protection of Groundwater or Protection of Public Health SCOs for Commercial Use as described in 6 NYCRR 375-6.7(d) and listed in Table 3 unless otherwise approved by NYSDEC.

A preliminary property review will be conducted to evaluate sources of potential fill to be used on-Site and will include documentation of each source's location and current and historical use(s). The following potential sources will be considered, subject to NYSDEC approval:

- Virgin sources (i.e., native soils and/or sediments from undeveloped properties),
- Construction projects at non-industrial properties,
- Roadway or other transportation-related projects,
- Other non-industrial sources, and
- Recycled concrete aggregate.

Prior to accepting any fill material, except for previously-approved recycled concrete aggregate, the procedures described below will be followed to verify the acceptability of the source. History of fill material source properties will be determined using historical Sanborn Fire Insurance Maps, if available, and one or more of the following sources:

- For fill sources in New York City or other urban areas, historical maps (Sanborn Maps) will be reviewed, if available,
- Aerial photographs,
- Historical title information,
- Site reconnaissance,
- Regulatory agency(ies) database review (NYSDEC, EPA), and/or
- Interviews of knowledgeable persons.

Confirmatory samples will be collected at a frequency specified in NYSDEC DER-10 Table 5.4(e)10 (summarized below).

Number of Samples to be collected for Imported Material		
Sampling Parameter	**TCL VOCs**	**Full TCLP parameters, TCL SVOCs, TCL PCBs, TCL herbicides, and TAL Metals**
Soil Quantity (Cubic Yards)	**Grab**	**Five-point Composite**
0-50	1	1
50-100	2	1
100-200	3	1
200-300	4	1
300-400	4	2
400-500	5	2
500-800	6	2
800-1,000	7	2
> 1,000 cubic yards	Add two additional VOC grab samples and one five-point composite sample for each additional 1,000 cubic yards or propose a lesser frequency of testing for NYSDEC approval	

Materials from virgin sources will be tested initially, and will consist of collecting and analyzing a minimum of one sample from the initial 100 cubic yards for the

parameters listed above. Imported materials from non-virgin sources will be tested at a frequency and for the parameters listed in the above table.

All materials proposed for import onto the site will be approved by the qualified environmental professional and will be in compliance with provisions in this SMP prior to receipt at the site.

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

All imported soils will meet the backfill and cover soil quality standards established in 6NYCRR 375-6.7(d). Based on an evaluation of the land use, protection of groundwater and protection of ecological resources criteria, the resulting soil quality standards are listed in Table 3. 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. Solid waste will not be imported onto the site.

Trucks entering the site with imported soils will be securely covered with tight fitting covers. Imported soils will be stockpiled separately from excavated materials and covered to prevent dust releases.

A-11 STORMWATER POLLUTION PREVENTION

This Site is less than an acre in size; therefore a stormwater pollution prevention plan (SWPPP) is not required during construction. Stormwater from the Site buildings will be collected via roof drains, which will be directly connected to either the NYCDEP storm sewer located on 47th Road or the storm sewer located on Center Boulevard. Stormwater pollution prevention measures will comply with the August 2005 or most recent New York Standards and Specifications for Erosion and Sediment Control (http://www.dec.ny.gov/chemical/29066.html).

Silt fencing or hay bales will be installed around the entire perimeter of the construction area only if warranted by site conditions and there is a reasonable chance that sediment transport or erosion could occur.

A-12 CONTINGENCY PLAN

If underground tanks or other previously unidentified contaminant sources are found during post-remedial subsurface excavations or development related construction, excavation activities will be suspended until sufficient equipment is mobilized to address the condition.

Sampling will be performed on product, sediment and surrounding soils, etc. as necessary to determine the nature of the material and proper disposal method. Chemical analysis will be performed for full a full list of analytes (TAL metals; TCL volatiles and semi-volatiles, TCL pesticides and PCBs), unless the site history and previous sampling results provide a sufficient justification to limit the list of analytes. In this case, a reduced list of analytes will be proposed to the NYSDEC for approval prior to sampling.

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. Reportable quantities of petroleum product will also be reported to the NYSDEC spills hotline. These findings will be also included in the periodic reports prepared pursuant to Section 5 of the SMP.

A-13 COMMUNITY AIR MONITORING PLAN

A sample CAMP for the Site is given in Appendix E. Air sampling stations will be based on generally prevailing wind conditions. These locations will be adjusted on a daily or more frequent basis based on actual wind directions to provide an upwind and at least two downwind monitoring stations. In addition, a fixed monitoring station will be located at the Site perimeter on the corner of Center Boulevard and 47th Road, regardless of wind direction, to monitor conditions adjacent to the residential buildings located there.

Exceedances of action levels listed in the CAMP (Appendix E) will be reported to NYSDEC and NYSDOH Project Managers.

A-14 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 foam odor suppressants. If nuisance odors are identified at the site boundary, or if odor complaints are received, 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 any other complaints about the project. Implementation of all odor controls, including the halt of work, is the responsibility of the property owner's Remediation Engineer, and any measures that are implemented will be discussed in the Periodic Review Report.

All necessary means will be employed to prevent on- and off-site nuisances. At a minimum, these measures will include: (a) limiting the area of open excavations and size of soil stockpiles; (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.

If nuisance odors develop during intrusive work that cannot be corrected, or where the control of nuisance odors cannot otherwise be achieved due to on-site conditions or close proximity to sensitive receptors, odor control will be achieved by sheltering the excavation and handling areas in a temporary containment structure equipped with appropriate air venting/filtering systems.

A-15 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 hoses attached to the nearby hydrants, as required.

A-16 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 to ensure compliance with local noise control ordinances.