Queens West Development – Parcel 11

(Tax Block 17, Lots No. 21 & 28)

QUEENS, NY

Site Management Plan

AKRF Project Number: 10913

NYSDEC VCA Number: V00194B

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LIST OF ACRONYMS

AWQVs – Ambient Water Quality Values

CHASP – Construction Health and Safety Plan

DNAPL – Dense Non-Aqueous Phase Liquid

NYCDEP – New York City Department of Environmental Protection

NYCRR – New York Code of Rules and Regulations

NYSDEC – New York State Department of Environmental Conservation

NYSDOH – New York State Department of Health

OM&M – Operation, Maintenance, and Monitoring

PAHs – Polycyclic Aromatic Hydrocarbons

PCBs – Polychlorinated Biphenyls

PPE – Personal Protective Equipment

QWDC – Queens West Development Corporations

RSCOs – Recommended Soil Cleanup Objectives

RWP – Remediation Work Plan

SCGs – Standards, Criteria, and Guidance

SCO – Soil Cleanup Objectives

SMP – Site Management Plan

SoMP – Soil Management Plan

SVOCs – Semivolatile Organic Compounds

SWPPP – Storm Water Pollution Prevention Plan

TAGM – Technical and Administrative Guidance Memorandum

VOCs – Volatile Organic Compounds

1.0 INTRODUCTION AND DESCRIPTION OF REMEDIAL PROGRAM

1.1 INTRODUCTION

This document is required for fulfillment of Remedial Action at the Queens West – Parcel 11 development site (hereafter referred to as the "Site") under a New York State (NYS) Voluntary Cleanup Agreement administered by New York State Department of Environmental Conservation (NYSDEC). The Site was remediated in accordance with the Voluntary Cleanup Agreement (VCA) Index# V00194B, which was issued in September 2000. The Parcel 11 Site is located at 50th Avenue and Center Boulevard in Hunters Point Queens, as shown on Figure 1, and is identified as Block 17, Lots 21 and 28 on the Borough of Queens Tax Map. The Site location is more fully described in Section 1.2.1.

1.1.1 General

The Queens West Development is a project of the Queens West Development Corporation (QWDC), a subsidiary of New York State's Empire State Development Corp., under the collective sponsorship of the Port Authority of New York and New Jersey, the New York City Economic Development Corporation, and Empire State Development Corporation. The overall Queens West Development site comprises 74 acres along the East River in Hunters Point, Queens, extending from Anable Basin to the north to Newtown Creek to the south (Figure 1). Stage 1 of the development involves construction of residential and mixed use buildings, and adjacent parks and streets on the portion of the site between 47th Road and 50th Avenue. The development sites in this area have been designated Parcels 8, 9, 10, and 11, as shown on Figure 2.

In August 1998, a Voluntary Cleanup Agreement was entered into between New York State Department of Environmental Conservation (NYSDEC) and QWDC. This agreement covered Parcels 8, 9, and 11 and the portion of Center Boulevard between Parcels 8 and 9. A Remediation Work Plan (RWP) for Parcel 11 was submitted to the NYSDEC in August 1998. In July 2000, the Voluntary Cleanup Agreement was amended to allow it to be separated into separate agreements for each parcel, which would be executed by the designated developer for the parcel. Accordingly, after AvalonBay Communities was selected as the developer of Parcels 8, 9, and 11, AvalonBay affiliates executed separate agreements for each of the three parcels.

The AvalonBay Communities affiliate Avalon Riverview I, LLC, (AvalonBay) entered into the Parcel 11 VCA with the NYSDEC to develop the approximately 1.17-acre property into a residential development. This VCA, and the attached *Remediation Work Plan for Parcel 11 Queens West Development*, dated August 1998, required the Volunteer, to investigate and remediate contaminated media at the Site. The boundary of this 1.17-acre VCA Site is more fully described in Appendix A – Metes and Bounds. The Site boundary is shown in Figure 3.

After completion of the remedial work described in the Remediation Work Plan (RWP), some contamination was left in the subsurface at this Site, which is hereafter referred to as 'residual contamination'. This Site Management Plan (SMP) was prepared to manage residual contamination at the Site in perpetuity or until extinguishment of the Deed Restriction (as defined and more fully described in Section 2.3.1.) in a manner consistent with 6 NYCRR Part 375. Remedial Action work on the Site began in June 2000, and was completed in 2006. 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 AKRF Engineering, P.C. on behalf of AvalonBay, in accordance with the requirements in NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation, dated December 2002, and the guidelines provided by NYSDEC. This SMP addresses the means for implementation of Institutional Controls (ICs) and Engineering Controls (ECs), which are required by the Deed Restriction for the Site.

1.1.2 Purpose

The Site contains residual contamination left after completion of the Remedial Action performed under the Voluntary Cleanup Program (VCP). ECs have been incorporated into the Site remedy to provide proper management of residual contamination in the future to ensure protection of public health and the environment. An Deed Restriction has been recorded with the Queens County Clerk that provides an enforceable means to ensure the continued and proper management of residual contamination and protection of public health and the environment. It requires strict adherence to all Engineering Controls and all Institutional Controls placed on this Site by NYSDEC by the owner/lessee of the property and any and all successors and assigns. ICs provide restrictions on Site usage and mandate maintenance, monitoring and reporting measures for all ECs and ICs. This SMP includes all methods necessary ensure compliance with all ECs and ICs required by the Deed Restriction for residual contamination at the Site. The SMP has been approved by the NYSDEC, and compliance with this Plan is required by the owner/lessee of the property and its successors and assigns. This plan is subject to change by NYSDEC.

Site management is the last phase of the remedial process and is triggered by the approval of the Final Engineering Report and issuance of the Assignable Release and Covenant Not to Sue (Covenant Not to Sue) by NYSDEC. The SMP continues in perpetuity or until extinguished in a manner consistent with 6NYCRR Part 375. It is the responsibility of the property owner/lessee, and its successors and assigns to ensure that all Site Management responsibilities under this plan are performed.

The SMP provides a detailed description of all procedures required to manage residual contamination at the Site following the completion of the Remedial Action in accordance with the VCA with the NYSDEC. This includes: (1) development, implementation, and management of all Engineering and Institutional Controls; (2) development and implementation of monitoring systems and a Monitoring Plan; and (3) submittal of Site Management Reports, performance of inspections and certification of results, and demonstration of proper communication of Site information to NYSDEC.

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/Inspections; and (3) a Site Management Reporting Plan for submittal of data, information, recommendations, and certifications to NYSDEC.

Site Management activities, reporting, and EC/IC certification will be scheduled on a certification period basis. The certification period will be annually.

Important notes regarding this SMP are as follows:

- This SMP defines Site-specific implementation procedures as required by the Deed Restriction. The penalty for failure to implement the SMP is revocation of the Covenant Not to Sue;

- At the time this report was prepared, the SMP and all Site documents related to Remedial Investigation and Remedial Action are maintained at the NYSDEC Region 2 offices in Long Island City. At the time of SMP submission (December 2007), the Site documents can also be found in the repositories established for this project, including:

  Long Island City Public Library
  Court Square Branch
  25-01 Jackson Avenue
  Long Island City, NY 10011
  (718) 937-2790

  and

  Community Board #2 Office
  43-22 50th Street- Second Floor
  Woodside, NY 11377
  (718) 553-8773

1.2 SITE BACKGROUND

1.2.1 Site Location and Description

The Site is located in the County of Queens (New York City), New York and is identified as Block 17, Lots 21 and 28 on the Borough of Queens Tax Map. The Site is an approximately 1.17-acre area bounded by 49th Avenue to the north, 50th Avenue to the south, residential/commercial properties to the east, and Center Boulevard to the west (see Figures 2 and 3). The boundary of the Site is more fully described in Appendix A – Metes and Bounds.

1.2.2 Site History

The history of the site and the surrounding area is summarized in the Hunters Point Development Final Environmental Impact Statement (June 1990). The Hunters Point area was originally a rocky outcrop surrounded by low-lying marshlands and tidal meadows. Filling of the wetlands and development of the area began in the mid-19th century. Starting around 1890, the area became a major industrial center.

Historic maps indicate that Parcel 11 was occupied by freight yards for the Long Island Railroad (LIRR) since before 1900. The yards were associated with the adjacent rail-to-barge transfer facilities located on the East River. Two on-site buildings were also present in the eastern portion of the site since before 1900 until demolition as part of the present redevelopment. These buildings were originally constructed as stables for a railway express delivery service. In the 1930s and 1940s, they were occupied by a Hardwood Sawdust Supply Company. Later there were a variety of warehouse and light industrial uses, including a building equipment manufacturer.

Historic site use east-adjacent to Parcel 11 included a varnish manufacturing facility (Keystone Varnish Company) from circa 1898 to 1914, and a vegetable oil refinery (Crown Oil Products Company) from circa 1936 to the 1980s. A coal-fired power generating facility, first developed for the LIRR and later operated by Con Edison, was located southeast of Parcel 11, across 50th Avenue, from circa 1915 until the 1950s. This facility was later occupied by Schwartz Chemical, a manufacturer of pigments and dyes, from circa 1970 until the late 1980s/early 1990s. Additional railroad tracks and freight

yard facilities were historically present on adjacent land to the north (Parcel 10), west (waterfront park area), and southwest (Parcel 13 of the Stage 4 development) of Parcel 11 from the late 1890s to early 1990s.

The blocks further to the north, between 48th Avenue and 47th Road (Parcels 8 and 9), were historically occupied by a variety of manufacturing facilities, including Warren Chemical Company (circa 1898 to 1915) and the Blau Gas Company of America (circa 1915 to 1936). The Warren Chemical Company manufactured roofing materials, tar paper, and asphalt, and the Blau Gas Company manufactured gas from petroleum products for use in gas lamps and heating. Petroleum and coal tar contamination, including dense non-aqueous phase liquid (DNAPL), was documented on these Parcels in an April 2005 Supplemental Remedial Investigation Report and a July 2006 Off-Site Investigation Report. Contamination on Parcel 9 was remediated under the Brownfields Cleanup Program (BCP) in late 2005/early 2006 and received a Certificate of Completion in December 2006. Field observations during the Parcel 9 remediation indicated that mobile DNAPL present near the southwestern corner of the parcel was accumulated on top of a low permeability silt/clay layer located just above a localized trough in the glacial till at elevations of approximately -25 to -27 feet (relative to the Queens Borough Datum). The 2006 Off-Site Investigation also identified residual DNAPL accumulated on top of discontinuous lenses of low-permeability silt/clay and peat along Center Boulevard (between 48th Avenue and 47th Road) and on Parcel 8.

1.2.3 Geological Conditions

Regional Geology

The geological setting of the Queens West Development area was created by glaciation at the end of the last ice age, followed by outwash and river action during the glacial retreat, and landfilling starting the 1850s. Sediments from these events were deposited over the bedrock, which consists of the Ravenswood Granodiorite in western Queens County. This formation is regarded as an igneous intrusion into the Fordham Gneiss and is found in a narrow band on both sides of the East River. Boring records from the Queens West project area indicate that the bedrock surface is located at approximately elevations ranging from elevations -25 to -55 (Queens Borough Datum) under most of the area.

During glaciation, a mantel of glacial till was deposited over the bedrock surface. As the glaciers began to retreat, outwash sand and a thin layer of organic clay were deposited over the till. As the glaciers retreated further, a river delta covered the area, leaving a sand layer above the organic clay. As the climate stabilized, the project area became a marsh at the confluence of the East River and Newtown Creek. The marshes remained for several thousand years until the 1850s, when they were filled-in to rid the area of mosquitoes and to create new land for the growing industries in the area.

Local Geology

Combined results from the geotechnical borings conducted by Mueser Rutledge and the environmental borings conducted by AKRF indicate that the surficial layer of fill material was present underneath the site, ranging in thickness from 5 to 19 feet below grade, with an average depth of approximately 14 feet below grade. The fill material was composed of brown-black fine to coarse sand with a trace of silt. Various debris intermixed with this layer included gravel, tar, wood, ash, brick, coal, and glass.

The organic silty clay layer was present below the fill at most locations, with an average thickness of 6 feet. This material was characterized as a post-glacial river bottom consisting of a soft gray, organic silty clay with a trace of fine sand, mica, and gravel. Shells and various organic matter such as peat and wood were also observed.

A layer of outwash sand was encountered below the organic layer in approximately half of the geotechnical borings, with observed thicknesses of up to 19 feet. This layer was composed of mainly compact gray fine to coarse sand, with trace components ranging in size from silt to gravel. This stratum is also post-glacial and represents the beginning of the early East River deposits.

Below the outwash sand was a glacial till layer that averaged 10 feet in thickness. This layer consisted of a compacted to highly compacted gray or brown, silty fine to coarse sand with trace elements of clay, mica and gravel with occasional boulders.

Bedrock was encountered at approximately 20 to 40 feet below grade and was generally shallower at the eastern and western ends if the site, sloping inward toward a low in the central portion of the site. The structure of the bedrock is generally blocky and massive with poor to moderate foliation. The composition of the rock is gneissic and granitic, dating back to the Ordovician to Cambrian Periods. A subway tunnel for the No. 7 train is cut through the bedrock at approximately 45 to 50 feet below grade, traversing the site in a northwest-southeast trending direction. A geologic section is shown in Figure 4.

1.2.4 Hydrogeology

Groundwater on western Long Island is found in a series of unconsolidated deposits of clay, sand, and gravel overlying the bedrock surface, which dips to the south. The deposits comprise three major aquifer units: the Upper Glacial Aquifer (up to 130 feet below grade), the Magothy Aquifer (130 to 600 feet below grade) and the Lloyd Aquifer (600 to 800 feet below grade). The Upper Glacial Aquifer is a water-table aquifer and is underlain by the Gardiners Clay, which forms a confining unit overlaying the Magothy Aquifer. The Magothy and Lloyd Aquifers are separated by an unnamed clay member of the Cretaceous Raritan Formation. Due to the relatively shallow bedrock, only the Upper Glacial Aquifer is found in the Queens West area. This aquifer is widely contaminated and is generally not used as a source of potable water.

Previous studies in the Queens West area indicate that groundwater flows in a westerly to southwesterly direction toward the East River, and is tidally influenced at locations near the river. Groundwater was encountered at approximately 6 to 9 feet below the surface in borings and test pits on or adjacent to Parcel 11.

1.3 DESCRIPTION OF REMEDIAL INVESTIGATION FINDINGS

The SMP and all Site documents, including the Remediation Work Plan and reports on previous investigations, are maintained by the NYSDEC (or successor agency). At the time of publication, these reports could be found at the Region 2 NYSDEC offices in Long Island City, New York.

1.3.1 Summary of Remedial Investigation Findings

The entire Queens West Development property was investigated during previous site-wide investigations conducted in 1985 and 1989, and an additional investigation was conducted in 1994 to assess subsurface conditions in the proposed rights-of-way for the Stage 1 development area. Results from these investigations that are relevant to Parcel 11

are summarized in this section. This section also summarizes results from a geotechnical study and a pre-construction soil sampling program both conducted at the project site in 2000, prior to the start of excavation activities for the building construction.

1.3.1.1 Soil/Fill

Field Observations

The majority of the environmental soil borings terminated at approximately 6 to 12 feet below grade in a layer of surficial fill, which consisted of silty sand containing coal, ash, wood, asphalt, brick, and tar. The geotechnical borings were advanced through the fill material and underlying layers of glacial outwash and till, into the bedrock. Groundwater was encountered in several of the preconstruction test pits/borings at depths ranging from 5 to 11 feet below grade. Groundwater levels measured in the on-site and off-site monitoring wells ranged from approximately 6 to 9 feet below grade.

Odors described as "petroleum" or "oily" were noted at 6 of the 28 preconstruction test pits/borings and 13 of the 30 geotechnical borings. In addition, "tar" or "pitch" was observed in geotechnical borings M-4, M-8, M-11, and M-13, and in the 1989 environmental boring B/MW-36. In general, the observed odors and tar were noted at isolated intervals within the fill material at depths of approximately 5 to 7 feet below grade or 10 to 12 feet below grade, generally corresponding to the water table depth. No evidence of contamination was noted below the shallow fill layer in the geotechnical borings.

Analytical Results

Consistent with published guidance at the time that Parcel 11 was investigated and the RWP was prepared (1990 - 1998), results from the soil sample analyses were compared to Recommended Soil Cleanup Objectives (RSCOs) listed in NYSDEC Technical and Administrative Guidance Memorandum (TAGM) #4046. Tables 1 through 3 shows exceedances from TAGM RSCOs for all soil/fill at the Site. Figures 5, 6, and 7 are spider maps that indicate the locations of and summarize exceedances from TAGM RSCOs for VOCs, SVOCs, and metals, respectively, in soil/fill at the site.

Elevated concentrations of polycyclic aromatic hydrocarbons (PAHs) and metals were detected in samples collected from the fill material throughout the site and adjacent roadways. Metals concentrations were generally less than 10 times the United States Eastern Background ranges listed in TAGM 4046. Naphthalene was detected above the TAGM 4046 RSCOs in only 2 of the 19 samples analyzed at concentrations of 391 parts per million (ppm) in the sample from 6 to 10 feet below grade in B/MW36, and 22 ppm in the sample from 10 to 12 feet below grade in pre-construction soil boring 12. With the exception of the grab sample collected between 6 and 10 feet below grade in B/MW36, the detected concentrations of the remaining individual PAHs (ranging from 0.19 ppm to 24.3 ppm) were consistent with contaminant levels typically found in urban fill. The grab sample from B/MW36 contained individual PAH concentrations ranging from 35.5 ppm to 1,100 ppm, and a total SVOC concentration of 7,960 ppm, as well as elevated concentrations of phenolic compounds (including phenol, 2-methylphenol, 2,4-dimethylphenol, and 3&4-methylphenol). The presence of phenolic compounds and higher PAH concentrations in this sample can be attributed to a tar-like material that was observed in boring B/MW36, located in the central portion of the site. All samples, excluding the tar-like sample from B/MW-36, contained total SVOC concentrations below 500 ppm.

Slightly elevated VOC concentrations were detected in soil samples throughout the site and adjacent roadways; however, concentrations were generally below TAGM 4046 RSCOs, with the exception of two samples. These two samples included: the grab sample from 6 to 10 feet below grade in B/MW36, which contained benzene at 0.470 ppm and total xylenes at 3.6 ppm; and the sample from 10 to 12 feet below grade in B14A, which contained total xylenes at 1.4 ppm. The elevated VOC concentrations in B/MW36 are attributable to the tar-like material observed in this boring. The elevated xylene concentration detected in B14A (located in the Center Boulevard roadway) only slightly exceeded the TAGM RSCO of 1.2 ppm.

PCBs were detected in 4 of the 25 samples analyzed, with the total PCB concentrations in the sample from 0 to 2 feet below grade in boring B39 (4.2 ppm) exceeding the TAGM RSCO for surface soil (1 ppm), but not the RSCO for subsurface soil (10 ppm). Only trace concentrations (less than 1 ppm) were detected in the remaining three samples (from borings S023, S025, and 21). These concentrations are consistent with the presence of urban fill at the site, and are not indicative a release.

1.3.1.2 On-Site and Off-Site Groundwater

Tables 4, 5, and 6 summarize exceedances of NYSDEC Ambient Water Quality Standards/Guidance Values (AWQVs) for GA groundwater. Figures 8 and 9 are spider maps that indicate the location(s) of and summarize exceedances from GA groundwater standards for VOCs/SVOCs and metals, respectively, in on-site and off-site monitoring wells.

During the 1989 sampling event, elevated VOC and SVOC concentrations were detected in groundwater samples from MW36, located in the central portion of Parcel 11, and MW38, located across Center Boulevard from the northwestern corner of the site. Both wells contained benzene, toluene, and PAHs at concentrations exceeding the Class GA AWQVs, and MW36 also contained xylenes, trichloroethene, and phenolic compounds at concentrations exceeding the AWQVs. The groundwater contamination identified at MW36 can be attributed to tar-like material that was observed during installation of this well; whereas, the contamination in MW38 may be attributable to on-site contamination and/or off-site contamination documented to the north of Parcel 11. During the 1985 sampling event, total phenols were detected by EPA Method 420.1 in monitoring wells MW8 and MW9, located in the roadways southwest and south of the site, respectively; however, individual phenolic compounds were not detected by Method 625 analysis. In addition, subsequent sampling of MW9 in 1989 and MW-B13A in 1994 did not detect elevated levels of VOCs or SVOCs in these wells. These results indicate that the VOC and SVOC contamination identified in MW36 is isolated in nature and is not migrating off-site at significant concentrations that would result in adverse exposure to human health or the environment.

Elevated concentrations of several metals were detected in unfiltered samples from both on-site and off-site monitoring wells. These elevated concentrations can be attributed to silt contained in the unfiltered samples and do not represent actual groundwater conditions. Filtered samples from MW36, MW38, MW9, and MW-B13A contained elevated concentrations of iron, lead, magnesium, manganese, sodium, and thallium. These dissolved concentrations can be attributed naturally occurring metals in the bedrock, potential tidal influence from the East River, and/or leaching of contaminants from fill material both on-site and off-site.

1.4 DESCRIPTION OF REMEDIAL ACTIONS

The Site was remediated in accordance with the scope of work presented in the NYSDEC-approved Remediation Work Plan (RWP) dated August 1998. This section includes a summary of the Remedial Actions specified in the RWP:

1. At the start of construction, the site was covered with a layer of crushed stone approximately two to three inches thick, sufficient to minimize worker contact with the site soil.
2. Because of the possibility of encountering areas of soil containing elevated levels of PAHs and other contamination (e.g., odors, tar-like material), special provisions applied to deeper excavations approaching the water table at approximately 6 to 9 feet below grade. For purposes of the Work Plan, the existing grade was defined as the grade at the time the investigations were performed and the Plan was prepared, exclusive of the piles of debris and fill that were placed on the site after that time. Since the ground elevation was between elevation +5.0 feet and elevation +7.6 feet (Queens Borough datum), the deep excavation procedures applied to excavations extending deeper than elevation -3.0 feet (i.e., +5.0 feet elevation minus 8 feet). Excavations below elevation -3.0 feet were subject to the provisions of the Construction Health and Safety Plan (HASP). This included excavation for the elevator pits, girders along the subway tunnel, and utility vaults. In summary, the HASP required the following:
    - Workers performing the excavation in areas of confirmed deeper contamination would have 40-hour hazardous waste training and be able to wear and maintain a full-face respirator. Workers must have read and signed a copy of the HASP.
    - The site was to be fenced to limit access, and there would be no eating, drinking, or smoking in the excavation area.
    - Air monitoring would be performed during the deep excavation using a PID or FID, a combustible gas indicator, and a real-time particulate (PM10) Monitor. Response actions for elevated air monitoring results were specified in the HASP.
3. No special health and safety provisions applied to excavation shallower than elevation -3.0 feet. This included general excavation for the building foundation, which was generally conducted to a maximum depth of 5 feet below grade (elevation 0 feet).
4. The Work Plan specified that all excavated soils from the construction on this parcel would be disposed of on site under paved areas or buildings, or disposed of off-site in accordance with all Federal, State and local rules and regulations for handling, transport, and disposal. Soil from excavation depths above elevation -3.0 feet (other than demolition debris) was either reused on-site or disposed of off-site. Soil from the limited excavations below elevation -3.0 feet was to be disposed of beneath on-site structures to limit potential exposure.
5. At the time the Work Plan was prepared, no underground storage tanks or PCB-containing equipment were known to exist on the site. However, at that time the interiors of the on-site buildings were not accessible for inspection or testing. Therefore, there was a possibility that underground tanks could be present. The Work Plan included a contingency provision for proper closure and investigation of any underground storage tanks.
6. The RWP specified construction and maintenance of an engineered composite cover consisting of concrete paving, building foundations, and 2 feet of clean fill material to prevent human exposure to residual contaminated soils remaining under the Site.

In addition to the requirements of the August 1998 Remediation Work Plan, the following elements were added to the site remedy to maintain consistency with current NYSDEC policy:

7. Filing of a Deed Restriction, including Institutional Controls, to prevent future exposure to any residual contamination remaining at the Site (a copy of the Deed Restriction is provided as Appendix B).
8. Publication of a Site Management Plan for long term management of residual contamination as required by the Deed Restriction, including plans for: (1) Institutional and Engineering Controls, (2) monitoring, and (3) reporting.

1.4.1 Removal of Contaminated Materials from the Site

Pre-construction sampling conducted in June 2000 at locations requiring deeper excavation (e.g., along the subway tunnel and at the proposed elevator pit/utility vaults) indicated that elevated levels of PAHs and field evidence of contamination were at depths of 8 feet below grade or greater in these areas. Excavation greater than 8 feet below grade was required only for installation of the building's southern elevator pit. Therefore, AKRF monitored the deeper excavation of the pit between March 3 and 7, 2001, and directed the excavation contractor to segregate all soil excavated from deeper than 8 feet below grade and stockpile it on-site for waste characterization. Approximately 60 cubic yards of soil were generated during these activities. One composite sample was collected from the stockpiled soil and analyzed for leachable VOCs and SVOCs listed in NYSDEC STARS Memo #1, using EPA methods 1311, 8260, and 8270. The results indicated that all VOC and SVOC concentrations were below the STARS TCLP Extraction Guidance Values. Therefore, the excavated soil (approximately 60 cubic yards) was used on-site as fill under the building slab, as specified in the RWP.

Excavation greater than 8 feet below grade was not required for construction purposes in any other areas of deep excavation at the site. In addition, the excavation depth for general foundation work in other areas of the site was generally 5 feet below grade or shallower. Therefore, all remaining soil was left in place under the site cover system, as specified in the NYSDEC-approved RWP. General excavation activities for the high-rise building foundation were completed in May 2001.

1.4.2 Residual Contamination

Residual contamination remaining on-site includes urban fill containing elevated PAH concentrations and an isolated area of contamination containing elevated concentrations of VOCs and phenolic compounds in soil, and VOCs and PAHs in groundwater (i.e., around B/MW-36).

Tables 1, 2, and 3 and Figures 5, 6, and 7 (spider maps) summarize results of all soil samples remaining at the Site after completion of Remedial Action that exceed the TAGM 4046 RSCOs.

1.4.3 Engineering and Institutional Controls

Since residual contamination is present at this Site, Engineering Controls and Institutional Controls have been implemented to protect public health and the environment in the future. The Controlled Property has one primary Engineering Control, consisting of a composite cover system, which is composed of concrete sidewalks, concrete building slabs, and clean top soil in landscaped areas (planters).

1.4.3.1 Engineering Controls

Exposure to residual contaminated soil is prevented by an engineered, composite cover system that has been built on the Site. This composite cover system is composed of concrete sidewalks, concrete building slabs, and two feet of clean top soil cover in landscaped areas. Figure 10 shows the location of each cover type built at the Site. A Soil Management Plan is included in Section 2.3.2, and outlines the procedures required in the event the composite cover system and underlying residual contamination are disturbed. Issues related to maintenance of this cover are provided in the Monitoring Plan included in Section 3.

1.4.3.2 Institutional Controls

A series of Institutional Controls are required to implement, maintain and monitor this Engineering Control. The Deed Restriction requires compliance with these Institutional Controls. These Institutional Controls consist of the following:

- All Engineering Controls must be operated and maintained as specified in this SMP;
- All Engineering Controls on the Controlled Property (the Site) must be inspected and certified at a frequency and in a manner defined in this SMP; and
- Data and information pertinent to Site Management for the Controlled Property must be reported at the frequency and in a manner defined in this SMP.

The Controlled Property has a series of Institutional Controls in the form of Site restrictions. Adherence to these Institutional Controls is required under the Deed Restriction. Site restrictions that apply to the Controlled Property are:

- Vegetable gardens and farming on the Controlled Property are prohibited;
- Use of groundwater underlying the Controlled Property is prohibited without treatment rendering it safe for the intended use;
- All future activities on the Controlled Property that will disturb residual contaminated material are prohibited unless they are conducted in accordance with the soil management provisions in this SMP; and
- The Controlled Property may be used for restricted residential use only provided the long-term Engineering and Institutional Controls included in the SMP remain in use.

These EC/ICs should:

- Prevent ingestion of groundwater with contamination levels that exceed drinking water standards; and
- Prevent ingestion/direct contact with contaminated soil.

2.0 ENGINEERING AND INSTITUTIONAL CONTROL PLAN

2.1 INTRODUCTION

2.1.1 General

Remedial activities completed at the Site were conducted in accordance with the NYSDEC-approved RWP for Queens West Development Parcel 11 (August 1998). A summary of the remedial strategies and EC/ICs implemented at the Site are as follows:

- Maintenance of an engineered composite cover consisting of concrete sidewalks, concrete building slabs, and two feet of clean top soil in landscaped areas to prevent human exposure to residual contaminated soils remaining under the Site;
- Filing of Deed Restrictions[1] (collectively, "the Deed Restriction"), including Institutional Controls, to prevent future exposure to any contamination remaining at the Site (a copy of the Deed Restriction is provided as Appendix B).

Since residual 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

The purpose of this Plan is to provide:

- A description of all EC/ICs on the Site;
- The basic operation and intended role of each implemented EC/IC;
- A description of the key components of the ICs created as stated in the Deed Restriction;
- A description of the features that should be evaluated during each annual inspection and compliance certification period;
- A description of plans and procedures to be followed for implementation of EC/ICs, such as the implementation of the Soil Management Plan for the safe handling of residual 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.

[1] The site is currently divided into two parcels that are owned by the Queens West Development Corporation and Riverview Housing Development Corporation. As such, the site will be covered by two separate deed restrictions, each of which will require compliance with and implementation of this Site Management Plan.

2.2 ENGINEERING CONTROL COMPONENTS

2.2.1 Engineering Control Systems

2.2.1.1 Composite Cover System

Exposure to residual contaminated soil/fill is prevented by an engineered composite cover system built on-Site. This composite cover system is composed of concrete-sidewalks, concrete building slabs, and two feet of clean top soil in landscaped areas. Figure 10 shows the location of each cover type at the Site. A Soil Management Plan is included in Section 2.3.2, and outlines the procedures required in the event the composite cover system and underlying residual contamination are disturbed. The Soil Management Plan is also discussed in greater detail in Section 2.3. Issues related to maintenance of the cover system are provided in the Monitoring Plan included in Section 3 of this SMP.

Procedures for inspecting and maintaining the composite cover system are documented 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, has occurred.

2.2.2 Criteria for Completion of Remediation/Termination of Remedial Systems

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.

2.3 INSTITUTIONAL CONTROLS COMPONENTS

2.3.1 Institutional Controls

A series of Institutional Controls are required under the RWP to: (1) implement, maintain and monitor Engineering Control systems; (2) prevent future exposure to residual contamination by controlling disturbances of the subsurface contamination; and, (3) restrict the use of the Site to Restricted Residential uses only. Adherence to these Institutional Controls on the Site (Controlled Property) is required under the Deed Restriction and will be implemented under this Site Management Plan. These Institutional Controls are:

- Compliance with the Deed Restriction by the property owner/Lessee and the owner's/lessee's successors and assigns with all elements of this SMP;
- All Engineering Controls must be operated and maintained as specified in this SMP;
- A composite cover system consisting of concrete covered sidewalks, concrete building slabs, and two feet of top soil in landscaped areas must be inspected, certified and maintained as required in this SMP;
- All Engineering Controls on the Controlled Property must be inspected and certified at a frequency and in a manner defied in the SMP;
- Data and information pertinent to Site Management for the Controlled Property must be reported at the frequency and in a manner defined in this SMP; and

- Engineering Controls may not be discontinued without an amendment or the extinguishment of the Deed Restriction.

The Controlled Property has a series of Institutional Controls in the form of Site restrictions. Adherence to these Institutional Controls is required by the Deed Restriction. Site restrictions that apply to the Controlled Property are:

- Vegetable gardens and farming on the Controlled Property are prohibited;
- The use of the groundwater underlying the Controlled Property is prohibited without treatment rendering it safe for intended purpose;
- All future activities on the Controlled Property that will disturb residual contaminated material are prohibited unless they are conducted in accordance with the soil management provisions in this SMP;
- The Controlled Property may only be used for Restricted Residential use provided that the long-term Engineering and Institutional Controls included in this SMP are employed;
- The Controlled Property may not be used for a higher level of use, such as Unrestricted Residential use without an amendment or the extinguishment of this Deed Restriction; and
- The owner/lessee agrees to submit to NYSDEC a written statement that certifies, under penalty of perjury, that: (1) controls employed at the Controlled Property are unchanged from the previous certification or that any changes to the controls were approved by the NYSDEC; and, (2) nothing has occurred that impairs the ability of the controls to protect public health and environment or that constitute a violation or failure to comply with the SMP. NYSDEC retains the right to access such Controlled Property at any time in order to evaluate the continued maintenance of any and all controls. This certification shall be submitted annually, or an alternate period of time that NYSDEC may allow. This annual statement must be certified by an expert that the NYSDEC finds acceptable.

2.3.2 Soil/Materials Management Plan

Residual contaminant concentrations in soil that exceed the TAGM 4046 RSCOs are summarized in Tables 1, 2, and 3 and illustrated on Figures 5, 6, and 7. Such exceedances occur in material located below the site cover; therefore, the interval immediately under the site cover is designated as the Residuals Management Zone (RMZ). For the majority of the site, the top of the RMZ is immediately below the 12-inch concrete building slab. For the small areas of the site containing landscaping in raised planters, the top of the RMZ is immediately below the two feet of imported top soil.

The Site has been fully remediated for restricted residential use. Any future intrusive work that will disturb the RMZ and modifications or repairs to the existing composite cover system will be performed in compliance with the Soil Management Plan (SoMP), described in this section. Intrusive construction work within the RMZ must 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. The Soil Management Plan is presented in the following sections, and the HASP and CAMP are presented in Appendix C. Implementation of the HASP (Appendix C) is the responsibility of the property owner and/or lessee and should be in compliance with DER-10 Technical Guide

and 29 CFR 1910 and 1926, and all other applicable Federal, State and local regulations. Any intrusive construction work must be certified as compliant with the SMP and included in the periodic inspection and certification reports submitted under the Site Management Reporting Plan (Section 4). The soil management procedures described herein do not apply to the upper two feet of soil in the on-site planters, which is not located in the RMZ.

2.3.2.1 Soil Screening Methods

Visual, olfactory and PID soil screening and assessment will be performed by a qualified environmental professional during all post-remedial and post-development excavations into known or potentially contaminated material (Residual Contamination Zone). Soil screening will be performed regardless of when the invasive work is done and will include all excavation and invasive work performed post-development, such as excavations for utility maintenance, repairs, or renovations, after issuance of the Covenant Not to Sue.

Screening will be performed by qualified environmental professionals. Resumes will be provided in the Annual Site Management Report for all personnel conducting invasive work field screening (i.e., those representing the Remedial Engineer) for unknown contaminant sources during post-remediation/post-development work.

The screening will consist of continuous monitoring of the excavated soil for evidence of contamination, with periodic headspace analysis for VOCs using a photoionization detector (PID). Soil exhibiting obvious contamination (e.g., staining, odors, elevated PID readings) will be stockpiled separately to prevent mixing with potentially uncontaminated excavated material.

2.3.2.2 Stockpile Methods

Any soil excavated from below the site cover will be staged in approximately 500 cubic yard stockpiles to be characterized for potential on-site reuse as backfill. Excavated soil exhibiting evidence of contamination, based on field screening as described in Section 2.3.2.1, will be stockpiled separately to prevent mixing with potentially uncontaminated material. All soil stockpiles will have side slopes not to exceed 2:1 and will be placed on a base consisting of minimum 6-mil plastic sheeting that is bermed with hay bales and/or continuously encircled with silt fence. Stockpiles will be kept covered with appropriately anchored tarps whenever excavation and/or loading operations are not occurring. Stockpiles will be routinely inspected and damaged tarp covers will be promptly replaced.

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.

Hay bales will be used as needed near catch basins, surface waters and other discharge points as part of best management practices for stormwater pollution prevention, as described in Section 2.3.2.9.

Water and hoses with spray attachments will be available on-site for dust control.

2.3.2.3 Materials Excavation and Load Out

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

excavated material. The owner/lessee of the Controlled 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 Remedial Engineer. 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.

Vehicles loaded with excavated soil or other contaminated material 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).

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

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

2.3.2.4 Materials Transport Off-Site

All transport of contaminated materials destined for off-site disposal 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 and will leave the neigborhood using the most direct truck route available. The selected truck route will take into account: (a) minimizing transport through residential areas and past sensitive sites; (b) use of city mapped truck routes; (c) minimizing total distance to major highways; (d) promoting safety in access to highways; and (e) overall safety in transport. Trucks will be prohibited from stopping and idling in the neighborhood outside the project Site.

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.

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

The following documentation will be obtained and reported by the Remedial Engineer for each disposal location used in this project to fully demonstrate and document that the disposal of material derived from the Site conforms with all applicable laws: (1) a letter from the Remedial Engineer or owner/lessee to the receiving facility describing the material to be disposed and requesting formal written acceptance of the material; and (2)

a letter from each receiving facility stating it is in receipt of the correspondence (above) and is approved to accept the material. The letter from the owner/lessee to the receiving facility will state that material to be disposed is contaminated material generated at an environmental remediation site in New York State. The letter will provide the project identity and the name and phone number of the Remedial Engineer. The letter will include as an attachment a summary of all chemical data for the material being transported;

Historical fill and contaminated soils from the Site are prohibited from being disposed at Part 360-16 Registration Facilities (also known as Soil Recycling Facilities). Material that does not meet NYCRR Part 375-6.8(a) unrestricted SCOs is prohibited from being taken to a New York State recycling facility (6NYCRR Part 360-16 Registration Facility). Non-hazardous historic fill and contaminated soils taken off-Site will be handled, at a minimum, as a Municipal Solid Waste per 6NYCRR Part 360-1.2.Soils that are contaminated, but non-hazardous, and are being removed from the Site are considered by the Division of Solid & Hazardous Materials (DSHM) in NYSDEC to be Construction and Demolition (C/D) materials with contamination not typical of virgin soils. These soils may be sent to a permitted Part 360 landfill. They may be sent to a permitted C/D processing facility without permit modifications only upon prior notification of NYSDEC Region 2 DSHM. This material is prohibited from being sent or redirected to a Part 360-16 Registration Facility. In this case, as dictated by DSHM, special procedures will include, at a minimum, a letter to the C/D facility that provides a detailed explanation that the material is derived from a DER remediation Site, that the soil material is contaminated and that it must not be redirected to on-site or off-site Soil Recycling Facilities. The letter will provide the project identity and the name and phone number of the Remedial Engineer. The letter will include as an attachment a summary of all chemical data for the material being transported.

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

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

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

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

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

2.3.2.6 Materials Reused On-Site

For soil excavated from below the site cover (from the RMZ), one multi-point composite soil sample will be collected from each 500 cubic yards of soil stockpile and analyzed for VOCs by EPA Method 8260, SVOCs by EPA Method 8270, and Target Analyte List (TAL) metals. If analytical results indicate that contaminant concentrations exceed the NYSDEC Restricted Residential SCOs in 6 NYCRR Part 375-6.8(b), the corresponding stockpile will be disposed of off-site according to applicable regulations as described in Section 2.3.2.5. If analytical results indicate that all contaminant concentrations in the composite sample are below the Track 4 SCOs, the corresponding stockpile will be used as backfill below the site cover. Contaminated on-Site material, including historic fill and contaminated soil, removed for grading or other purposes will not be reused within a cover soil layer, within landscaping berms, or as backfill for subsurface utility lines.

Chemical criteria for on-Site reuse of material (Part 375 Restricted Residential SCOs) has been approved by NYSDEC. The Remedial Engineer will ensure that procedures defined for materials reuse in this SMP are followed and that unacceptable material will not remain on-Site.

Acceptable demolition material proposed for reuse on-Site, if any, will be sampled for asbestos. Concrete crushing or processing on-Site will be prohibited. Organic matter (wood, roots, stumps, etc.) or other solid waste derived from clearing and grubbing of the Site will be prohibited for reuse on-Site.

2.3.2.7 Fluids Management

Dewatering will be performed as necessary to complete excavation work below the water table. If the excavation work requires only minimal groundwater removal, a vacuum truck will be utilized to dewater the excavation. All liquids to be removed from the Site, including dewatering fluids, will be handled, transported and disposed in accordance with applicable local, State, and Federal regulations.

If larger scale dewatering efforts are required, submersible pumps will be used to remove groundwater from gravel-lined sumps dug at the bottom of the excavations. The groundwater will be pumped to a treatment unit designed specifically for the anticipated dewatering requirements. The treated water will be discharged to the New York City sanitary sewer under New York City Department of Environmental Protection (NYCDEP) sewer connection and discharge permits, or to the storm sewer under a NYSDEC State Pollutant Discharge Elimination System (SPDES) permit, as appropriate. A sample of the treated water will be collected prior to the sewer connection at the time of system activation and will be analyzed for NYCDEP or NYSDEC discharge parameters to ensure that effluent limitations are met. Additional sampling and analysis of the dewatering discharge will be completed as required by the NYCDEP or NYSDEC. Waste materials from the water treatment system (e.g., spent carbon and bag filters, sediment from the settling tanks) will be characterized and disposed of at an appropriate waste receiving facility. Dewatered fluids will not be recharged back to the land surface or subsurface of the Site.

2.3.2.8 Backfill from Other Sources

All materials proposed for import onto the Site will be approved by the Remedial Engineer and will be in compliance with provisions in this SMP prior to receipt at the Site. Any imported materials will be documented as having originated from locations

having no evidence of disposal or release of hazardous, toxic, or radioactive substances, wastes, or petroleum products. If the contractor designates a source of soil, it shall be further documented in writing to be soil from areas not having supported any known prior industrial or commercial development, or agricultural use. Material from industrial sites, spill sites, or other environmental remediation sites or potentially contaminated sites will not be imported to the Site.

Native material from a virgin quarry source will not be sampled prior to use as backfill on the site. All other imported material will be tested via collection of one composite sample per 1,000 cubic yards of material from each source. Samples will be analyzed for VOCs using EPA Method 8260, SVOCs using EPA Method 8270, TAL metals using EPA Method 6000/7000 series, PCBs using EPA Method 8082, pesticides using EPA Method 8081, and herbicides using EPA Method 8151. Soils will be considered appropriate for use as on-site backfill if contaminant concentrations are less than the Part 375 Restricted Residential SCOs.

If more than 1,000 cubic yards of soil are imported from a given off-site, non-virgin soil source area, and both samples of the first 1,000 cubic yards meet the limits described above, the sample collection frequency will be reduced to one composite sample for every 2,500 cubic yards of additional soils from the same source, up to 5,000 cubic yards. For sources greater than 5,000 cubic yards, sampling frequency may be reduced to one sample per 5,000 cubic yards, provided that all earlier samples meet the prescribed limits. Trucks entering the Site with imported soils will be securely covered with tight fitting covers.

All imported soils will meet NYSDEC approved backfill or cover soil quality objectives for this Site (e.g., Part 375 Restricted Residential or Groundwater Protection SCOs, whichever is lower). Non-compliant soils will not be imported onto the Site without prior approval by NYSDEC. Nothing in the approved SMP or its approval by NYSDEC should be construed as an approval for this purpose.

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

2.3.2.9 Stormwater Pollution Prevention

- Small-scale soil disturbances, such as for future utility maintenance and renovations conducted after the completion of site redevelopment, are not anticipated to require coverage under the New York SPDES General Stormwater Permit for Construction Activity (Permit Number GP-02-01). However, best management practices will be implemented during small-scale soil disturbance. These practices will include the following: barriers and hay bale checks will be installed and inspected once a week and after every storm event; results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by NYSDEC; and all necessary repairs shall be made immediately.
- Accumulated sediments will be removed as required to keep the barrier and hay bale check functional.
- All undercutting or erosion of the silt fence toe anchor shall be repaired immediately with appropriate backfill materials.

- Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.
- Erosion and sediment control measures identified in the SMP will be observed to ensure that they are operating correctly. Where discharge locations or points are accessible, they will be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters.

2.3.2.10 Composite Cover Restoration

The composite Site cover will be repaired following any soil disturbance activities to restore it to its original condition and ensure that it continues to be effective at preventing direct exposure to residual contamination in the RMZ. Restoration of the soil cover will include replacing any excavated cover soil/top soil in landscapes areas (planters) with at least 2 feet of material that meets the Part 375 Restricted Residential SCOs, and stabilizing the affected area using plantings, paving stones, and/or other stabilization measures. Any portions of the cover where concrete building slab or sidewalk is removed will be restored by patching the area with concrete of appropriate thickness. If the vapor barrier is breached during the soil disturbance activities, the affected portion will be patched/repaired prior to placement of the concrete patch.

2.3.2.11 Contingency Plan

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

Identification of unknown or unexpected contaminated media by screening during invasive Site work will be promptly communicated by phone to NYSDEC's Project Manager.

2.3.2.12 Community Air Monitoring Plan

Air monitoring will be performed during disturbance of the RMZ below the site cover, in accordance with the site-specific HASP. If the air monitoring program identifies potential exposure of field personnel or the public to potential environmental hazards in the soil or groundwater, appropriate measures will be taken to control odors/dust and community air monitoring will be initiated as described in the CAMP (Appendix C). Odor and dust control measures are described in the following Section.

2.3.2.13 Odor and Dust Control Plan

Odor Control Plan

This odor control plan is capable of controlling emissions of nuisance odors off-Site and on-Site during any activities that expose material in the RMZ.

If nuisance odors are identified, work within the RMZ will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and NYSDOH will be notified of all odor events and of all other complaints about the project. Implementation of all odor controls, including work

stoppage, will be the responsibility of the Controlled Property owner's Remediation Engineer, who is responsible for certifying the Annual Site Management Report.

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

Dust Control Plan

The generation of dust during future maintenance activities or renovation work will be controlled by limiting the size of open excavations; spraying water on stockpiles, haul loads, and open excavations; and/or covering stockpiles and excavations with plastic tarps.

2.4 INSPECTIONS AND NOTIFICATIONS

2.4.1 Inspections

A comprehensive Site-wide inspection will be conducted annually. The inspections will determine and document the following:

- Whether Engineering Controls continue to perform as designed;
- Whether these controls continue to be protective of human health and the environment;
- Compliance with requirements of this SMP and the Deed Restriction;
- Achievement of remedial performance criteria;
- Sampling and analysis of appropriate media during monitoring events;
- Whether 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 Site Management Reporting Plan (Section 4).

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 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

2.4.2.1 NYSDEC-Acceptable Electronic Database

The following information is presented in Appendix D in an electronic database format:

- A Site summary;
- The name of the current Site owner and/or the party implementing the SMP for the Site;

- The location of the Site; and
- A contact name and phone number of a person knowledgeable about the Deed Restriction's requirements, in order for NYSDEC to obtain additional information, as necessary.

This information should be: 1) modified as conditions change; (2) revised in Appendix D of this document; and, (3) submitted to NYSDEC in the Annual Site Monitoring Report. Should the Deed Restriction be modified or terminated, the copy of the revised Deed Restriction will also be updated in this manner.

2.4.2.2 Non-routine Notifications

Non-routine notifications are to be submitted by the property owner(s) to the NYSDEC on an as-needed basis for the following reasons:

- 60-day advance notice of any proposed changes in Site use that are consistent with the terms of the VCA.
- 48-hour advance notice of any proposed ground-intrusive activities that will expose or penetrate the RMZ.
- Notice within 48-hours of any damage or defect to the foundations structures that reduces or has the potential to reduce the effectiveness of other Engineering Controls and likewise any action taken to mitigate the damage or defect.
- Notice within 48-hours of any emergency, such as a fire, flood, or earthquake that reduces or has the potential to reduce the effectiveness of Engineering Controls in place at the Site, including a summary of action taken and the 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.

3.0 MONITORING PLAN

3.1 INTRODUCTION

3.1.1 General

This Monitoring Plan describes the measures for evaluating the performance and effectiveness of the implemented ECs in reducing or mitigating contamination at the Site. The EC at the Site consists of the composite cover system. This Monitoring Plan is subject to revision by NYSDEC.

3.1.2 Purpose

This Monitoring Plan describes the methods to be used for (1) evaluating Site information periodically to confirm that the remedy continues to be effective as per the design, and (2) preparing the necessary reports for the monitoring activities.

3.2 ENGINEERING CONTROL SYSTEM MONITORING

3.2.1 Composite Cover Monitoring/Inspection

The site cover will be inspected on an annual basis to ensure that it continues to be effective at preventing direct exposure to residual contamination (below the site cover). Inspections of the site cover will also be conducted whenever a severe condition, such as major erosion or flooding occurs at the site. The inspections will consist of checking the concrete pavement for cracking and/or signs of wear, and checking for erosion of the soil cover in unpaved areas. If minor cracking or damage is observed over less than 25 percent of the paved areas, cracks and/or holes will be patched or repaired as required. If cracking and/or other damage is observed over greater than 25 percent of the paved areas, the area will be repaved with concrete to restore a thickness of at least four inches. If signs of erosion to the soil cover are observed, the corresponding portion of the cover will be stabilized using plantings, paving stones, and/or other stabilization measures. Inspection logs and records of any repairs made to the site cover will be included in the Site Management Report, as described in Section 4.4. An example Site Cap Inspection Log is included in Appendix E.

3.3 SITE-WIDE INSPECTION

Site-wide inspections will be performed on a regular schedule at a minimum of once a year. Site-wide inspections should also be performed after all severe weather conditions that may affect Engineering Controls. During these inspections, an inspection form will be completed (Appendix E). 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; and
- Confirm that Site records are up to date.

3.4 MONITORING REPORTING REQUIREMENTS

Forms and any other information generated during regular monitoring events and inspections will be kept on file at the offices of the owner/lessee. 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 Annual Site Management Report, as specified in the Reporting Plan of the SMP.

3.5 CERTIFICATIONS

Site inspections will take place as previously described. The frequency of inspections is subject to change by NYSDEC. Inspection certification for all ICs and ECs will be submitted to NYSDEC on a calendar year basis and must be submitted by March 1 of the following year. A qualified environmental professional, as determined by NYSDEC, will perform inspection and certification. Further information on the certification requirements are outlined in the Reporting Plan of the SMP.

4.0 SITE MANAGEMENT REPORTING PLAN

4.1 INTRODUCTION

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

This report will include the following:

- Identification of all EC/ICs required by the Remediation Work Plan for the Site;
- An evaluation of the Engineering and Institutional Control Plan and the Monitoring Plan for adequacy in meeting remedial goals;
- Assessment of the continued effectiveness of all Institutional and Engineering Controls for the Site;
- Certification of the EC/ICs;
- Results of the required periodic Site Inspections; and
- All deliverables generated during the reporting period, as specified in Section 2 EC/IC Plan and Section 3 Monitoring Plan.

The Site Management Reporting Plan is subject to NYSDEC revision.

4.2 CERTIFICATION OF ENGINEERING AND INSTITUTIONAL CONTROLS

Information of EC/ICs can be found in the Engineering and Institutional Control Plan portion of the SMP (Section 2.0). Inspection of the EC/ICs will occur at a frequency described in Section 3 Monitoring Plan. After the last inspection of the reporting period, a qualified environmental professional will sign and certify the document. The document will certify that:

- On-Site ECs/ICs are unchanged from the previous certification or any changes made to the ECs/ICs are consistent with the requirements of this SMP;
- They remain in-place and effective;
- The systems are performing as designed;
- Nothing has occurred that would impair the ability of the controls to protect the public health and environment or appropriate repairs have been made;
- Nothing has occurred that would constitute a violation or failure to comply with any operation and maintenance plan for such controls;
- Access is available to the Site by NYSDEC and NYSDOH to evaluate continued maintenance of such controls; and
- Site usage is compliant with the Deed Restriction.

The signed certification will be included in the Annual Site Management Report (see Section 4.4).

4.3 SITE INSPECTIONS

4.3.1 Inspection Frequency

All inspections will be conducted at the frequency specified in the schedules provided in Section 3 Monitoring Plan of this SMP. At a minimum, a Site-wide inspection will be conducted:

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

4.3.2 Inspection Forms, Sampling Data, and Maintenance Reports

All inspections and monitoring events will be recorded on the appropriate forms for their respective system (Appendix E). Additionally, a general Site-wide inspection form will be completed during the Site-wide inspection (Appendix E). These forms are subject to NYSDEC revision.

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

4.3.3 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; and
- The Site remedy continues to be protective of public health and the environment and is performing as designed in the RWP and FER.

4.4 SITE MANAGEMENT REPORT

The Site Management Report will be submitted annually by March 1 of the calendar year following the reporting period. The report will include:

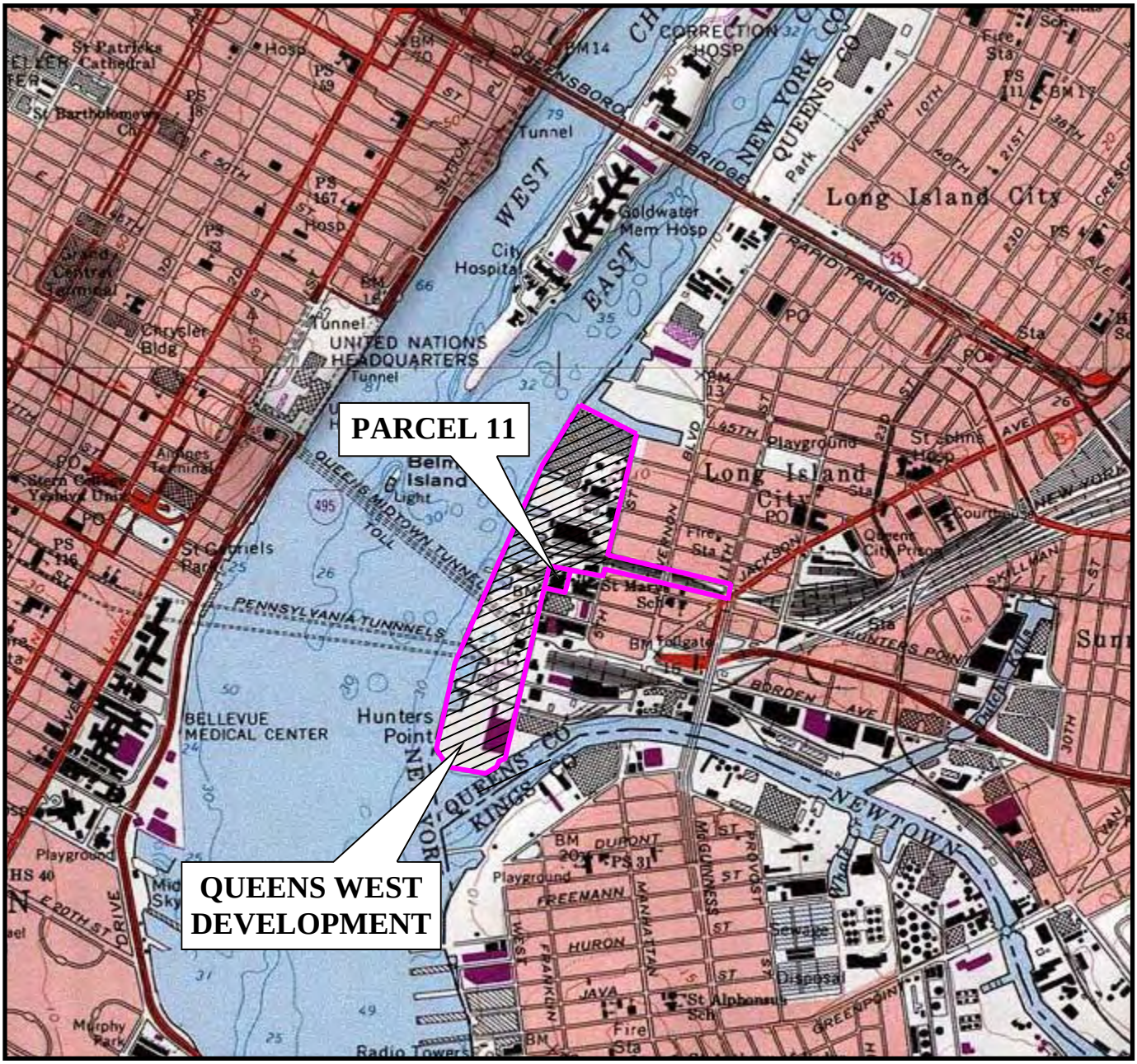
- EC/IC certification;
- All applicable inspection forms and other records generated for the Site during the reporting period;
- Cumulative data summary tables and/or graphical representations of contaminants of concern by media, which include a listing of all compounds analyzed along with the applicable standards, with all exceedances highlighted;
- Results of all analyses, copies of all laboratory data sheets, and the required laboratory data deliverables required for all points sampled during the calendar year (also to be submitted electronically in the NYSDEC-specified format);
- A Site evaluation, which will address the following:
    - The performance and effectiveness of the remedy;
    - Any new conclusions or observations regarding Site contamination based on inspections or data generated during soil management activities; and

- Recommendations regarding any necessary changes to the remedy and/or Site Management Plan.

- A figure showing sampling locations, and significant analytical values at sampling locations (e.g., for potential waste characterization or endpoint sampling during invasive activities that disturb the RMZ); and
- Comments, conclusions, and recommendations, based on an evaluation of the information included in the report, regarding EC/ICs at the Site.

The Site Management Report will be submitted, in hard-copy format, to the Region 2 NYSDEC offices, located at 41-40 21st Street, Long Island City, New York, and in electronic format to NYSDEC and NYSDOH.

FIGURES





SCALE IN FEET

0’ 1000’ 2000’ 4000’

SCALE: 1”=2000’

N

SOURCE:

7.5 MINUTE SERIES USGS TOPOGRAPHIC MAP
QUADRANGLE: BROOKLYN, NY 1995

QUEENS WEST PARCEL 11
QUEENS, NEW YORK

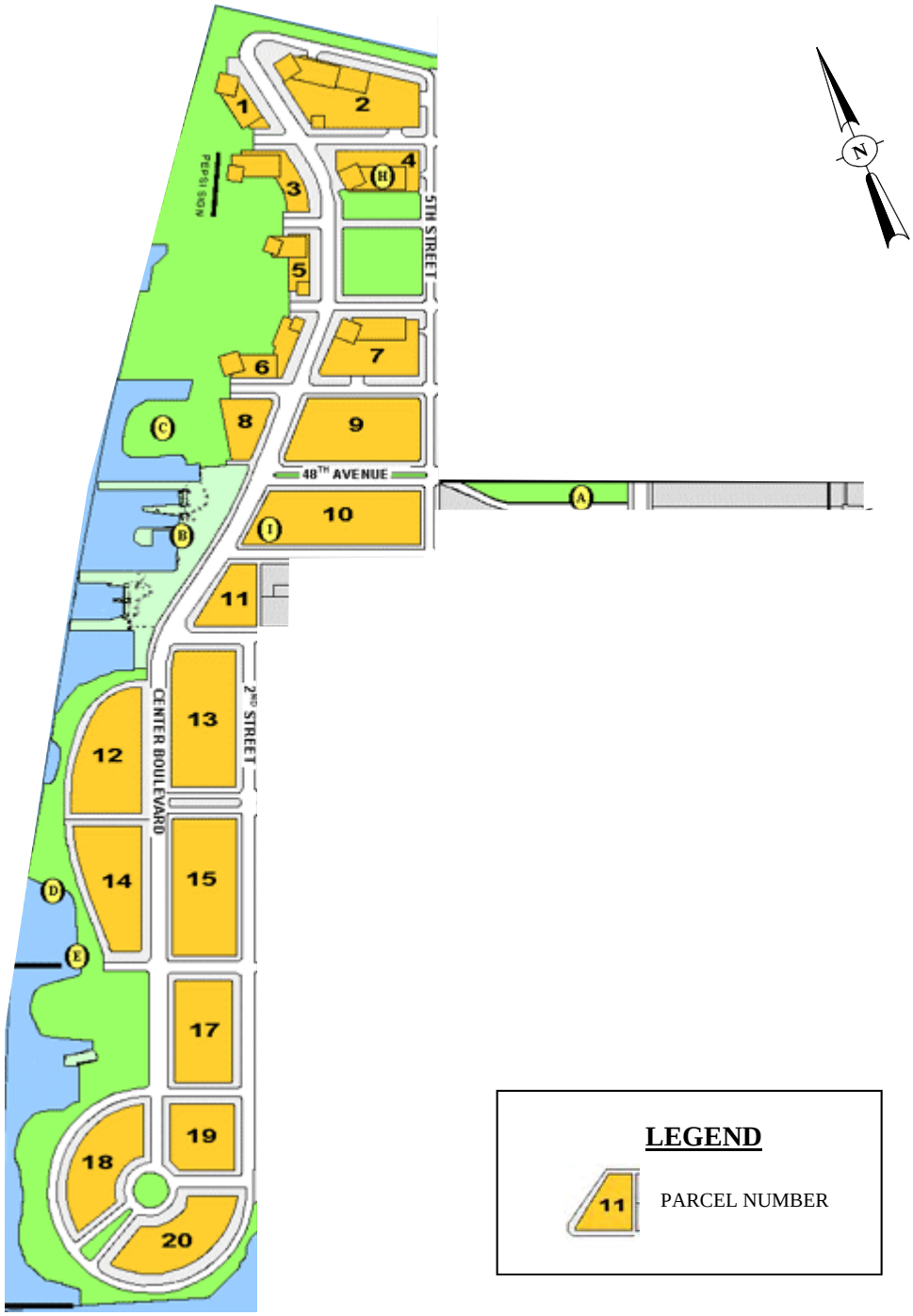
PROJECT SITE LOCATION

AKRF

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440 Park Avenue South, New York, N.Y. 10016

DATE **03.04.08**
PROJECT No. **10913**
SCALE **AS SHOWN**
FIGURE **1**

© 2008 AKRF, Inc. Environmental Consultants Q:\Westchester Data\AKRFData\10913 Queens West Parcel 11\Figures\10913 Fig 1 site location map.pub



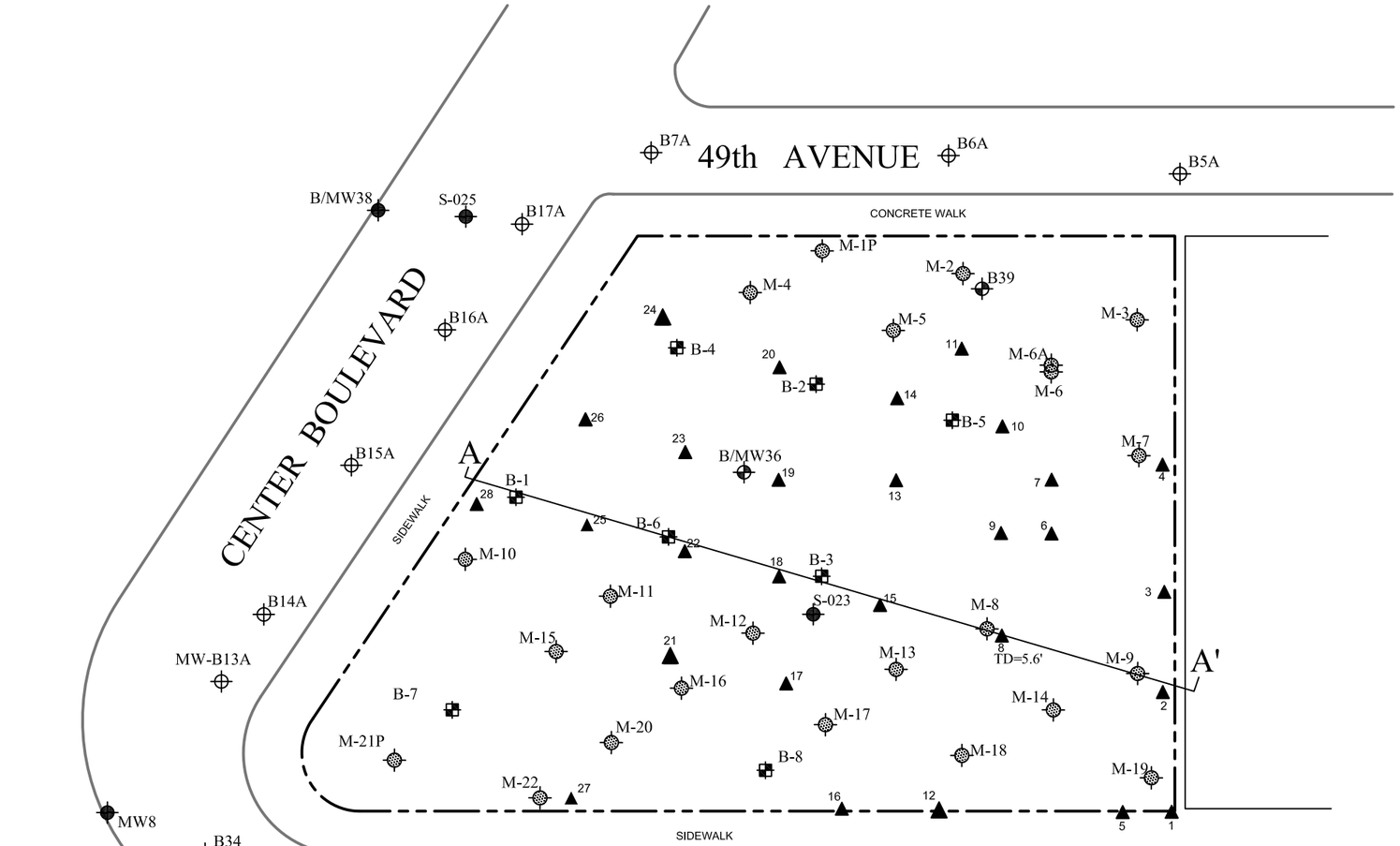
QUEENS WEST PARCEL 11
QUEENS, NEW YORK

PROJECT SITE LOCATION

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DATE **03.04.08**
PROJECT No. **10913**
SCALE **AS SHOWN**
FIGURE **2**

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LEGEND:

- 12 — TEST PIT OR SOIL BORING 2000
- B14A — PERIMETER SOIL BORING/ MONITORING WELL 1994
- B15A — SOIL BORING 1989/ MONITORING WELL
- S-023 — SOIL BORING 1985/ MONITORING WELL
- M-1 — GEOTECHNICAL BORING 2000
- B-8 — GEOTECHNICAL BORING 1997
- PROPERTY BOUNDARY
- A A' — CROSS SECTION

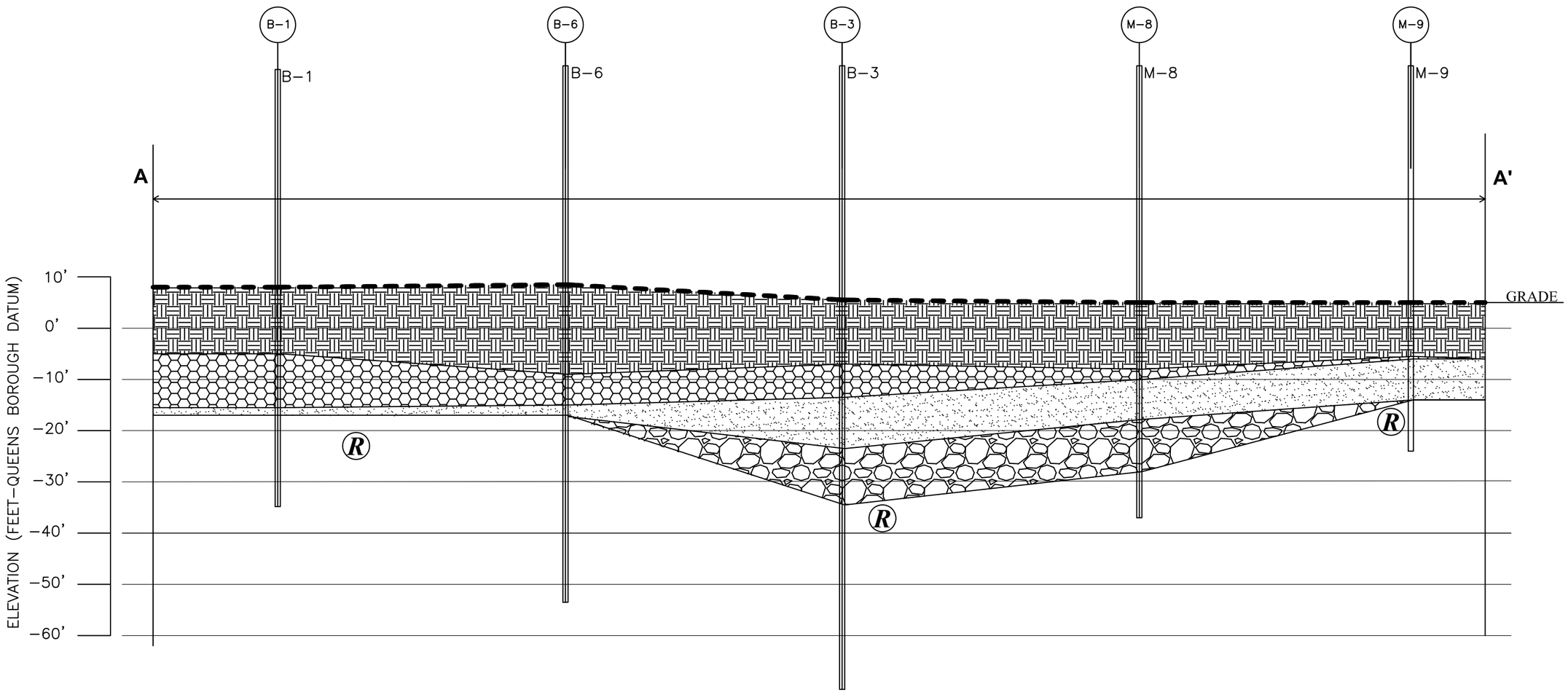
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QUEENS WEST PARCEL 11
QUEENS, NEW YORK

SITE PLAN AND SAMPLING LOCATIONS

DATE: **03.25.08**
PROJECT NO.: **10913**
SCALE: **1"=50'**
FIGURE: **3**

©2007 AKRF, Inc. Environmental Consultants Q:\Westchester Data\AKRFData\10913 Queens West Parcel 11\Figures\SMP Figures\10913 Fig 3 Site Plan and Sampling Locations.dwg



0' 10' 20' 40'

SCALE IN FEET

Reference:
Cross Section Based on Final Geotechnical Report, Queens West- Site 11; Mueser Rutledge Consulting Engineers; Dated October 16,2000.

LEGEND:

- FILL MATERIAL
- ORGANIC SILTY CLAY
- OUTWASH SAND
- GLACIAL TILL
- (R) BEDROCK

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QUEENS WEST PARCEL 11
QUEENS, NEW YORK

GEOLOGICAL CROSS SECTION A-A'

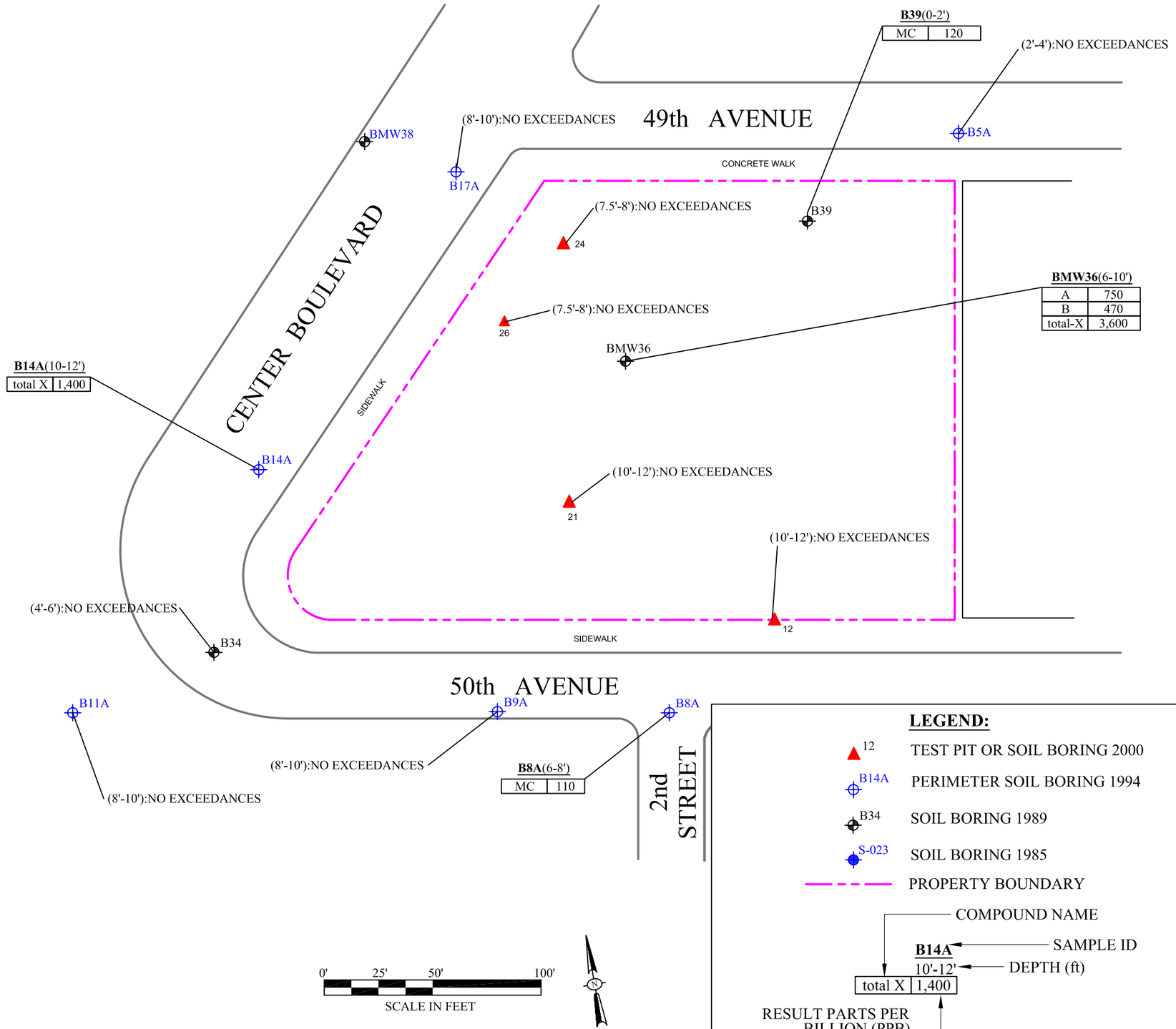
DATE
03.25.08

PROJECT NO.
10913

SCALE
1"=20'

FIGURE
4

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QUEENS WEST PARCEL 11
QUEENS, NEW YORK

VOCs ABOVE TAGM RSCOs IN SOIL - POST REMEDIATION

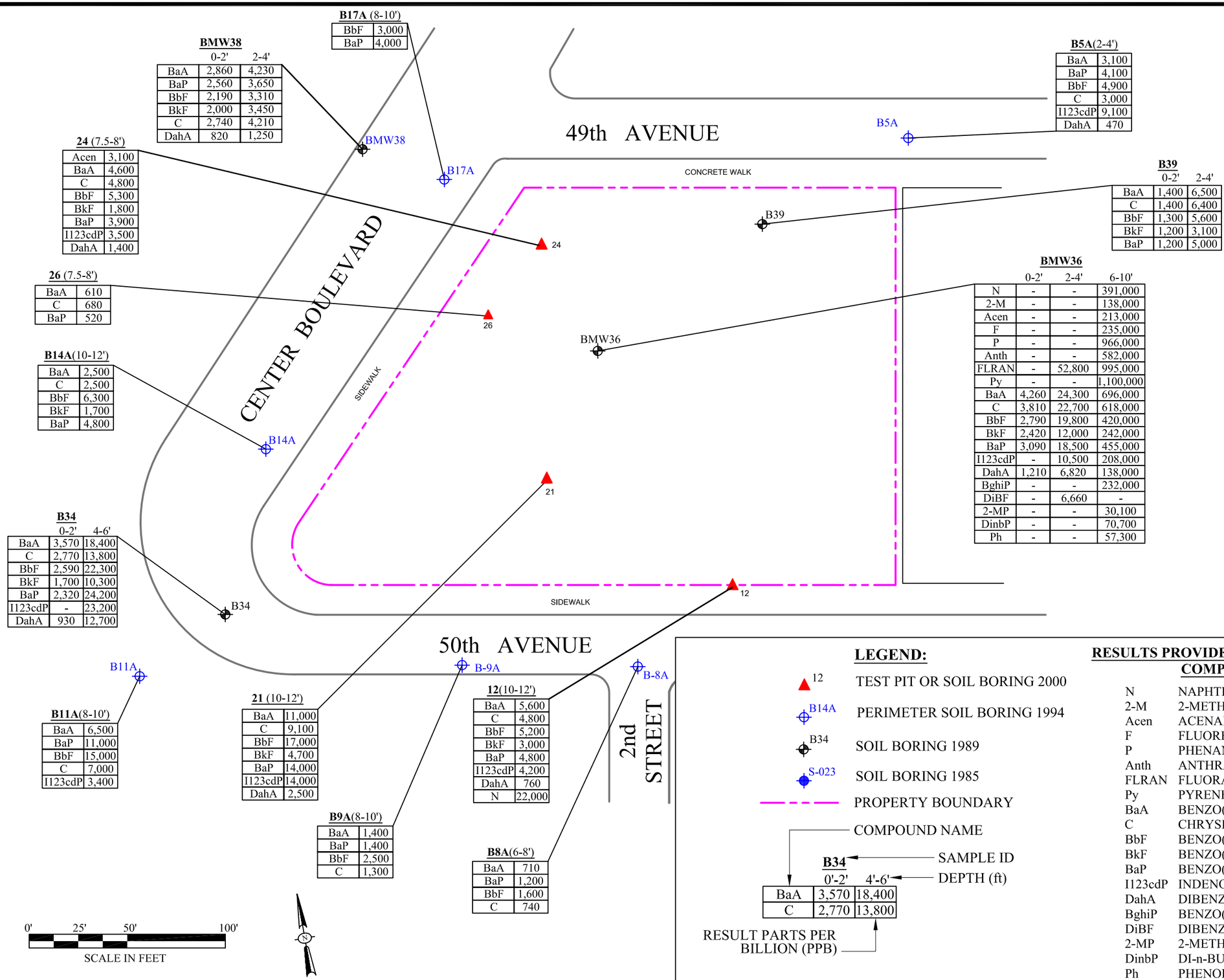
DATE **03.25.08**

PROJECT NO. **10913**

SCALE **1"=50'**

FIGURE **5**

©2007 AKRF, Inc. Environmental Consultants Q:\Westchester Data\AKRFData\10913 Queens West Parcel 11\Figures\10913 Fig 7 VOCs Above TAGM RSCOS in soil.dwg



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QUEENS WEST PARCEL 11
QUEENS, NEW YORK
SVOCs ABOVE TAGM RSCOs IN SOIL - POST REMEDIATION

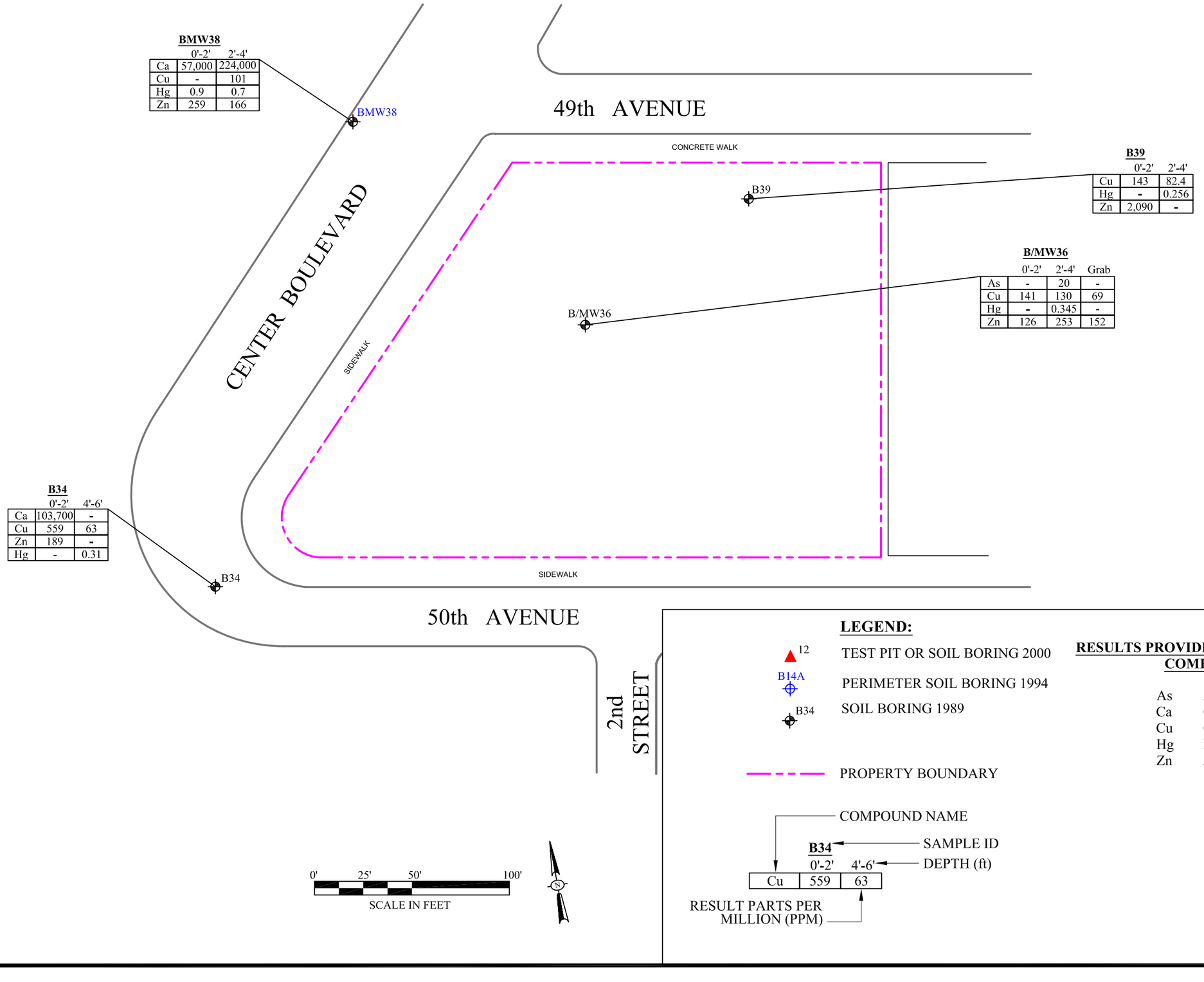
DATE
03.25.08

PROJECT NO.
10913

SCALE
1"=50'

FIGURE
6

©2007 AKRF, Inc. Environmental Consultants Q:\Westchester Data\AKRFData\10913 Queens West Parcel 11\10913 Fig 8 SVOCs above TAGM.dwg

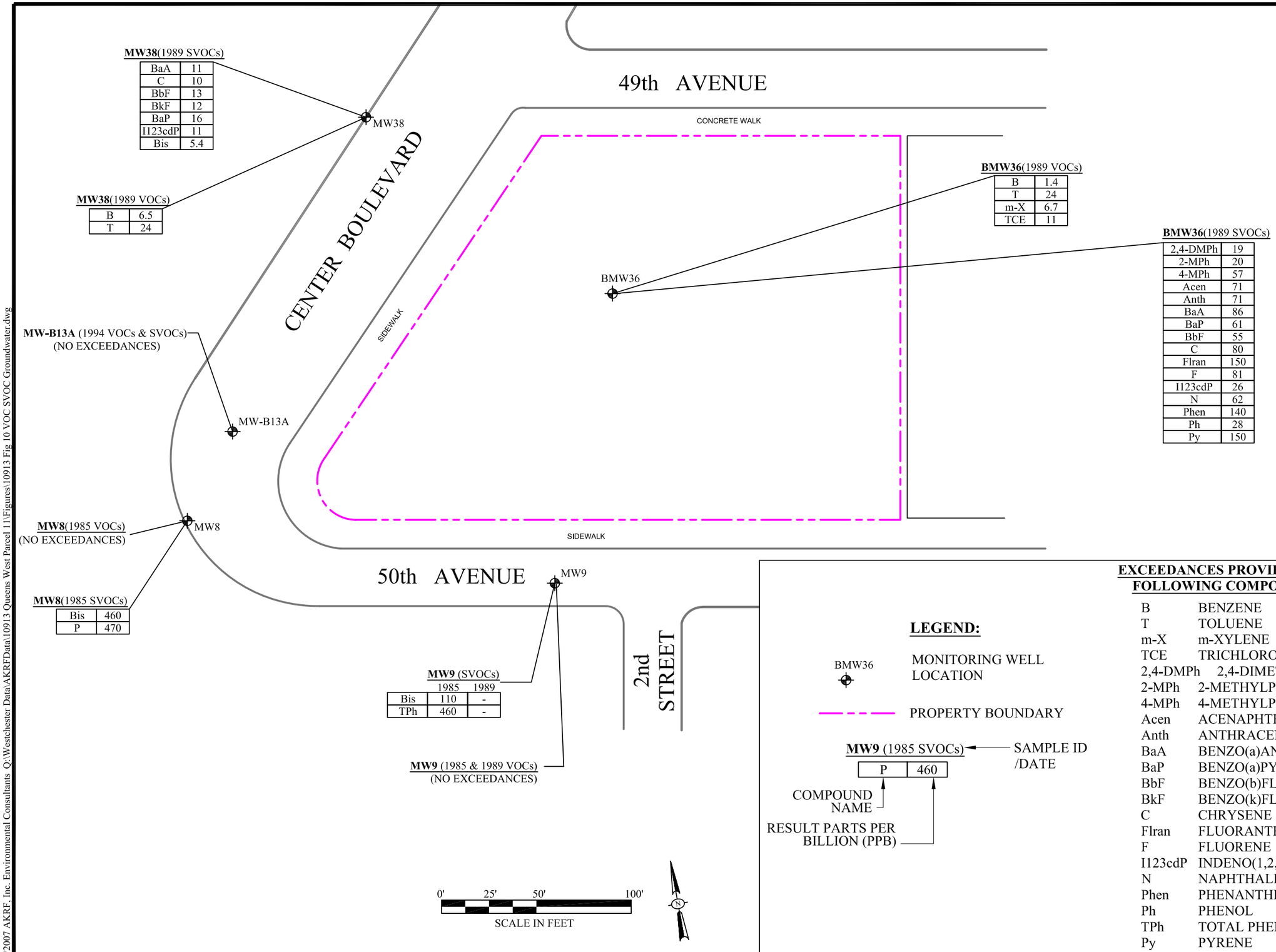


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QUEENS WEST PARCEL 11
QUEENS, NEW YORK
METALS ABOVE EASTERN US BACKGROUND IN SOIL - POST REMEDIATION

DATE **03.25.08**
PROJECT NO. **10913**
SCALE **1"=50'**
FIGURE **7**

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EXCEEDANCES PROVIDED FOR FOLLOWING COMPOUNDS:

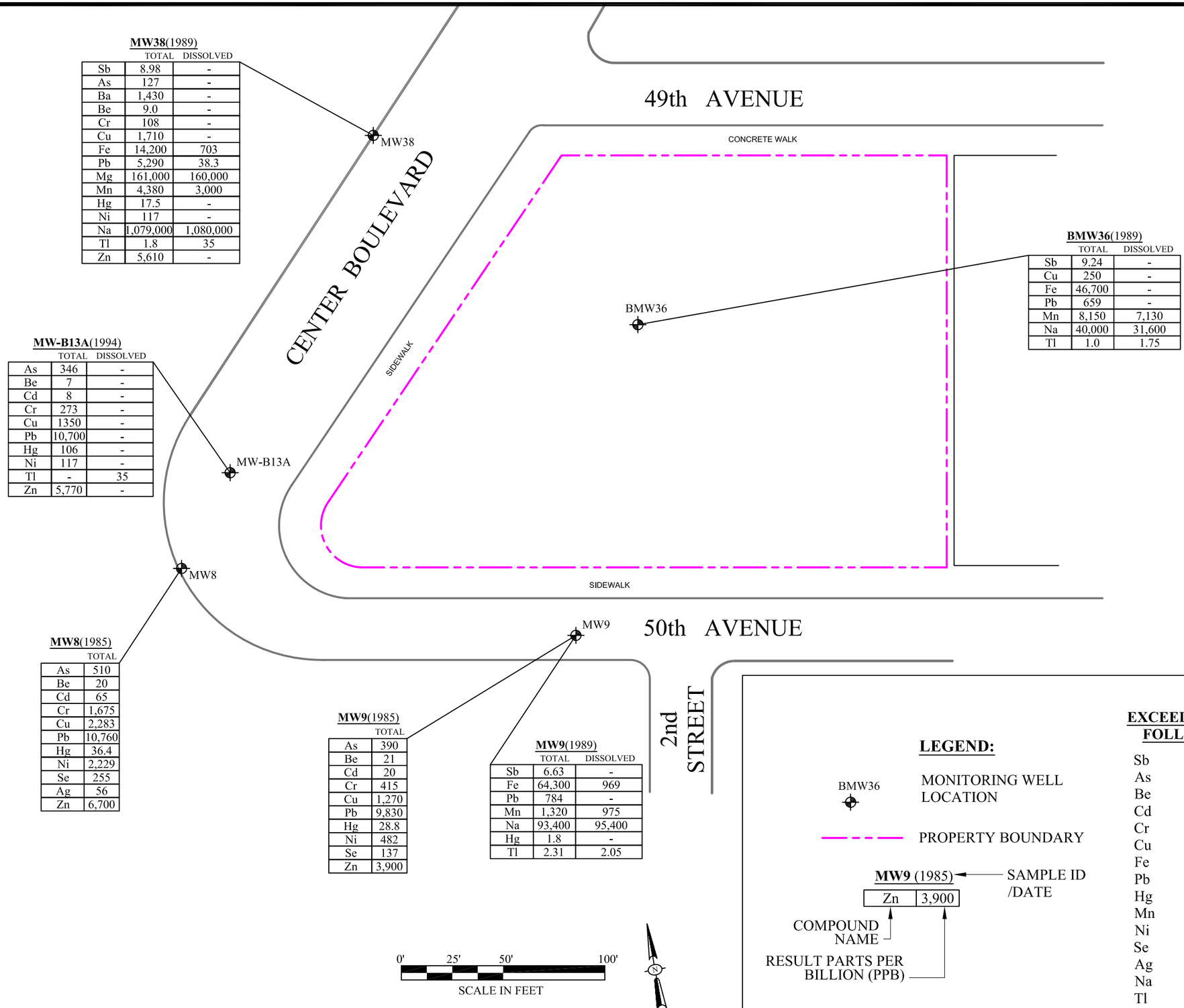
B	BENZENE
T	TOLUENE
m-X	m-XYLENE
TCE	TRICHLOROETHENE
2,4-DMPh	2,4-DIMETHYLPHENOL
2-MPh	2-METHYLPHENOL
4-MPh	4-METHYLPHENOL
Acen	ACENAPHTHENE
Anth	ANTHRACENE
BaA	BENZO(a)ANTHRACENE
BaP	BENZO(a)PYRENE
BbF	BENZO(b)FLUORANTHENE
BkF	BENZO(k)FLUORANTHENE
C	CHRYSENE
Flran	FLUORANTHRENE
F	FLUORENE
I123cdP	INDENO(1,2,3-c,d)PYRENE
N	NAPHTHALENE
Phen	PHENANTHRENE
Ph	PHENOL
TPh	TOTAL PHENOLS
Py	PYRENE

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QUEENS WEST PARCEL 11
QUEENS, NEW YORK
VOCs & SVOCs ABOVE CLASS GA STANDARDS IN GROUNDWATER

DATE **03.25.08**
PROJECT NO. **10913**
SCALE **1"=50'**
FIGURE **8**

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MW38(1989)

	TOTAL	DISSOLVED
Sb	8.98	-
As	127	-
Ba	1,430	-
Be	9.0	-
Cr	108	-
Cu	1,710	-
Fe	14,200	703
Pb	5,290	38.3
Mg	161,000	160,000
Mn	4,380	3,000
Hg	17.5	-
Ni	117	-
Na	1,079,000	1,080,000
Tl	1.8	35
Zn	5,610	-

BMW36(1989)

	TOTAL	DISSOLVED
Sb	9.24	-
Cu	250	-
Fe	46,700	-
Pb	659	-
Mn	8,150	7,130
Na	40,000	31,600
Tl	1.0	1.75

MW-B13A(1994)

	TOTAL	DISSOLVED
As	346	-
Be	7	-
Cd	8	-
Cr	273	-
Cu	1350	-
Pb	10,700	-
Hg	106	-
Ni	117	-
Tl	-	35
Zn	5,770	-

MW8(1985)

	TOTAL
As	510
Be	20
Cd	65
Cr	1,675
Cu	2,283
Pb	10,760
Hg	36.4
Ni	2,229
Se	255
Ag	56
Zn	6,700

MW9(1985)

	TOTAL
As	390
Be	21
Cd	20
Cr	415
Cu	1,270
Pb	9,830
Hg	28.8
Ni	482
Se	137
Zn	3,900

MW9(1989)

	TOTAL	DISSOLVED
Sb	6.63	-
Fe	64,300	969
Pb	784	-
Mn	1,320	975
Na	93,400	95,400
Hg	1.8	-
Tl	2.31	2.05

LEGEND:

BMW36 — MONITORING WELL LOCATION

PROPERTY BOUNDARY

MW9 (1985) ← SAMPLE ID /DATE

Zn	3,900

COMPOUND NAME

RESULT PARTS PER BILLION (PPB)

EXCEEDANCES PROVIDED FOR FOLLOWING COMPOUNDS:

Sb	ANTIMONY
As	ARSENIC
Be	BERYLLIUM
Cd	CADMIUM
Cr	CHROMIUM
Cu	COPPER
Fe	IRON
Pb	LEAD
Hg	MERCURY
Mn	MANGANESE
Ni	NICKEL
Se	SELENIUM
Ag	SILVER
Na	SODIUM
Tl	THALLIUM
Zn	ZINC

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QUEENS WEST PARCEL 11
QUEENS, NEW YORK
METALS ABOVE CLASS GA STANDARDS IN GROUNDWATER

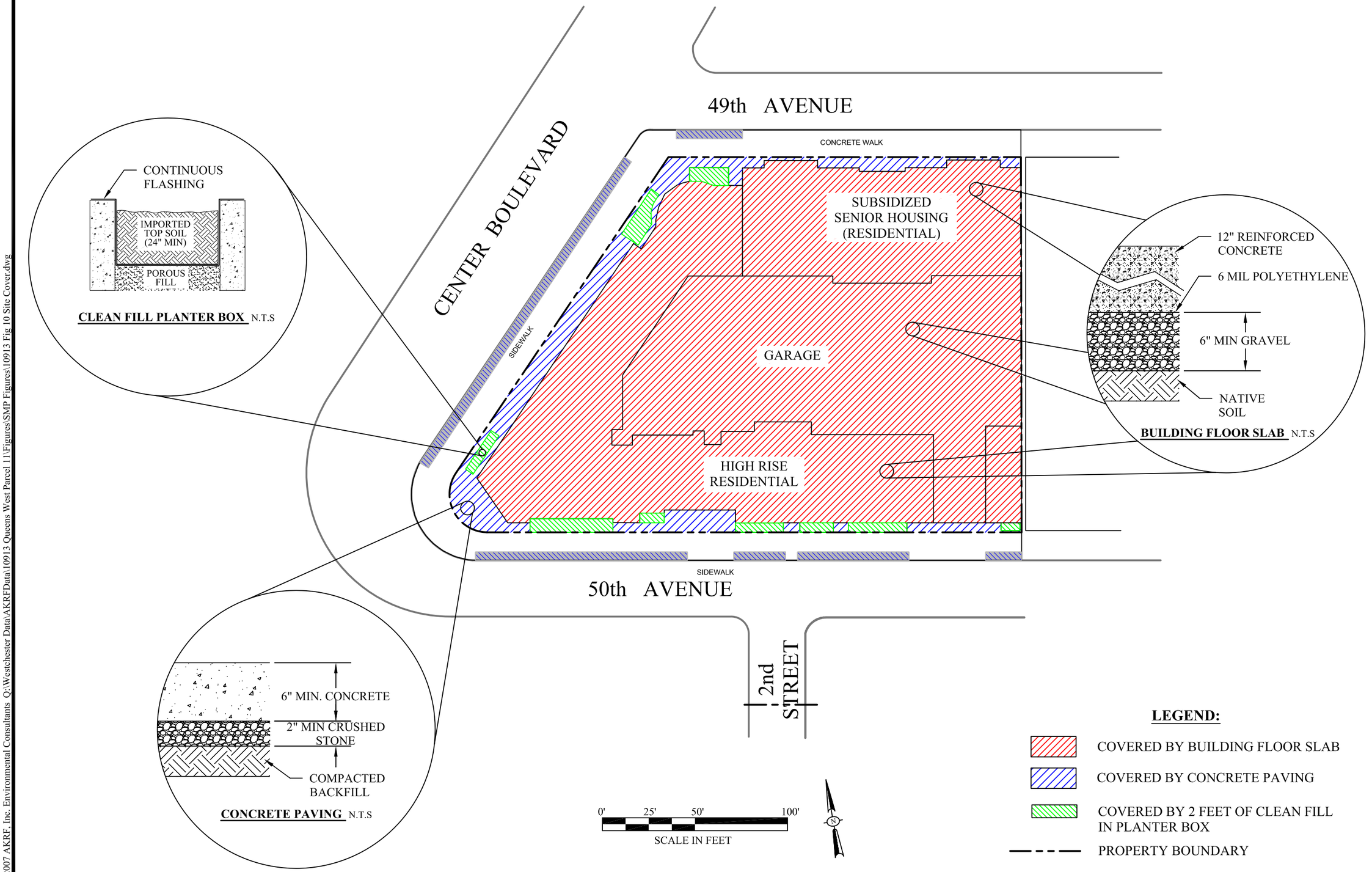
DATE **03.25.08**

PROJECT NO. **10913**

SCALE **1"=50'**

FIGURE **9**

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QUEENS WEST PARCEL 11
QUEENS, NEW YORK

SITE DEVELOPMENT AND COMPOSTIE SITE COVER

DATE
03.25.08

PROJECT NO.
10913

SCALE
1"=50'

FIGURE
10

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TABLES

Queens West Parcel 11

Queens, New York

Notes for Tables 1, 2, 3

NY-TAGM RSCO	:	Recommended Soil Clean-up Objectives listed in NYSDEC (New York State Department of Environmental Conservation) Technical and Administrative Guidance Memorandum (TAGM) #4046. Exceedances indicated in bold.
Eastern United States Background	:	Eastern United States background ranges listed in TAGM #4046. Background levels for lead vary widely. Average background levels in metropolitan or suburban areas or near highways are much higher and typically range from 200-500 ppm.
mg/kg	:	milligrams per kilogram = parts per million (ppm)
NS	:	No soil clean-up objective listed
SB	:	Site background
ND	:	Not detected
NR	:	Not reported
NA	:	Not analyzed
U	:	Compound not detected above the indicated concentration
J	:	Result is an estimated value below the reporting limit or a tentatively identified
*****	:	Total xylene concentrations calculated by summing the reported m-xylene and o,p-xylene concentrations.

Table 1
Queens West Parcel 11
Queens, New York
Soil Analytical Results
Volatile Organic Compounds

Client ID Date Sampled Lab Sample ID Units Compound	TAGM Recommended Soil Cleanup Objectives mg/kg	B-34 (0-2) 1989 mg/kg	B-34 (4-6) 1989 mg/kg	B/MW-36 (0-2) 1989 mg/kg	B/MW-36 (2-4) 1989 mg/kg	B/MW-36 (GRAB) 1989 mg/kg	B-38 (0-2) 1989 mg/kg	B-38 (2-4) 1989 mg/kg	B-39 (0-2) 1989 mg/kg	B-39 (2-4) 1989 mg/kg	B5A-I (2-4) 1994 mg/kg	B8A-I (6-8) 1994 mg/kg	B9A-I (8-10) 1994 mg/kg
1,1-Dichloroethene	**0.4**	0.0056 U	0.0056 U	0.0057 U	0.0057 U	0.0098 U	0.0057 U	0.0059 U	0.021	0.0056 U	U	U	U
2-Butanone	**0.3**	0.011 U	0.011 U	0.011 U	0.011 U	0.071	0.011 U	0.012 U	0.011 U	0.011 U	NR	NR	NR
2-Hexanone	**NS**	0.011 U	0.011 U	0.011 U	0.011 U	0.061	0.011 U	0.012 U	0.011 U	0.011 U	NR	NR	NR
Acetone	**0.2**	0.012 U	0.0056 U	0.0057 U	0.0057 U	**0.750**	0.057 U	0.0059 U	0.130	0.036 U	NR	NR	NR
Benzene	**0.06**	0.0025 U	0.0056 U	0.0057 U	0.0057 U	**0.470**	0.0057 U	0.0059 U	0.010	0.0025 U	U	U	U
Carbon disulfide	**2.7**	0.0056 U	0.0056 U	0.0057 U	0.0057 U	0.0098 U	0.0057 U	0.0059 U	0.030	0.0056 U	NR	NR	NR
Carbon tetrachloride	**0.6**	0.012	0.0056 U	0.0057 U	0.0057 U	0.0098 U	0.0057 U	0.0059 U	0.020	0.012	U	U	U
Chloroform	**0.3**	0.0040 U	0.0056 U	0.0057 U	0.0057 U	0.0098 U	0.0057 U	0.0059 U	0.011	0.0040 U	U	U	U
Ethylbenzene	**5.5**	0.0056 U	0.0056 U	0.0057 U	0.0057 U	1.30	0.0057 U	0.0059 U	0.0055 U	0.0056 U	U	U	U
Methylene chloride	**0.1**	0.0056	0.0056 U	0.0057 U	0.011	0.022	0.0057 U	0.0095	**0.120**	0.0440	0.005 JB	**0.110**	U
Naphthalene	**13**	NR	NR	NR	NR	NR	0.0057 U	0.0059 U	NR	NR	NR	NR	NR
p-Isopropyltoluene	**10**	NR	NR	NR	NR	NR	0.0057 U	0.0059 U	NR	NR	NR	NR	NR
Tetrachloroethene	**1.4**	0.0056 U	0.0056 U	0.0057 U	0.0057 U	0.0098 U	0.0057 U	0.0059 U	0.0055 U	0.0056 U	0.032	U	U
Toluene	**1.5**	0.0011 U	0.0011 U	0.0011 U	0.0011 U	1.20	0.0057 U	0.0059 U	0.0083	0.0011 U	U	U	U
m-Xylene	**NS**	0.0056 U	0.0056 U	0.0057 U	0.0057 U	1.90	0.0057 U	0.0059 U	0.0055 U	0.0056 U	NR	NR	NR
o,p-Xylene	**NS**	0.0056 U	0.0056 U	0.0057 U	0.0057 U	1.70	0.0057 U	0.0059 U	0.0055 U	0.0056 U	NR	NR	NR
Total xylenes	**1.2**	0.0112 *	0.0112 *	0.0114 *	0.0114 *	**3.6** *	0.0057 U	0.0059 U	0.011 *	0.0112 *	U	U	U

Table 1
Queens West Parcel 11
Queens, New York
Soil Analytical Results
Volatile Organic Compounds

Client ID Date Sampled Lab Sample ID Units Compound	TAGM Recommended Soil Cleanup Objectives mg/kg	B11A-I (8-10) 1994 mg/kg	B14A-I (10-12) 1994 mg/kg	B17A-I (8-10) 1994 mg/kg	Field Blank 1994 mg/kg	Trip Blank 1994 mg/kg	12 (10-12') 2000 0012833 mg/kg	21 (10-12') 2000 0012834 mg/kg	24 (7.5-8') 2000 0012835 mg/kg	26 (7.5-8') 2000 0012836 mg/kg
1,1-Dichloroethene	**0.4**	U	U	U	U	U	0.005 U	0.005 U	0.005 U	0.005 U
2-Butanone	**0.3**	NR	NR	NR	NR	NR	0.005 U	0.005 U	0.005 U	0.005 U
2-Hexanone	**NS**	NR	NR	NR	NR	NR	0.005 U	0.005 U	0.005 U	0.005 U
Acetone	**0.2**	NR	NR	NR	NR	NR	0.048	0.005 U	0.005 U	0.052
Benzene	**0.06**	U	U	U	U	U	0.005 U	0.005 U	0.005 U	0.005 U
Carbon disulfide	**2.7**	NR	NR	NR	NR	NR	0.005 U	0.005 U	0.005 U	0.005 U
Carbon tetrachloride	**0.6**	U	U	U	U	U	0.005 U	0.005 U	0.005 U	0.005 U
Chloroform	**0.3**	U	U	U	U	U	0.005 U	0.005 U	0.005 U	0.005 U
Ethylbenzene	**5.5**	0.280 J	U	U	U	U	0.005 U	0.005 U	0.005 U	0.005 U
Methylene chloride	**0.1**	U	U	U	0.015	0.016	0.005 U	0.005 U	0.005 U	0.005 U
Naphthalene	**13**	NR	NR	NR	NR	NR	0.04	0.005 U	0.005 U	0.4
p-Isopropyltoluene	**10**	NR	NR	NR	NR	NR	0.005 U	0.005 U	0.005 U	0.051
Tetrachloroethene	**1.4**	U	U	U	U	U	0.005 U	0.005 U	0.005 U	0.005 U
Toluene	**1.5**	0.740	U	U	U	U	0.005 U	0.005 U	0.005 U	0.005 U
m-Xylene	**NS**	NR	NR	NR	NR	NR	NR	NR	NR	NR
o,p-Xylene	**NS**	NR	NR	NR	NR	NR	NR	NR	NR	NR
Total xylenes	**1.2**	0.580	**1.40**	U	U	U	0.015 U	0.015 U	0.015 U	0.015 U

Table 2
Queens West Parcel 11
Queens, New York
Soil Analytical Results
Semi-Volatile Organic Compounds

Client ID Date Sampled Lab Sample ID Units Compound	TAGM Recommended Soil Cleanup Objectives mg/kg	B-34 (0-2) 1989 mg/kg	B-34 (4-6) 1989 mg/kg	B/MW-36 (0-2) 1989 mg/kg	B/MW-36 (2-4) 1989 mg/kg	B/MW-36 (GRAB) 1989 mg/kg	B-38 (0-2) 1989 mg/kg	B-38 (2-4) 1989 mg/kg	B-39 (0-2) 1989 mg/kg	B-39 (2-4) 1989 mg/kg	B5A-I (2-4) 1994 mg/kg	B8A-I (6-8) 1994 mg/kg
2,4-Dimethylphenol	NS	0.37 U	1.85 U	1.96 U	5.75 U	37.8	0.38 U	0.39 U	1.80 U	1.90 U	U	U
2-Chloronaphthalene	NS	0.37 U	1.85 U	1.96 U	5.75 U	9.15 J	0.38 U	0.39 U	1.80 U	1.90 U	U	U
2-Methylnaphthalene	36.4	0.37 U	1.85 U	1.96 U	3.03 J	**138**	0.38 U	1.90	1.80 U	1.90 U	NR	NR
2-Methylphenol	0.1	0.37 U	1.85 U	1.96 U	5.75 U	**30.1**	0.38 U	0.39 U	1.80 U	1.90 U	NR	NR
3&4-Methylphenol	NS	0.37 U	1.85 U	1.96 U	5.75 U	68.6	0.38 U	0.39 U	1.80 U	1.90 U	NR	NR
Acenaphthene	50	0.44	3.20 U	0.96 J	9.00	**213**	0.31 J	0.58	1.80 U	1.80 J	U	U
Acenapthylene	41	0.37 U	1.85 U	1.96 U	5.75 U	35.5	0.38 U	0.39 U	1.80 U	1.90 U	0.53 J	U
Anthracene	50	1.33	4.47	2.00	15.7	**582**	0.87	1.26	1.80 U	3.10	1.50	U
Benzo(a)anthracene	0.224	**3.57**	**18.4**	**4.26**	**24.3**	**696**	**2.86**	**4.23**	**1.40** J	**6.50**	**3.10**	**0.71** J
Benzo(a)pyrene	0.061	**2.32**	**24.2**	**3.09**	**18.5**	**455**	**2.56**	**3.65**	**1.20** J	**5.00**	**4.10**	**1.20**
Benzo(b)fluoranthene	1.1	**2.59**	**22.3**	**2.79**	**19.8**	**420**	**2.19**	**3.31**	**1.30** J	**5.60**	**4.90**	**1.60**
Benzo(g,h,i)perylene	50	2.14	22.8	2.62	10.5	**232**	1.64	2.56	1.30 J	2.50	0.90 J	0.40 J
Benzo(k)fluoranthene	1.1	**1.70**	**10.3**	**2.42**	**12.0**	**242**	**2.00**	**3.45**	**1.20** J	**3.10**	U	0.38 J
Bis(2-ethylhexyl)phthalate	50	0.47	0.99	1.96 U	5.75 U	21.0	3.34	2.59	0.900 J	1.90 J	U	U
Butyl benzyl phthalate	50	5.83	1.16 J	1.96 U	5.75 U	17.2 U	5.80	2.15	1.80 U	1.90 U	U	U
Chrysene	0.4	**2.77**	**13.8**	**3.81**	**22.7**	**618**	**2.74**	**4.21**	**1.40** J	**6.40**	**3**	**0.74** J
Dibenzo(a,h)anthracene	0.014	**0.93**	**12.7**	**1.21** J	**6.82**	**138**	**0.82**	**1.25**	1.80 U	**1.30**	**0.47** J	**0.19** J
Dibenzofuran	6.2	0.27	1.09 J	1.96 U	**6.66**	17.20 U	0.17 J	0.83	1.80 U	1.90 U	NR	NR
Di-n-butylphthalate	8.1	1.65	5.37	4.03	6.48	**70.7**	1.37	2.56	1.80 U	3.00	U	U
Di-n-octylphthalate	50	0.37 U	1.85 U	1.96 U	5.75 U	17.2 U	0.38 U	0.39 U	1.80 U	1.90 U	U	U
Fluoranthene	50	4.66	14.1	6.74	52.8	**995**	5.59	5.99	2.40	15.0	6.80	1.40
Fluorene	50	0.50	1.43 J	1.96 U	8.23	**235**	0.35 J	0.66	1.80 U	1.90 U	0.49 J	U
Indeno(1,2,3-cd)pyrene	3.2	1.62	**23.2**	2.28	**10.5**	**208**	1.56	2.43	1.10 J	2.40	**9.10** J	0.43 J
Naphthalene	13	0.19 J	1.14 U	1.96 U	4.8 J	**391**	0.38 U	1.63	0.810 J	1.90 U	U	U
Phenanthrene	50	3.55	11.8	7.68	44.7	**966**	2.99	4.99	2.60	12.0	5.10	0.37 J
Phenol	0.03	0.37 U	1.85 U	1.96 U	5.75 U	**57.3**	0.38 U	0.39 U	1.80 U	1.90 U	U	U
Pyrene	50	5.75	16.9	8.32	39.5	**1100**	4.92	7.01	2.40	14.0	5.80	1.20
Total SVOCs	500	40.19	203.58	52.21	316.02	**7959.15**	42.08	57.24	18.01	83.6	45.79	8.62

Table 2
Queens West Parcel 11
Queens, New York
Soil Analytical Results
Semi-Volatile Organic Compounds

Client ID Date Sampled Lab Sample ID Units Compound	TAGM Recommended Soil Cleanup Objectives mg/kg	B9A-I (8-10) 1994 mg/kg	B11A-I (8-10) 1994 mg/kg	B14A-I (10-12) 1994 mg/kg	B17A-I (8-10) 1994 mg/kg	Field Blank 1994 mg/kg	12 (10-12') 2000 0012833 mg/kg	21 (10-12') 2000 0012834 mg/kg	24 (7.5-8') 2000 0012835 mg/kg	26 (7.5-8') 2000 0012836 mg/kg
2,4-Dimethylphenol	NS	U	U	U	U	NR	0.35 U	0.35 U	0.35 U	0.14 U
2-Chloronaphthalene	NS	U	U	U	U	U	NR	NR	NR	0.08 U
2-Methylnaphthalene	36.4	NR	NR	NR	NR	NR	4.4	0.38	4.4	0.08 U
2-Methylphenol	0.1	NR	NR	NR	NR	NR	0.35 U	0.3 U	0.3 U	0.12 U
3&4-Methylphenol	NS	NR	NR	NR	NR	NR	0.5 U	0.5 U	0.5 U	0.2 U
Acenaphthene	50	0.5 J	U	U	U	U	9.4	1.5	0.2 U	1.6
Acenapthylene	41	U	U	U	U	U	0.2 U	0.33	0.2 U	0.08 U
Anthracene	50	0.69 J	3.10 J	1.50 J	U	U	5.3	2.9	2.9	1
Benzo(a)anthracene	0.224	**1.40**	**6.50** J	**2.50** J	U	U	**5.6**	**11**	**4.6**	**0.61**
Benzo(a)pyrene	0.061	**1.40**	**11**	**4.80** J	**4.0**	U	**4.8**	**14**	**3.9**	**0.52**
Benzo(b)fluoranthene	1.1	**2.50**	**15**	**6.30**	**3.0** J	U	**5.2**	**17**	**5.3**	0.53
Benzo(g,h,i)perylene	50	U	U	U	U	U	3.9	13	3.8	0.41
Benzo(k)fluoranthene	1.1	0.51 J	U	**1.70** J	U	U	**3.0**	**4.7**	**1.8**	0.3
Bis(2-ethylhexyl)phthalate	50	24	11	8.90	U	U	2.1	0.76	1.8	3.4
Butyl benzyl phthalate	50	0.99 J	14	U	U	U	0.2 U	0.72	0.2 U	0.08 U
Chrysene	0.4	**1.30**	**7** J	**2.50** J	U	U	**4.8**	**9.1**	**4.8**	**0.68**
Dibenzo(a,h)anthracene	0.014	U	U	U	U	U	**0.76**	**2.5**	**1.4**	0.08 U
Dibenzofuran	6.2	NR	NR	NR	NR	NR	4.2	0.58	1.1	0.67
Di-n-butylphthalate	8.1	U	U	U	U	U	0.2 U	0.2 U	0.2 U	0.08 U
Di-n-octylphthalate	50	4.70	26	U	U	U	0.2 U	0.2 U	0.2 U	0.08 U
Fluoranthene	50	3.20	12 J	5.50 J	5.60 J	U	13	12	9.9	1.9
Fluorene	50	0.38 J	U	U	U	U	8.1	1.2	0.93	1.6
Indeno(1,2,3-cd)pyrene	3.2	0.40 J	**3.40** J	2.30 J	U	U	**4.2**	**14**	**3.5**	0.4
Naphthalene	13	U	U	U	U	U	**22**	0.57	0.2	0.69
Phenanthrene	50	2.30	10 J	5.30 J	4.30 J	U	23	7.7	6.6	2.5
Phenol	0.03	U	U	U	U	NR	0.3 U	0.3 U	0.3 U	0.12 U
Pyrene	50	2	14	3.50 J	3.80 J	U	12	10	7.6	1.6
Total SVOCs	500	46.27	133	44.8	20.7	0	131.36	113.81	63.61	18.41

Table 3
Queens West Parcel 11
Queens, New York
Soil Analytical Results
Metals

Client ID Date Sampled Lab Sample ID Units Compound	TAGM Recommended Soil Cleanup Objectives mg/kg	Eastern United States Background Range mg/kg	B-34 (0-2) 1989 mg/kg	B-34 (4-6) 1989 mg/kg	B/MW-36 (0-2) 1989 mg/kg	B/MW-36 (2-4) 1989 mg/kg	B/MW-36 (GRAB) 1989 mg/kg	B-38 (0-2) 1989 mg/kg	B-38 (2-4) 1989 mg/kg	B-39 (0-2) 1989 mg/kg	B-39 (2-4) 1989 mg/kg
Aluminum	**SB**	**33,000**	5,710	2,130	5,790	3,620	3,830	5,790	2,790	1,630	9,880
Antimony	**SB**	**N/A**	0.637 U	1.72 J	5.63 J	1.79 J	1.46 J	0.673 U	1.99 J	2.99 J	7.65
Arsenic	**7.5 or SB**	**3 - 12**	1.72	6.77	6.12	**20.0**	4.55	2.79	8.66	1.74	4.02
Barium	**300 or SB**	**15 - 600**	122	69.20	81.7	140	60.5	263	178	63.70	62.3
Beryllium	**0.16 or SB**	**0 - 1.75**	0.549	0.556	0.464	0.69	0.862	0.813	0.706	0.879	1.05
Cadmium	**1 or SB**	**0.1 - 1**	0.392 J	0.144 U	0.148 U	0.376 J	0.253 J	0.83	0.251 J	0.171 J	0.149 U
Calcium	**SB**	**130 - 35,000**	**103,700**	1,530	2,460	5,800	2,250	**57,000**	22,400	3,290	625
Chromium	**10 or SB**	**1.5 - 40**	15.80	8.22	14.0	6.25	4.31	21	23.4	34.2	11.40
Cobalt	**30 or SB**	**2.5 - 60**	5.49 U	5.56 U	5.81 U	13.2	8.62 U	7.43	5.88 U	54.9 U	58.1 U
Copper	**25 or SB**	**1 - 50**	**559**	**63**	**141**	**130**	**69**	23.9	**101**	**143**	**82.40**
Iron	**2000 or SB**	**2,000 - 55,000**	6,720	9,610	19,100	14,000	11,800	4,240	10,300	18,400	24,200
Lead	**0**	**200 - 500**	98.6	252	258	391	344	281	482	191	289
Magnesium	**SB**	**100 - 5,000**	3,610	837	856	4,750	646 J	3,570	1,670	1,390	282 J
Manganese	**SB**	**50 - 5,000**	122	74	201	541	157	115	97.5	179	161
Total Mercury	**0.1**	**0.001 - 0.2**	0.11	**0.306**	0.182	**0.345**	0.069	**0.897**	**0.706**	0.134	**0.256**
Nickel	**13 or SB**	**0.5 - 25**	9.78	4.33 U	10.5	15.7	11.2	10.4	8.59	12.0	4.49 U
Potassium	**SB**	**8,500 - 43,000**	2,170	659	223 J	273 J	321 J	801	573 J	283 J	107 U
Selenium	**2 or SB**	**0.1 - 3.9**	0.227 U	0.276 J	0.227 U	0.229 U	0.345 U	0.232 U	0.168 U	0.218 U	0.23 U
Silver	**SB**	**N/A**	0.989 J	0.556 U	0.568 U	0.574 U	0.862 U	0.69 J	0.588 J	0.879 J	0.93 J
Sodium	**SB**	**6,000 - 8,000**	204 J	99.7 J	50.1 J	64.9 J	388 J	3470	173 J	95.8 J	77.3 J
Thallium	**SB**	**N/A**	0.091 J	0.146 J	0.144 J	0.128 J	0.195 J	0.093 U	0.122 J	0.107 J	0.165 J
Vanadium	**150 or SB**	**1 - 300**	23.30	11.6	28.90	12.6	8.28	68.3	39.8	27.9	9.65
Zinc	**20 or SB**	**9 - 50**	**189**	33.6	**126**	**253**	**152**	**259**	**166**	**2,090**	43.5

Queens West Parcel 11

Queens, New York

Notes for Tables 4, 5, 6

NYSDEC Class GA Ambient Standards	:	NYSDEC Class GA Ambient Standard = New York State Department of Environmental Conservation Technical and Operational Guidance Series (1.1.1): Class GA Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations.
Class GA	:	Standard for Class GA Groundwater (source of drinking water).
Class 1 SW H(FC)	:	Standard for Class 1 Saline Surface Water (human consumption of fish)
ug/L	:	Micrograms per liter, or parts per billion
NS	:	No standards or guidance value listed.
ND	:	Not detected
NA	:	Not Analyzed
NR	:	Result not reported
U	:	Compound not detected
J	:	Result is an estimated value below the reporting limit or a tentatively identified
*	:	Guidance value.

Table 4
Queens West Parcel 11
Queens, New York
Groundwater Analytical Results
Volatile Organic Compounds

Client ID Date Sampled Units Compound	NYSDEC Class GA GW AWQVs ug/L	NYSDEC Class I SW H(FC) AWQVs ug/L	MW8 1985 ug/L	MW9 1985 ug/L	MW9 1989 ug/L	B/MW36 1989 ug/L	B/MW38 1989 ug/L	MW-B13A 1994 ug/L	Field Blank 1994 ug/L	Trip Blank 1994 ug/L
2-Hexanone	**50***	**NS**	NR	NR	50 U	4.2 J	10 U	NR	NR	NR
Benzene	**1**	**10**	10 U	10 U	25 U	**1.4** J	**6.5** J	U	U	U
Ethylbenzene	**5**	**NS**	10 U	10 U	25 U	3.2 J	25 U	U	U	U
Methylene chloride	**5**	**200**	10 U	10 U	25 U	5 U	25 U	U	15	20
Toluene	**5**	**6,000**	10 U	10 U	25 U	**24** J	**24** J	U	U	U
Trichloroethene	**5**	**40**	10 U	10 U	10 U	**11**	25 U	U	U	U
m-Xylene	**5**	**NS**	NR	NR	25 U	**6.7**	25 U	NR	NR	NR
o,p-Xylene	**5**	**NS**	NR	NR	25 U	2.8 J	25 U	NR	NR	NR
Total xylenes	**5**	**NS**	NR	NR	NR	NR	NR	U	U	U

Table 5
Queens West Parcel 11
Queens, New York
Groundwater Analytical Results
Semi-Volatile Organic Compounds

Client ID Date Sampled Lab Sample ID Units Compound	NYSDEC Class GA GW AWQVs ug/L	NYSDEC Class I SW H(FC) AWQVs ug/L	MW-8 1985 1 ug/L	MW-9 1985 1 ug/L	MW-9 1989 1 ug/L	B/MW-36 1989 1 ug/L	B/MW-38 1989 1 ug/L
2,4-Dimethylphenol	**1**	**NS**	25 U	25 U	10 U	**19**	10 U
2-Methylnaphthalene	**NS**	**NS**	NR	NR	10 U	52	10 U
2-Methylphenol	**1**	**NS**	NR	NR	10 U	**20**	10 U
4-Methylphenol	**1**	**NS**	NR	NR	10 U	**57**	10 U
Acenaphthene	**20***	**NS**	10 U	10 U	10 U	**71**	10 U
Anthracene	**50***	**NS**	10 U	10 U	10 U	**71**	4.1 J
Benzo(a)anthracene	**0.002***	**NS**	10 U	10 U	10 U	**86**	**11**
Benzo(a)pyrene	**ND**	**0.0006**	10 U	10 U	10 U	**61**	**16**
Benzo(b)fluoranthene	**0.002***	**NS**	10 U	10 U	10 U	**55**	**13**
Benzo(g,h,i)perylene	**NS**	**NS**	25 U	25 U	10 U	21	11
Benzo(k)fluoranthene	**0.002***	**NS**	10 U	10 U	10 U	**46**	**12**
Bis(2-ethylhexyl)phthalate	**5**	**NS**	**460**	**110**	10 U	4.9 J	**5.4** J
Chrysene	**0.002***	**NS**	10 U	10 U	10 U	**80**	**10**
Dibenz(a,h)anthracene	**NS**	**NS**	25 U	25 U	10 U	20	5.4 J
Di-n-octylphthalate	**50***	**NS**	20	40	10 U	10 U	10 U
Fluoranthene	**50***	**NS**	10 U	10 U	4.6 J	**150**	24
Fluorene	**50***	**NS**	10 U	10 U	10 U	**81**	10 U
Indeno(1,2,3-cd)pyrene	**0.002***	**NS**	10 U	10 U	10 U	**26**	**11**
Naphthalene	**10***	**NS**	10 U	10 U	10 U	**62**	10 U
Phenanthrene	**50***	**NS**	10 U	10 U	10 U	**140**	14
Phenol	**1**	**NS**	25 U	25 U	10 U	**28**	10 U
Pyrene	**50***	**NS**	10 U	10 U	4.1 J	**150**	14
Phenol (total)*	**1**	**NS**	**470**	**460**	NA	NA	NA

Table 6
Queens West Parcel 11
Queens, New York
Groundwater Analytical Results
Metals

Client ID Date Sampled Units Compound	NYSDEC Class GA GW AWQVs ug/L	NYSDEC Class I SW H(FC) AWQVs ug/L	MW-8 1985 ug/L	MW-9 1985 ug/L	MW-9 1989 ug/L	B/MW-36 1989 ug/L	B/MW-38 1989 ug/L	MW-B13A 1994 ug/L	FIELD BLANK 1994 ug/L
Aluminum	**NS**	**NS**	NA	NA	5,250	7,140	46,300	NA	NA
Antimony	**3**	**NS**	100 U	100 U	**6.63** J	**9.24** J	**8.98** J	U	U
Arsenic	**25**	**NS**	**510**	**390**	17.1	17.5	**127**	**346**	U
Barium	**1,000**	**NS**	NA	NA	526	515	**1,430**	NA	NA
Beryllium	**3***	**NS**	**20**	**21**	2 J	2 J	**9**	**7**	U
Cadmium	**5***	**2.7***	**65**	**20**	3.25	1.3 U	2.86 J	**8**	U
Calcium	**NS**	**NS**	NA	NA	154,000	68,600	296,000	NA	NA
Chromium	**50**	**NS**	**1,675**	**415**	14	15	**108**	**273**	U
Cobalt	**NS**	**NS**	NA	NA	50 U	50 U	84	NA	NA
Copper	**200**	**NS**	**2,283**	**1,270**	101	**250**	**1,710**	**1,350**	**4,760**
Iron	**300**	**NS**	NA	NA	**64,300**	**46,700**	**14,200**	NA	NA
Lead	**25**	**NS**	**10,760**	**9,830**	**784**	**659**	**5,290**	**10,700**	12
Magnesium	**35,000***	**NS**	NA	NA	31,400	20,700	**161,000**	NA	NA
Manganese	**300**	**NS**	NA	NA	**1,320**	**8,150**	**4,380**	NA	NA
Total Mercury	**0.7**	**0.0007**	**36.4**	**28.8**	**1.8**	0.5	**17.5**	**106**	U
Nickel	**100**	**NS**	**2,229**	**482**	39 U	39 U	**117**	**301**	NA
Potassium	**NS**	**NS**	NA	NA	27,700	14,600	51,700	NA	NA
Selenium	**10**	**NS**	**255**	**137**	2 U	2 U	2 U	U	U
Silver	**50**	**NS**	**56**	26	5 U	5 U	6 J	U	U
Sodium	**20,000**	**NS**	NA	NA	**93,400**	**40,000**	**1,070,000**	NA	NA
Thallium	**0.5***	**NS**	50 U	50 U	**2.31 J**	**1 J**	**1.8 J**	U	U
Vanadium	**NS**	**NS**	NA	NA	55	48 J	359	NA	NA
Zinc	**2,000***	**NS**	**6,700**	**3,900**	828	584	**5,610**	**5,770**	98

Table 6
Queens West Parcel 11
Queens, New York
Groundwater Analytical Results
Metals

Client ID Date Sampled Units Compound	NYSDEC Class GA GW AWQVs ug/L	NYSDEC Class I SW H(FC) AWQVs ug/L	MW-8 1985 ug/L	MW-9 1985 ug/L	MW-9 1989 ug/L	B/MW-36 1989 ug/L	B/MW-38 1989 ug/L	MW-B13A 1994 ug/L	FIELD BLANK 1994 ug/L
Aluminum (dissolved)	**NS**	**NS**	NA	NA	8,989	368	1,350	NA	NA
Antimony (dissolved)	**3**	**NS**	NA	NA	5.8 U	5.8 U	5.8 U	U	NA
Arsenic (dissolved)	**25**	**NS**	NA	NA	2 U	2 U	12.2	U	NA
Barium (dissolved)	**1,000**	**NS**	NA	NA	69	89	568	NA	NA
Beryllium (dissolved)	**3***	**NS**	NA	NA	1 U	1 U	1 U	U	NA
Cadmium (dissolved)	**5***	**2.7***	NA	NA	1.3 U	1.3 U	4.1	U	NA
Calcium (dissolved)	**NS**	**NS**	NA	NA	129,000	59,800	249,000	NA	NA
Chromium (dissolved)	**50**	**NS**	NA	NA	10 U	10 U	10 U	10	NA
Cobalt (dissolved)	**NS**	**NS**	NA	NA	50 U	50 U	50 U	NA	NA
Copper (dissolved)	**200**	**NS**	NA	NA	9 J	5 U	13 J	U	NA
Iron (dissolved)	**300**	**NS**	NA	NA	**969**	219	**703**	NA	NA
Lead (dissolved)	**25**	**NS**	NA	NA	18.3	7.77	**38.3**	U	NA
Magnesium (dissolved)	**35,000***	**NS**	NA	NA	33,800	16,700	**160,000**	NA	NA
Manganese (dissolved)	**300**	**NS**	NA	NA	**975**	**7,130**	**3,000**	NA	NA
Total Mercury (dissolved)	**0.7**	**0.0007**	NA	NA	0.2 U	0.2 U	0.2 U	U	NA
Nickel (dissolved)	**100**	**NS**	NA	NA	39 U	39 U	39 U	U	NA
Potassium (dissolved)	**NS**	**NS**	NA	NA	260,000	14,300	47,500	NA	NA
Selenium (dissolved)	**10**	**NS**	NA	NA	2 U	2 U	2 U	U	NA
Silver (dissolved)	**50**	**NS**	NA	NA	5 U	5 U	6 J	U	NA
Sodium (dissolved)	**20,000**	**NS**	NA	NA	**95,400**	**31,600**	**1,080,000**	NA	NA
Thallium (dissolved)	**0.5**	**NS**	NA	NA	**2.05 J**	**1.75 J**	**2.76 J**	**35**	NA
Vanadium (dissolved)	**NS**	**NS**	NA	NA	41 J	50 U	139	NA	NA
Zinc (dissolved)	**2,000***	**NS**	NA	NA	61	72	212	U	NA

APPENDIX A

METES & BOUNDS DESCRIPTION OF PARCEL 11

METES AND BOUNDS FOR RIVER VIEW GARDENS PROPERTY

Metes and Bounds Description of the Controlled Property

ALL that certain plot, piece or parcel of land, with the buildings and improvements thereon erected, situate, lying and being in the County of Queens, City and State of New York, bounded and described as follows:

BEGINNING at a point on the southerly side of 49th Avenue (60 feet wide), distant 38.78 feet easterly from the corner formed by the intersection of the southerly side of 49th Avenue with the southeasterly side of Center Boulevard (100 feet wide);

RUNNING THENCE easterly along the southerly side of 49th Avenue, north 75 degrees 17 minutes 05 seconds east, 150.42 feet to a point;

RUNNING THENCE southerly at right angles to the southerly side of 49th Avenue, south 14 degrees 42 minutes 55 seconds east, 62.00 feet to a point;

RUNNING THENCE westerly at right angles to the last mentioned course, south 75 degrees 17 minutes 05 seconds west, 48.67 feet to a point;

RUNNING THENCE southerly at right angles to the last mentioned course, south 14 degrees 42 minutes 55 seconds east, 4.00 feet to a point;

RUNNING THENCE westerly at right angles to the last mentioned course, south 75 degrees 17 minutes 05 seconds west, 52.66 feet to a point;

RUNNING THENCE northerly at right angles to the last mentioned course, north 14 degrees 42 minutes 55 seconds west, 4.00 feet to a point;

RUNNING THENCE westerly at right angles to the last mentioned course, south 75 degrees 17 minutes 05 seconds west, 49.09 feet to a point;

RUNNING THENCE northerly at right angles to the southerly side of 49th Avenue, north 14 degrees 42 minutes 55 seconds west, 62.00 feet to the southerly side of 49th Avenue, the point or place of BEGINNING.

ALL BEING the same plot, piece or parcel of land shown on the Survey dated 8-1-00 (Survey No. 55646) by Montrose Surveying Co., LLP and shown on the Survey dated 02-20-05 (Survey No. 55646-7) by Montrose Surveying Co., LLP.

METES AND BOUNDS FOR QWDC PROPERTY

Metes and Bounds Description of the Controlled Property

ALL that certain plot, piece or parcel of land, situate, lying and being in the County of Queens, City and State of New York, bounded and described as follows:

BEGINNING at a point on the southerly side of 49th Avenue (60 feet wide) distant 550.42 feet westerly from the corner formed by the intersection of the southerly side of 49th Avenue with the westerly side of 5th Street (60 feet wide);

RUNNING THENCE South 14 degrees 42 minutes 55 seconds East, 62.00 feet to a point;

RUNNING THENCE North 75 degrees 17 minutes 05 seconds East, 49.09 feet to a point;

RUNNING THENCE South 14 degrees 42 minutes 55 seconds East, 4.00 feet to a point;

RUNNING THENCE North 75 degrees 17 minutes 05 seconds East, 52.66 feet to a point;

RUNNING THENCE North 14 degrees 42 minutes 55 seconds West, 4.00 feet to a point;

RUNNING THENCE North 75 degrees 17 minutes 05 seconds East, 48.67 feet to a point;

RUNNING THENCE South 14 degrees 42 minutes 55 seconds East, 137.99 feet to the northerly side of 50th Avenue (60 feet wide);

RUNNING THENCE South 75 degrees 17 minutes 05 seconds West, along the northerly side of 50th Avenue, 286.41 feet to a point of curvature;

RUNNING THENCE northwesterly and northerly along a curve bearing to the right having a radius of 20.00 feet an arc length of 43.32 feet to a point of tangency;

RUNNING THENCE North 19 degrees 22 minutes 59 seconds East along the easterly side of Center Boulevard (100 feet wide), 167.06 feet to a point of curvature;

RUNNING THENCE northerly along the easterly side of Center Boulevard along a curve bearing to the left having a radius of 1650.00 feet an arc length of 36.49 feet to the southerly side of 49th Avenue;

RUNNING THENCE easterly along the southerly side of 49th Avenue North 75 degrees 17 minutes 05 seconds East, 38.78 feet to the point or place of BEGINNING.

ALL BEING the same plot, piece or parcel of land shown on the Survey dated 8-1-00 (Survey No. 55646) by Montrose Surveying Co., LLP.

APPENDIX B

DEED RESTRICTION

DECLARATION of COVENANTS and RESTRICTIONS

THIS DECLARATION of Covenants and Restrictions is made as of the 6th day of March, 2008, by the Queens West Development Corporation (the "Corporation"), a subsidiary of the New York State Urban Development Corporation d/b/a Empire State Development Corporation, which is a corporate governmental agency of the State of New York constituting a public benefit corporation and a political subdivision thereof and having an office at 633 Third Avenue, New York, New York 10017.

WITNESSETH

WHEREAS, the Corporation is the owner of a parcel of property in Long Island City, New York, commonly known as a portion of Parcel 11 of the Queens West Waterfront Development Project comprised of Section 1, Block 17, part of Lots 21, 28 and 9021 on the Borough of Queens Tax Assessor's Map, as more particularly bounded and described in Appendix A annexed hereto and made a part hereof (the "Controlled Property");

WHEREAS, the Corporation has authorized the participation of Avalon Riverview I LLC (hereinafter referred to as the "Volunteer"), as the ground lessee of Block 17, part of Lots 21, 28 and 9021 in the New York State Department of Environmental Conservation's (the "Department's") Voluntary Cleanup Program with respect to Parcel 11;

WHEREAS, Parcel 11, which includes the Controlled Property, is the subject of a Voluntary Cleanup Agreement, effective May 31, 2002 (Index Number: D2-0003-00-09; Site Number V00194B), by Avalon Riverview I LLC, as the ground lessee of Parcel 11 (hereinafter referred to as the "Volunteer") and the Department (the "Voluntary Cleanup Agreement");

WHEREAS, subject to and in accordance with the Voluntary Cleanup Agreement, the Department approved the Remediation Plan for Parcel 11, dated August 1998, prepared by AKRF Engineering P.C. and attached to the Voluntary Cleanup Agreement as Exhibit B (such Plan is hereinafter referred to as the "Remediation Plan");

WHEREAS, the Remediation Plan contemplates the possibility of ongoing operation, monitoring and maintenance of engineering controls so that the selected remedy be protective of human health and the environment;

WHEREAS, the Department approved the Parcel 11 Site Management Plan dated June 2007, prepared by AKRF Engineering P.C. (said Site Management Plan, as the same may be amended and approved by the Relevant Agency, as defined below, the "Site Management Plan"); and

WHEREAS, this Declaration of Covenants and Restrictions sets forth those required restrictive covenants necessary to ensure implementation of the Site Management Plan;

NOW, THEREFORE, the Corporation, for itself and its successors and assigns, covenants and agrees as follows:

1. The Controlled Property is hereby made subject to this Declaration of Covenants and Restrictions.

2. Unless the prior written approval of the Department is first obtained or, if the Department shall no longer exist or no longer have jurisdiction with respect to the enforcement of this Declaration of Covenants and Restrictions, the prior written approval of any New York State (the "State") agency or agencies whose purpose shall be to protect the environment of the State and the health of the State's citizens (the "Relevant Agency") is first obtained:

a. The Controlled Property may be used for restricted-residential use (as defined in 6 Codes Rules and Regulations of the State of New York ("NYCRR") Section 375-1.8(g)(2)(ii)), provided the long-term engineering and institutional controls in the Site Management Plan are employed.

b. The Controlled Property may not be used for a less restrictive use than restricted-residential, i.e., residential or unrestricted (as such terms are defined in 6 NYCRR Section 375-1.8(g)(1)(i) and (2)(i)), without an amendment or termination of this Declaration of Covenants and Restrictions.

c. Vegetable gardens are prohibited on the Controlled Property, with the exception of those located entirely above the composite cover system and separated from the Residuals Management Zone by a high density polyethylene (HDPE) liner or equivalent approved by the Relevant Agency.

d. Farming is prohibited on the Controlled Property.

e. Engineering controls must be operated and maintained as specified in the Site Management Plan and may not be discontinued or modified without an amendment of the Site Management Plan (approved by the Relevant Agency) or the termination of this Declaration of Covenants and Restrictions.

f. A composite cover system consisting of the concrete covered sidewalks, clean fill cover in landscaped areas and concrete building slabs must be maintained, inspected and certified at a frequency and in a manner specified in the Site Management Plan.

g. All data and information pertinent to site management for the Controlled Property must be reported at the frequency and in a manner specified in the Site Management Plan.

h. All future activities on the Controlled Property that will disturb residual contaminated material are prohibited unless such activities are conducted in accordance with the soil management provisions in the Site Management Plan.

i. The use of the groundwater underlying the Controlled Property is prohibited without treatment rendering it safe for the intended purpose.

3. This Declaration of Covenants and Restrictions is and shall be deemed a covenant that shall run with the land and shall be binding upon all future owners of the Controlled Property. The Corporation, its successors and assigns consent to the enforcement by the Relevant Agency of the restrictive covenants set forth herein and hereby covenant not to contest the authority of the Relevant Agency to seek such enforcement.

4. Any deed conveying all or a portion of the Controlled Property shall recite that the said conveyance is subject to this Declaration of Covenants and Restrictions.

5. It shall be a condition of this Declaration of Covenants and Restrictions that any owner of the Controlled Property or Volunteer may, upon not less than thirty (30) days written notice to each of the owners of record of the Controlled Property and each of the Volunteers, petition the Relevant Agency to modify or terminate this Declaration of Covenants and Restrictions provided that such party certifies that written notice was provided to each owner of record and Volunteer and that human health and the environment will continue to be protected notwithstanding such modification or termination. If all or any portion of the Controlled Property, any improvement thereon or any interest in the Controlled Property or any improvement thereon is subjected to a condominium regime, no condominium owner may separately exercise any rights hereunder and no condominium owner shall be entitled to receive notices pursuant hereto, it being the intent of the Corporation that only the board of managers of the condominium shall be deemed an owner pursuant to the terms hereof and be entitled to notices hereunder.

6. Enforcement.

a. This Declaration of Covenants and Restrictions is enforceable in law or equity in perpetuity by the Relevant Agency against any owner of the Controlled Property and any ground lessee, by the Corporation or any subsequent owner against any ground lessee or other owner, and by any ground lessee against any owner or other ground lessee. Enforcement shall not be defeated because of any subsequent adverse possession, laches, estoppel, or waiver. It is not a defense in any action to enforce this Declaration of Covenants and Restrictions that: it is not appurtenant to an interest in real property; it is not of a character that has been recognized traditionally at common law; it imposes a negative burden; it imposes affirmative obligations upon the owner of any interest in the burdened property; the benefit does not touch or concern real property; there is no privity of estate or of contract; or it imposes an unreasonable restraint on alienation.

b. In the event that the Relevant Agency, any owner or any ground lessee becomes aware of a breach or suspected breach of the terms of this Declaration of Covenants (hereinafter the "Notifying Party"), it shall notify the parties in breach or suspected breach (collectively hereinafter, the "Breaching Parties") of the nature of the breach or suspected breach. Such notice shall be in writing and except in the case of notice by the Relevant Agency shall set forth how the Breaching Parties can cure such breach or suspected breach and give the Breaching Parties a reasonable amount of time from the date of receipt of notice in which to cure. At the expiration of such period of time to cure, or any

extensions granted by the Notifying Party, the Notifying Party shall notify the Breaching Parties of any failure to adequately cure the breach or suspected breach. The Breaching Parties shall then have a reasonable amount of time from receipt of such notice to cure. At the expiration of said second period, the Notifying Party may commence any proceedings and take any other appropriate action reasonably necessary to remedy any breach of this Declaration of Covenants and Restrictions in accordance with applicable law to require compliance with the terms of this Declaration of Covenants and Restrictions. With respect to any enforcement action brought by the Relevant Agency, the cure provisions set forth herein shall not apply, and nothing contained herein shall limit or otherwise restrict enforcement of this Declaration of Covenants and Restrictions by the Relevant Agency under applicable law.

c. The failure of the Relevant Agency, the Corporation, any subsequent owner or any ground lessee to enforce any of the terms contained herein shall not be deemed a waiver of any such term nor bar its enforcement rights in the event of a subsequent breach of or noncompliance with any of the terms of this Declaration of Covenants and Restrictions.

IN WITNESS WHEREOF, the Corporation has executed this instrument as of the day first set forth above.

QUEENS WEST DEVELOPMENT CORPORATION

By: _____

Name: Paul Januszewski
Title: President

STATE OF NEW YORK)
) ss:
COUNTY OF NEW YORK)

On the 6th day of March; in the year 2008, before me, the undersigned, personally appeared Paul Januszewski, personally known to me who, being duly sworn, did depose and say that he resides at 143 Coles St., Jersey City, NJ, 07302 and that he is the President of QUEENS WEST DEVELOPMENT CORPORATION, the corporation described in and which executed the above instrument; and that he signed his name thereto by the authority of the board of directors of said corporation.

Notary Public, State of New York

SIMON WYNN
Notary Public, State of New York
No. 02WY4792002
Qualified in New York County
Commission Expires Aug. 31, 2009

Appendix A

Metes and Bounds Description of the Controlled Property

ALL that certain plot, piece or parcel of land, situate, lying and being in the County of Queens, City and State of New York, bounded and described as follows:

BEGINNING at a point on the southerly side of 49th Avenue (60 feet wide) distant 550.42 feet westerly from the corner formed by the intersection of the southerly side of 49th Avenue with the westerly side of 5th Street (60 feet wide);

RUNNING THENCE South 14 degrees 42 minutes 55 seconds East, 62.00 feet to a point;

RUNNING THENCE North 75 degrees 17 minutes 05 seconds East, 49.09 feet to a point;

RUNNING THENCE South 14 degrees 42 minutes 55 seconds East, 4.00 feet to a point;

RUNNING THENCE North 75 degrees 17 minutes 05 seconds East, 52.66 feet to a point;

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RUNNING THENCE South 14 degrees 42 minutes 55 seconds East, 137.99 feet to the northerly side of 50th Avenue (60 feet wide);

RUNNING THENCE South 75 degrees 17 minutes 05 seconds West, along the northerly side of 50th Avenue, 286.41 feet to a point of curvature;

RUNNING THENCE northwesterly and northerly along a curve bearing to the right having a radius of 20.00 feet an arc length of 43.32 feet to a point of tangency;

RUNNING THENCE North 19 degrees 22 minutes 59 seconds East along the easterly side of Center Boulevard (100 feet wide), 167.06 feet to a point of curvature;

RUNNING THENCE northerly along the easterly side of Center Boulevard along a curve bearing to the left having a radius of 1650.00 feet an arc length of 36.49 feet to the southerly side of 49th Avenue;

RUNNING THENCE easterly along the southerly side of 49th Avenue North 75 degrees 17 minutes 05 seconds East, 38.78 feet to the point or place of BEGINNING.

ALL BEING the same plot, piece or parcel of land shown on the Survey dated 8-1-00 (Survey No. 55646) by Montrose Surveying Co., LLP.

DECLARATION of COVENANTS and RESTRICTIONS

THIS DECLARATION of Covenants and Restrictions is made as of the 7th day of March , 2008, by River View Gardens Housing Development Fund Company, Inc. ("River View HDFC"), a New York not-for profit corporation, having an office c/o the New York Foundation for Senior Citizens, Inc., 11 Park Place, 14th floor, New York, New York 10007-2801.

WITNESSETH

WHEREAS, River View HDFC is the current owner of a parcel of property in Long Island City, New York, commonly known as a portion of Parcel 11 of the Queens West Waterfront Development Project comprised of Section 1, Block 17, part of Lots 21, 28 and 9021 on the Borough of Queens Tax Assessor's Map, as more particularly bounded and described in Appendix A annexed hereto and made a part hereof (the "Controlled Property");

WHEREAS, the Queens West Development Corporation (the "Corporation"), a subsidiary of the New York State Urban Development Corporation d/b/a Empire State Development Corporation, which is a corporate governmental agency of the State of New York constituting a public benefit corporation and a political subdivision thereof and having an office at 633 Third Avenue, New York, New York 10017, holds a residuary estate in the Controlled Property that will commence on October 28, 2048;

WHEREAS, River View HDFC and the Corporation have authorized the participation of Avalon Riverview I LLC (hereinafter referred to as the "Volunteer"), as the ground lessee of Block 17, part of Lots 21, 28 and 9021 (which is also a portion of Parcel 11), in the New York State Department of Environmental Conservation's (the "Department's") Voluntary Cleanup Program with respect to Parcel 11;

WHEREAS, Parcel 11, which includes the Controlled Property, is the subject of a Voluntary Cleanup Agreement, effective May 31, 2002 (Index Number: D2-0003-00-09; Site Number V00194B), by the Volunteer and the Department (the "Voluntary Cleanup Agreement");

WHEREAS, subject to and in accordance with the Voluntary Cleanup Agreement, the Department approved the Remediation Plan for Parcel 11, dated August 1998, prepared by AKRF Engineering P.C. and attached to the Voluntary Cleanup Agreement as Exhibit B (such Plan is hereinafter referred to as the "Remediation Plan");

WHEREAS, the Remediation Plan contemplates the possibility of ongoing operation, monitoring and maintenance of engineering controls so that the selected remedy be protective of human health and the environment;

WHEREAS, the Department approved the Parcel 11 Site Management Plan dated February 2008, prepared by AKRF Engineering P.C. (said Site Management Plan, as the same may be amended and approved by the Relevant Agency, as defined below, the "Site Management Plan"); and

WHEREAS, this Declaration of Covenants and Restrictions sets forth those required restrictive covenants necessary to ensure implementation of the Site Management Plan;

NOW, THEREFORE, the River View HDFC, for itself and its successors and assigns, covenants and agrees as follows:

1. The Controlled Property is hereby made subject to this Declaration of Covenants and Restrictions.

2. Unless the prior written approval of the Department is first obtained or, if the Department shall no longer exist or no longer have jurisdiction with respect to the enforcement of this Declaration of Covenants and Restrictions, the prior written approval of any New York State (the "State") agency or agencies whose purpose shall be to protect the environment of the State and the health of the State's citizens (the "Relevant Agency") is first obtained:

   a. The Controlled Property may be used for restricted-residential use (as defined in 6 Codes Rules and Regulations of the State of New York ("NYCRR") Section 375-1.8(g)(2)(ii)), provided the long-term engineering and institutional controls in the Site Management Plan are employed.

   b. The Controlled Property may not be used for a less restrictive use than restricted-residential, i.e., residential or unrestricted (as such terms are defined in 6 NYCRR Section 375-1.8(g)(1)(i) and (2)(i)), without an amendment or termination of this Declaration of Covenants and Restrictions.

   c. Vegetable gardens are prohibited on the Controlled Property, with the exception of those located entirely above the composite cover system and separated from the Residuals Management Zone by a high density polyethylene (HDPE) liner or equivalent approved by the Relevant Agency.

   d. Farming is prohibited on the Controlled Property.

   e. Engineering controls must be operated and maintained as specified in the Site Management Plan and may not be discontinued or modified without an amendment of the Site Management Plan (approved by the Relevant Agency) or the termination of this Declaration of Covenants and Restrictions.

   f. A composite cover system consisting of the concrete covered sidewalks, clean fill cover in landscaped areas and concrete building slabs must be maintained, inspected and certified at a frequency and in a manner specified in the Site Management Plan.

   g. All data and information pertinent to site management for the Controlled Property must be reported at the frequency and in a manner specified in the Site Management Plan.

h. All future activities on the Controlled Property that will disturb residual contaminated material are prohibited unless such activities are conducted in accordance with the soil management provisions in the Site Management Plan.

i. The use of the groundwater underlying the Controlled Property is prohibited without treatment rendering it safe for the intended purpose.

3. This Declaration of Covenants and Restrictions is and shall be deemed a covenant that shall run with the land and shall be binding upon all future owners of the Controlled Property. River View HDFC, its successors and assigns consent to the enforcement by the Relevant Agency of the restrictive covenants set forth herein and hereby covenant not to contest the authority of the Relevant Agency to seek such enforcement.

4. Any deed conveying all or a portion of the Controlled Property shall recite that the said conveyance is subject to this Declaration of Covenants and Restrictions.

5. It shall be a condition of this Declaration of Covenants and Restrictions that any owner of the Controlled Property or Volunteer may, upon not less than thirty (30) days written notice to each of the owners of record of the Controlled Property and each of the Volunteers, petition the Relevant Agency to modify or terminate this Declaration of Covenants and Restrictions provided that such party certifies that written notice was provided to each owner of record and Volunteer and that human health and the environment will continue to be protected notwithstanding such modification or termination. If all or any portion of the Controlled Property, any improvement thereon or any interest in the Controlled Property or any improvement thereon is subjected to a condominium regime, no condominium owner may separately exercise any rights hereunder and no condominium owner shall be entitled to receive notices pursuant hereto, it being the intent of River View HDFC that only the board of managers of the condominium shall be deemed an owner pursuant to the terms hereof and be entitled to notices hereunder.

6. Enforcement.

a. This Declaration of Covenants and Restrictions is enforceable in law or equity in perpetuity by the Relevant Agency against any owner of the Controlled Property and any ground lessee, by the Corporation, River View HDFC or any subsequent owner against any ground lessee or other owner, and by any ground lessee against any owner or other ground lessee. Enforcement shall not be defeated because of any subsequent adverse possession, laches, estoppel, or waiver. It is not a defense in any action to enforce this Declaration of Covenants and Restrictions that: it is not appurtenant to an interest in real property; it is not of a character that has been recognized traditionally at common law; it imposes a negative burden; it imposes affirmative obligations upon the owner of any interest in the burdened property; the benefit does not touch or concern real property; there is no privity of estate or of contract; or it imposes an unreasonable restraint on alienation.

b. In the event that the Relevant Agency, any owner or any ground lessee becomes aware of a breach or suspected breach of the terms of this Declaration of

Covenants (hereinafter the "Notifying Party"), it shall notify the parties in breach or suspected breach (collectively hereinafter, the "Breaching Parties") of the nature of the breach or suspected breach. Such notice shall be in writing and except in the case of notice by the Relevant Agency shall set forth how the Breaching Parties can cure such breach or suspected breach and give the Breaching Parties a reasonable amount of time from the date of receipt of notice in which to cure. At the expiration of such period of time to cure, or any extensions granted by the Notifying Party, the Notifying Party shall notify the Breaching Parties of any failure to adequately cure the breach or suspected breach. The Breaching Parties shall then have a reasonable amount of time from receipt of such notice to cure. At the expiration of said second period, the Notifying Party may commence any proceedings and take any other appropriate action reasonably necessary to remedy any breach of this Declaration of Covenants and Restrictions in accordance with applicable law to require compliance with the terms of this Declaration of Covenants and Restrictions. With respect to any enforcement action brought by the Relevant Agency, the cure provisions set forth herein shall not apply, and nothing contained herein shall limit or otherwise restrict enforcement of this Declaration of Covenants and Restrictions by the Relevant Agency under applicable law.

c. The failure of the Relevant Agency, the Corporation, River View HFDC, any subsequent owner or any ground lessee to enforce any of the terms contained herein shall not be deemed a waiver of any such term nor bar its enforcement rights in the event of a subsequent breach of or noncompliance with any of the terms of this Declaration of Covenants and Restrictions.

IN WITNESS WHEREOF, River View HFDC has executed this instrument as of the day first set forth above.

RIVER VIEW GARDENS HOUSING
DEVELOPMENT FUND COMPANY, INC.

By: Elizabeth F. Tozer
Name: Elizabeth F. TOZER
Title: Vice President

Consented to:

QUEENS WEST DEVELOPMENT CORPORATION

By:
Name: Paul Jaruszewski
Title: President

STATE OF NEW YORK)
) ss:
COUNTY OF NEW YORK)

On the 7th day of March; in the year 2008, before me, the undersigned,

personally appeared Elizabeth F. Tozer,
(Full name)

personally known to mewho, being duly sworn, did depose and say that ~~he~~/she/~~they~~ ~~reside~~s at
11 Park Place, New York, NY 10007
(Full mailing address)

and that ~~he~~/she/~~they~~ is (~~are~~) the Vice President
(President or other officer or director or attorney in fact duly appointed)

of ~~the~~ River View Gardens Housing Development Fund Company, Inc.,
(Full legal name of corporation)
the corporation described in and which executed the above instrument; and that he/she/they

signed ~~his~~/her/~~their~~ name (~~s~~) thereto by the authority of the board of directors of said corporation.

Richard C. Singer
Notary Public, State of New York

RICHARD C. SINGER
Notary Public, State of New York
No. 02SI4620614
Qualified in Kings County
Commission Expires December 31, 2009

STATE OF NEW YORK)
) ss:
COUNTY OF NEW YORK)

On the 10th day of MARCH; in the year 2008, before me, the undersigned,

personally appeared PAUL JANUSZEWSKI,
(Full name)

personally known to mewho, being duly sworn, did depose and say that he/~~she/they~~ reside at
143 COLES ST, JERSEY CITY, NJ 07302
(Full mailing address)

and that he/~~she/they~~ is (~~are~~) the PRESIDENT
(President or other officer or director or attorney in fact duly appointed)

of the QUEENS WEST DEVELOPMENT CORPORATION,
(Full legal name of corporation)
the corporation described in and which executed the above instrument; and that he/~~she/they~~

signed his/~~her/their~~ name ~~(s)~~ thereto by the authority of the board of directors of said corporation.

Notary Public, State of New York

SIMON WYNN
Notary Public, State of New York
No. 02WY4792002
Qualified in New York County
Commission Expires Aug. 31, 2009

APPENDIX A

Metes and Bounds Description of the Controlled Property

ALL that certain plot, piece or parcel of land, with the buildings and improvements thereon erected, situate, lying and being in the County of Queens, City and State of New York, bounded and described as follows:

BEGINNING at a point on the southerly side of 49th Avenue (60 feet wide), distant 38.78 feet easterly from the corner formed by the intersection of the southerly side of 49th Avenue with the southeasterly side of Center Boulevard (100 feet wide);

RUNNING THENCE easterly along the southerly side of 49th Avenue, north 75 degrees 17 minutes 05 seconds east, 150.42 feet to a point;

RUNNING THENCE southerly at right angles to the southerly side of 49th Avenue, south 14 degrees 42 minutes 55 seconds east, 62.00 feet to a point;

RUNNING THENCE westerly at right angles to the last mentioned course, south 75 degrees 17 minutes 05 seconds west, 48.67 feet to a point;

RUNNING THENCE southerly at right angles to the last mentioned course, south 14 degrees 42 minutes 55 seconds east, 4.00 feet to a point;

RUNNING THENCE westerly at right angles to the last mentioned course, south 75 degrees 17 minutes 05 seconds west, 52.66 feet to a point;

RUNNING THENCE northerly at right angles to the last mentioned course, north 14 degrees 42 minutes 55 seconds west, 4.00 feet to a point;

RUNNING THENCE westerly at right angles to the last mentioned course, south 75 degrees 17 minutes 05 seconds west, 49.09 feet to a point;

RUNNING THENCE northerly at right angles to the southerly side of 49th Avenue, north 14 degrees 42 minutes 55 seconds west, 62.00 feet to the southerly side of 49th Avenue, the point or place of BEGINNING.

ALL BEING the same plot, piece or parcel of land shown on the Survey dated 8-1-00 (Survey No. 55646) by Montrose Surveying Co., LLP and shown on the Survey dated 02-20-05 (Survey No. 55646-7) by Montrose Surveying Co., LLP.

DECLARATION OF COVENANTS AND RESTRICTIONS

Section 1
Block 17
Part of Lots 21, 28 and 9021

County of Queens
State of New York

Record and Return to:

APPENDIX C

HEALTH AND SAFETY PLAN AND COMMUNITY AIR MONITORING PLAN

Queens West Development

Parcel 11

(Tax Block 17, Lots No. 21 & 28)

QUEENS, NEW YORK

Community Air Monitoring Plan

NYSDEC VCA Number: V00194B

AKRF Project Number: 10913

Prepared for:

AvalonBay Communities
275 Seventh Avenue
New York, New York 10001

Prepared by:

AKRF Engineering, P.C.
440 Park Avenue South, 7th Floor
New York, NY 10016
212-696-0670

MARCH 2008

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1.0 INTRODUCTION

1.1 Project Background

Parcel 11 is located in the Hunters Point section of Queens, New York. The parcel is bounded by residential/commercial properties to the east, 50th Avenue to the south, Center Boulevard to the west, and 49th Avenue to the north. The property has a total area of approximately 0.45 acres and lies at an elevation of 5 to 7.6 feet (relative to Queens Borough Datum). The East River is located roughly 400 feet west of the site.

Previous investigations of the site identified contamination in the fill material, which was encountered from the ground surface to approximately 14 feet below grade. This material was found to contain elevated levels of polycyclic aromatic hydrocarbons (PAHs) and total arsenic, copper, mercury, and/or zinc. Higher PAH concentrations and other evidence of petroleum-related contamination (e.g., odors, tar-like material) were observed in portions of the fill material near the water table (approximately 6 to 9 feet below grade). In addition, somewhat elevated levels of volatile organic compounds (VOCs) were detected in soil and groundwater in one soil boring/monitoring well located in the central portion of the site.

Development on Parcel 11 consists of a high-rise residential building on the southern portion of the site; a second residential building, containing federally-subsidized housing for the elderly, on the north side of the site; and a parking garage parking between the two residential buildings. Remediation of the site consisted of implementation of a Health and Safety Plan during deep excavation activities, and placement of all excavated soil beneath the site cover (i.e., building slabs, concrete-paved areas, and two-feet of clean fill in landscaped areas).

The Site Management Plan (SMP) for Parcel 11 includes requirements for maintenance of the site cover and provides guidance for soil disturbances related to utility repair, landscaping activities, and other renovations/repairs. This Community Air Monitoring Plan specifies air monitoring procedures to be implemented during all such soil disturbances under the site cover.

1.2 Project Purpose and Objectives

The principal purpose of the CAMP is to provide for air quality monitoring along the site perimeter during any intrusive work below the site cover required for future repairs and/or renovation activities. Monitoring during these activities will include air monitoring for particulate matter/dust and VOCs, observations for visible emissions and odors, inspection and monitoring of the contractor's work practices, and reporting to the New York State Department of Environmental Conservation (NYSDEC).

The principal objectives of the program are as follows:

- Monitor particulates, VOCs, and odors on at least periodic basis at the upwind and downwind perimeter of the site.
- Implement necessary corrective actions in the event that particulate, VOC, or odor levels exceed action levels.
- Conduct appropriate reporting to the NYSDEC.

2.0 AIR MONITORING PROCEDURES

Based upon the limited size and depth of excavations that will be required for future repairs/renovations, significant fugitive dust and/or vapors are not anticipated during these activities. Notwithstanding, the following community air monitoring procedures have been developed.

Walk-around air monitoring will be conducted along the upwind and downwind boundaries of the work zone to monitor for elevated levels of VOCs, particulate, visible dust, and odor. Results from the walk-around monitoring will be logged at least once every one to two hours. More frequent monitoring will be implemented based upon visible dust, odors, detection of VOCs or particulate at concentrations approaching or exceeding an alert level, or other conditions, as warranted.

VOC concentrations will be monitored with a Thermo 580B photoionization detector (PID) or equivalent. A Dust Trak® dust monitor or equivalent will be used to monitor particulate matter. Field equipment will be calibrated at the start of each workday in accordance with the manufacturers' requirements. Instrument readings and any instances of observable odors or visible dust will be documented in the field book. The following table presents the appropriate action levels and responses.

Alert Level	Action Level	Response Action
Green	VOCs < 3.3 ppm PM10 < 100 µg/m^3 No Visible Dust No Odors Along Perimeter	**None – continue monitoring**
Yellow	VOCs ≥ 3.3 ppm, but less than 5.0 ppm Odors Along Perimeter or Odor Complaints	1. Confirm VOC/odor source is from site emissions – if not, continue total VOC monitoring (green alert) 2. If VOCs/odors are from site emissions, then cover exposed affected soils/stockpiles with tarpaulins and/or clean fill material. Work can continue provided VOC levels remain below 5.0 ppm.
Yellow	PM10 ≥ 100 µg/m^3, but <150 µg/m^3 Visible Dust	1. Confirm particulate exceedances or visible dust are downwind of work area and are from site activities 2. If particulates are attributable to site activities, then cover exposed soils/stockpiles with tarpaulins or apply water, as appropriate. Work can continue provided PM10 levels remain below 150 µg/m^3.
Red	VOCs ≥ 5.0 ppm PM10 ≥ 150 µg/m^3	1. Apply yellow alert controls 2. If exceedance(s) not resolved, cease excavation activities and re-evaluate dust/odor control practices 3. Re-initiate activities after reaching concurrence between site personnel & NYSDEC

Notes: ppm = parts per million
µg/m^3 = micrograms per cubic meter

2.1 Equipment Operational Requirements

The air monitoring equipment must be operated by trained and qualified personnel. Personnel who perform air-monitoring functions described in this section must be experienced in the use of field air monitoring equipment, as well as the air monitoring procedures described above. There will also be appropriate staff for assessing the results of air monitoring and advising field personnel of air quality considerations.

All monitoring equipment must be calibrated on a daily basis in accordance with the manufacturer's operating instructions. A dedicated log book for each monitoring unit will be maintained that details the date, time, calibration gas, or other standard, and name of person performing the calibration.

3.0 AIR MONITORING RECORDKEEPING AND OBSERVATIONS

The qualified air monitoring technician will ensure that all air-monitoring data is logged in a dedicated log book. Field log sheets may also be utilized to record data from each of the stations and document observations as part of the walk-around air monitoring. Documentation will also include observational data that has potential for impacting results (e.g., off-site interferences, on-site public interferences, damage to instruments, site equipment problems, or weather-related interferences).

A hand-held weather meter will be used at the site to determine the wind speed, wind direction, barometric pressure, and relative humidity. These weather data will be recorded in the field log book (or on the field log sheets) at a minimum of twice per day (at the start and end of work).

The NYSDEC will be notified promptly via phone and electronic mail of any exceedance of an Action Level and of the corrective actions taken in connection with the exceedance.

4.0 DUST AND VOC CONTROLS

The information and procedures presented in this section will be used for dust and VOC control during future soil disturbance below the site cap for repairs and/or renovations. The contractor will be responsible for implementing these procedures based on the air monitoring results and required Action Levels described in Section 2.0.

4.1 Dust Controls

The primary measure of preventing exposure to dust during excavation or other soil disturbance activities will be wetting techniques. The construction manager will provide for engineering controls (wet techniques) or other techniques to control dust during work tasks that have the potential for generating dust. Dust controls involving the use of water (wetting or water spraying) will be employed at potential dust generating activity areas as follows.

- Before each task is initiated
- Continuously during the tasks to keep the soils damp
- When air monitoring results dictate the need for additional dust control

4.2 VOC and Odor Controls

Control of VOCs during excavation work or other soil disturbance activities will consist of the construction manager implementing one or more of the following methods or measures:

- Covering stockpile areas using plastic sheeting or tarpaulins
- Wetting excavation material
- Backfilling the excavation

If these measures do not adequately reduce VOC emissions or odors, then additional measures such as foaming agents, shrouding of the work area, or odor controlling mists will be considered in consultation with the NYSDEC and NYSDOH.

Queens West Development
Parcel 11

QUEENS, NEW YORK

Environmental Health and Safety Plan

NYSDEC VCA Number: V00194B

AKRF Project Number: 10913

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ATTACHMENT C — Information on West Nile Virus and St. Louis Encephalitis
ATTACHMENT D — Information on Heat Stress Monitoring
ATTACHMENT E — Incident Form
ATTACHMENT F — Emergency Hand Signals

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1.0 INTRODUCTION

Parcel 11 is located in the Hunters Point section of Queens, New York. The parcel is bounded by residential/commercial properties to the east, 50th Avenue to the south, Center Boulevard to the west, and 49th Avenue to the north. The property has a total area of approximately 0.45 acres and lies at an elevation of 5 to 7.6 feet (relative to Queens Borough Datum). The East River is located roughly 400 feet west of the site.

Previous investigations of the site identified contamination in the shallow fill material, which was encountered from the ground surface to approximately 14 feet below grade. This material was found to contain elevated levels of polycyclic aromatic hydrocarbons (PAHs) and total arsenic, copper, mercury, and/or zinc. Higher PAH concentrations and other evidence of petroleum-related contamination (e.g., odors, tar-like material) were observed in portions of the fill material near the water table (approximately 6 to 9 feet below grade). In addition, elevated levels of volatile organic compounds (VOCs) and phenolic compounds were detected at greater than 6 feet below grade in soil and groundwater in one soil boring/monitoring well located in the central portion of the site.

Development on Parcel 11 consists of a high-rise residential building on the southern portion of the site; a second residential building, containing federally-subsidized housing for the elderly, on the north side of the site; and a parking garage parking between the two residential buildings. Remediation of the site consisted of implementation of a Health and Safety Plan during deep excavation activities, and placement of all excavated soil beneath the site cover (i.e., building slabs, concrete-paved areas, and two-feet of clean fill in landscaped areas).

The Site Management Plan (SMP) for Parcel 11 includes requirements for maintenance of the site cover and provides guidance for soil disturbances related to utility repair, landscaping activities, and other renovations/repairs. This environmental Health and Safety Plan (HASP) has been developed for implementation of the Site Management Plan conducted by all personnel on-site, both AKRF employees and others. This HASP does not discuss other routine health and safety issues common to general construction/excavation, including but not limited to slips, trips, falls, shoring, and other physical hazards.

All AKRF employees are directed that all work must be performed in accordance with the Company's Generic HASP and all OSHA applicable regulations for the work activities required for the project. All project personnel are furthermore directed that they are not permitted to enter Permit Required Confined Spaces (as defined by OSHA). For issues unrelated to contaminated materials, all non-AKRF employees are to be bound by all applicable OSHA regulations as well as any more stringent requirements specified by their employer in their corporate HASP or otherwise. AKRF is not responsible for providing oversight for issues unrelated to contaminated materials for non-employees. This oversight shall be the responsibility of the employer of that worker or other official designated by that employer.

The OSHA Job Safety and Health Protection Poster must be posted prominently during field activities. Attachment A contains example of the poster to be used in the field. The actual poster must be an 11 inch by 17 inch size version of the attachment. The OSHA 300 Log of injuries and illnesses is maintained in the home office of each AKRF employee.

1.1 Scope of Work

The scope of work for the post-remediation portion of the project includes soil disturbances beneath the site cover related to utility repair, landscaping activities, and other renovations/repairs.

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General Health and Safety Issues

Identified issues related to work at this site include:

- Vapor phase volatile organic compounds migrating from the subsurface wastes/materials;
- Dissolved phase petroleum and coal tar-related contamination migrating in the groundwater; and
- Adsorbed phase petroleum residuals in the soil.
- Hazards related to heavy equipment for soil excavation.

1.2 Project Team Organization and Responsibilities

Project team responsibilities, particularly with respect to worker health and safety, are described below.

Project Manager - The project manager assumes total control over site activities and reports to upper-level management. He/she has the authority to direct response operations. Project manager responsibilities include:

- Prepares and supervises site management activities;
- Coordinates activities with excavation contractors, O&M technician, and monitoring personnel;
- Ensures that the Site Management Plan is executed and on schedule;
- Briefs the field team on their specific assignments;
- Coordinates with the site Health and Safety Officer (HSO) to ensure that health and safety requirements are met; and,
- Serves as the liaison with public officials.

Field Safety Officer (FSO) - The FSO advises the HSO and Project Manager on all aspects of health and safety on site. He/she can stop work if any operation threatens worker or public health or safety. FSO responsibilities include:

- Ensures that all necessary health and safety equipment is available on-site and that all equipment is functional;
- Periodically inspects protective clothing and equipment and ensures that they are properly stored and maintained;
- Controls entry and exit at the access control points;
- Coordinates health and safety program activities with the Project HSO;
- Confirms each team member's suitability for work based on a physician's recommendation;
- Monitors the work parties for signs of stress, such as cold exposure, heat stress, and fatigue;
- Implements the site Health and Safety Plan and conducts periodic inspections to determine if the site Health and Safety Plan is being followed.

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- Knows emergency procedures, evacuation routes, and the telephone numbers of the ambulance, local hospital, poison control center, fire department, and police department;
- Notifies, when necessary, local public emergency officials;
- Coordinates emergency medical care and advises medical personnel of potential exposures and consequences;
- Sets up decontamination lines and the decontamination solutions appropriate for the type of chemical contamination on the site; and
- Controls the decontamination of all equipment, personnel, and samples from the contaminated areas, and assures proper disposal of contaminated clothing and materials.

Field Team Leader- The field team leader advises the Project Manager on all aspects of health and safety on site. He/she can stop work if any operation threatens worker or public health or safety. The field team leader is directly responsible for the field team and the safety of site operations. Responsibilities include:

- Manages field operations;
- Executes the Work Plan and schedule;
- Enforces safety procedures;
- Coordinates with the FSO in determining protection level;
- Enforces site control;
- Documents field activities and sample collection; and
- Serves as a liaison with public officials.

Work Team - Work team responsibilities include:

- Safely completes the on-site tasks required to fulfill the Site Management Plan;
- Complies with site Health and Safety Plan; and
- Notifies FSO or supervisor of suspected unsafe conditions.

2.0 HAZARD ANALYSIS

2.1 Chemical Hazards

Potential contaminants that may be encountered while conducting deep excavation include residual volatile organic compounds (VOCs), carcinogenic polycyclic aromatic hydrocarbons (PAHs), phenolic compounds, and metals. Exposure limits and associated health hazards of some of these compounds are summarized in the following table:

Chemical	REL/PEL/STEL	Health Hazards
Benzene	REL = 0.1 ppm PEL = 1 ppm STEL = 5 ppm	Irritation eyes, skin, nose, respiratory system; dizziness; headache, nausea, staggered gait; anorexia, lassitude, dermatitis; bone marrow depression, potential occupational carcinogen.
Toluene	REL = 100 ppm PEL = 200 ppm STEL = 300 ppm	Irritation eyes, nose; lassitude, confusion, euphoria, dizziness, headache; dilated pupils, lacrimation (discharge of tears); anxiety, muscle fatigue, insomnia; paresthesia; dermatitis; liver, kidney damage.
Ethylbenzene	REL = 100 ppm PEL = 100 ppm	Irritation eyes, skin, mucous membrane; headache; dermatitis; narcosis, coma.
Xylenes	REL = 100 ppm PEL = 100 ppm	Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis
Naphthalene	REL = 10 ppm PEL = 10 ppm	Irritation eyes; headache, confusion, excitement, malaise; nausea, vomiting, abdominal pain; irritation bladder; profuse sweating; jaundice; hematuria (blood in the urine), renal shutdown; dermatitis, optical neuritis, corneal damage
Coal Tar	REL = 100 ppm PEL = 100 ppm	Irritation eyes, skin, nose; dizziness, drowsiness; dermatitis; in animals: liver, kidney damage
Phenol	REL = 5 ppm PEL = 5 ppm	Irritation eyes, nose, throat; anorexia, weight loss; lassitude (weakness, exhaustion), muscle ache, pain; dark urine; cyanosis; liver, kidney damage; skin burns; dermatitis; ochronosis; tremor, convulsions, twitching
Mercury	REL= 0.1 mg/m^3 PEL = 0.1 mg/m^3	Irritation eyes; headache, confusion, excitement, malaise; nausea, vomiting, abdominal pain; irritation bladder; profuse sweating; jaundice; hematuria (blood in the urine), renal shutdown; dermatitis, optical neuritis, corneal damage
Lead	REL = 0.1 mg/m^3 PEL = 0.05 mg/m^3	Weak, lassitude, insomnia, facial pallor, pale eye, anorexia, low weight, malnutrition, constipation, abdominal pain, colic, anemia, gingival lead line, tremors, paralysis wrists and ankles, encephalopathy, kidney disease, irritation eyes, hypotension
Particulate	PEL = 15 mg/m^3 (total) PEL = 5 mg/m^3 (respirable)	Irritation eyes, skin, throat, upper respiratory system
Comments: REL = NIOSH Recommended Exposure Limit PEL = OSHA Permissible Exposure Limit STEL = OSHA Short Term Exposure Limit		

In addition to the compounds detected on-site, some of the solvents used in decontamination of equipment are potentially hazardous to human health if they are not used properly. Material Safety Data Sheets (MSDSs) for substances that will be used on site and a select number of site contaminants are included in Attachment B.

2.2 Radiation Hazards

No radiation hazards are known or expected at the site.

2.3 Biological Hazards

2.3.1 Animals

During site operations, animals such as dogs, pigeons, sea gulls, mice, and rats may be encountered. Workers will use discretion and avoid all contact with animals. Bites and scratches from dogs can be painful and can potentially transmit rabies. Contact with rat and mice droppings may lead to contracting hantavirus. Inhalation of dried pigeon droppings may lead to psittacosis; crytococcosis and histoplasmosis are also diseases associated with exposure to dried bird droppings but these are less likely to occur in this occupational setting.

2.3.2 Insects and West Nile Virus

Insects, including bees, wasps, hornets, mosquitoes, ticks and spiders, may be present at this site. Some individuals may have a severe allergic reaction to an insect bite or sting that can result in a life threatening condition. Mosquito bites may lead to St. Louis encephalitis or West Nile encephalitis. Tick bites may lead to Lyme disease. Personnel that have been bitten or stung by an insect at the site should notify the HSO or FSO of such immediately. Information on West Nile virus and St. Louis encephalitis prevention are provided in Attachment C.

The following is a list of preventive measures:

- Apply insect repellent prior to fieldwork and or as often as needed throughout the shift;
- Wear proper protective clothing (work boots, socks and light colored pants);
- When walking in wooded areas, to the extent possible avoid contact with bushes, tall grass, or brush; and
- Field personnel who may have insect allergies (e.g., bee sting) should provide this information to the HSO or FSO prior to commencing work, and will have allergy medication on site.

The HSO or FSO will instruct the project personnel in the recognition and procedures for encountering potentially hazardous insects at the site.

2.4 Physical Hazards

2.4.1 Heat Stress

The use of Level C protective equipment, or greater, may create heat stress. Monitoring of personnel wearing personal protective clothing should commence when the ambient temperature is 72^{o}F or above. Attachment D includes information on frequency of monitoring for heat stress and assessing the risk for

heat related illness. Heat stress monitoring should be performed by the FSO, who shall be able to recognize symptoms related to heat stress.

To monitor the workers, be familiar with the following heat-related disorders and their symptoms:

Prickly Heat (Heat rash)

Painful, itchy red rash. Occurs during sweating, on skin covered by clothing.

Heat Cramps

Painful spasm of arm, leg or abdominal muscles, during or after work.

Heat Exhaustion

Headache, nausea, dizziness. Cool, clammy, moist skin. Heavy sweating. Weak, fast pulse. Shallow respiration, normal temperature.

Heat Fatigue

Weariness, irritability, loss of skill for fine or precision work. Decreased ability to concentrate. No loss of temperature control.

Heat Syncope (Heat Collapse)

Fainting while standing in a hot environment.

Heat Stroke

Headache, nausea, weakness, hot dry skin, fever, rapid strong pulse, rapid deep respirations, loss of consciousness, convulsions, coma. **This is a life threatening condition.**

Do not permit a worker to wear a semi-permeable or impermeable garment if he/she is showing signs or symptoms of heat-related illness.

Prevention of Heat Stress - Proper training and preventative measures will aid in averting loss of worker productivity and serious illness. Heat stress prevention is particularly important because once a person suffers from heat stroke or heat exhaustion, that person may be predisposed to additional heat related illness. To avoid heat stress the following steps should be taken:

- Adjust work schedules;
- Mandate work slowdowns as needed;
- Perform work during cooler hours of the day if possible or at night if adequate lighting can be provided;
- Provide shelter (air-conditioned, if possible) or shaded areas to protect personnel during rest periods; and
- Maintain worker's body fluids at normal levels. This is necessary to ensure that the cardiovascular system functions adequately. Daily fluid intake must approximately equal the amount of water lost in sweat, i.e., eight fluid ounces (0.23 liters) of water must be ingested for approximately every eight ounces (0.23 kg) of weight lost. The normal thirst mechanism is not sensitive enough to ensure that enough water will be drunk to replace lost

sweat. When heavy sweating occurs, encourage the worker to drink more. The following strategies may be useful:

- Maintain water temperature 50º to 60ºF (10º to 16.6ºC).
- Provide small disposal cups that hold about four ounces (0.1 liter).
- Have workers drink 16 ounces (0.5 liters) of fluid (preferably water or dilute drinks) before beginning work.
- Urge workers to drink a cup or two every 15 to 20 minutes, or at each monitoring break. A total of 1 to 1.6 gallons (4 to 6 liters) of fluid per day are recommended, but more may be necessary to maintain body weight.
- Train workers to recognize the symptoms of heat related illness.

2.4.2 Noise

Hearing protection must be used as necessary.

2.4.3 Slips, Trips and Fall Hazards

Care should be exercised when walking at the site, especially when carrying equipment. The presence of open excavations, surface debris, uneven surfaces, facility equipment, and soil piles contribute to tripping hazards.

2.4.4 Utilities (Electrocution and Fire Hazards)

Underground utilities, facilities, equipment, and structures will be located prior to start of any required excavation activities below the site cap, and confirmation will be obtained that all site utilities are shut off prior to the start of work. The Underground Utilities Call Center will be notified a minimum of three (3) days before any excavation. The possibility of encountering underground utilities poses fire, explosion, and electrocution hazards. Potential adverse effects of electrical hazards include burns and electrocution, which could result in death.

2.5 Task Hazard Analysis

Excavation activities are inherently dangerous. As noted above, special attention should be given to establishing the location of any underground utilities prior to excavating. Chemical exposure may occur if impacted soil is handled. Activities should be conducted using the appropriate Personal Protective Equipment (PPE) for the associated exposure, as described in Section 3.0. Care should be taken within the work zone to avoid general physical hazards as described above.

3.0 PERSONAL PROTECTION AND MONITORING

3.1 Medical Surveillance

All personnel performing site post-remediation soil disturbance activities are required to have passed a complete medical surveillance examination in accordance with 29 CFR 1910.120 (f). A physician's medical release for work will be confirmed by the FSO before an employee can begin site activities. The medical release shall consider the type of work to be performed and the required PPE. The medical examination will, at a minimum, be provided annually and upon termination of hazardous waste site work.

3.2 OSHA Training

All on-site personnel who will be actively involved in any soil disturbance activities must have completed hazardous waste operations-related training, as required by OSHA Regulations 29 CFR 1910.120. Personnel who completed this training more than 12 months prior to the start of the project must have completed an 8-hour refresher course within the past 12 months. Documentation of OSHA training for project personnel must be provided to AKRF prior to starting work. Other personnel involved in ancillary, or support activities, including transportation of material for disposal, shall have the proper training as required by Federal, State and local regulations.

3.3 Site-Specific Training

The FSO or his/her designee will conduct a health and safety meeting at the start of each site management task to train all on-site personnel about potential hazards, proper health and safety measures, and emergency response procedures. The FSO will conduct subsequent meetings any time new personnel start work on the project or as warranted by a change in conditions. The training should include the following topics:

- General requirements of this HASP;
- Review of the Scope of Work;
- Names of personnel responsible for site safety and health;
- Potential hazards and acute effects of compounds present at the site;
- Air monitoring procedures;
- Proper use of personal protective equipment;
- Safe use of engineering controls and equipment on the site; and
- Decontamination procedures.
- Work practices by which the employee can minimize risk from hazards. This may include a specific review of heavy equipment safety, safety during inclement weather, changes in common escape rendezvous point, site security measures, or other site-specific issues that need to be addressed before work begins.

3.4 Air Monitoring

The purpose of the air monitoring program is to identify any exposure of the field personnel and the public to potential environmental hazards in the soil and/or groundwater. Results of the air monitoring will be used to determine the appropriate response action, if needed.

3.4.1 Volatile Organic Compounds

A photoionization detector (PID) will be used to perform air monitoring during all activities requiring soil disturbance under the site cover to determine airborne levels of total VOCs. The PID will be calibrated daily with a 100 ppm isobutylene standard.

3.4.2 Particulates

A particulate monitor will be used to measure airborne levels of respirable particulates (less than 10 microns) during all soil disturbance activities under the

site cover. The particulate monitor will be used in accordance with the manufacturer's specifications. Particulates are of concern on their own, and also when VOCs, SVOCs, and/or metals are attached to them. The particulate monitor will be zeroed daily according to manufacturer specifications.

3.4.3 Work Zone Air Monitoring

Real time air monitoring within the work area during all soil disturbance activities will be performed with the PID and particulate monitor. Measurements will be taken prior to commencement of work and continuously during the work as outlined in the table below. Measurements will be made as close to the workers as practical and at the breathing height of the workers.

The FSO shall set up the equipment and confirm that it is working properly. His/her designee may oversee the air measurements during the day. The initial measurement for the day will be performed before the start of work and will establish the background level for that day. The final measurement for the day will be performed after the end of work. The action levels and required responses are listed in the table below.

Instrument	Action Level	Response Action
PID	Less than 10 ppm in breathing zone.	Level D or D-Modified
	Between 10 and 50 ppm	Level C
	More than 50 ppm	Stop work. Resume work when readings are less than 50 ppm.
Particulate monitor	Less than 5 mg/m^3	Level D
	Between 5 mg/m^3 and 125 mg/m^3	Level C. Apply dust suppression measures. If < 2.5 mg/m^3, resume work using Level D. Otherwise, use Level C.
	Above 125 mg/m^3	Stop work. Apply additional dust suppression measures. Resume work when less than 125 mg/m^3.

3.5 Personal Protection Equipment

The personal protection equipment required for various kinds of site investigation tasks are based on 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response, Appendix B, "General Description and Discussion of the Levels of Protection and Protective Gear."

During excavation all on-site site personnel shall wear, at a minimum, Level D personal protective equipment. There is potential non-aqueous phase liquid (NAPL) contamination on the site. When work is conducted in areas near potential NAPL contamination is present, workers shall where, at a minimum, Level D modified personal protective equipment. The protection will be based on the air monitoring described in Section 3.4.

LEVEL OF PROTECTION & PPE		UPGRADE TRIGGER
Level D (x) Steel Toe Shoes (x) Hard Hat (within 25 ft of drill rig/excavator) (x) Work Gloves	(x) Safety Glasses ( ) Face Shield (x) Ear Plugs (within 25 ft of drill rig/excavator) (x) Latex Gloves	At all times
Level D – Modified ***(in addition to Level D)*** (x) Tyvek Coveralls -or-	(x) Nitrile Gloves ( ) Overboots (x) Saranex Coveralls	If potential contact with NAPL
Level C ***(in addition to Level D – Modified)*** (x) Half-Face Respirator -or- (x) Full Face Respirator ( ) Full-Face PAPR	( ) Particulate Cartridge ( ) Organic Cartridge (x) Dual Organic/ Particulate Cartridge	If PID > 10 ppm or PM10 > 5 mg/m^3 (breathing zone)

All personal protective equipment must meet the following OSHA standards:

Type of Protection	Regulation	Source
Eye and Face	29 CFR 1910.133 29 CFR 1926.102	ANSI Z87.1-1968
Respiratory	29 CFR 1910.134 29 CFR 1926.103	ANSI Z88.1-1980
Head	29 CFR 1910.135 29 CFR 1926.100	ANSI Z89.1-1969
Foot	29 CFR 1910.136 29 CFR 1926.96	ANSI Z41.1-1967

ANSI = American National Standards Institute

Both the respirator and cartridges specified for use in Level C protection must be fit-tested prior to use in accordance with OSHA regulations (29 CFR 1910.1025; 29 CFR 1910.134).

Based on performance criteria of air purifying respirators, they cannot be worn under the following conditions:

- Oxygen deficiency;
- IDLH concentrations;
- High relative humidity; and
- If contaminant levels exceed designated use concentrations.

4.0 WORK ZONES AND DECONTAMINATION

4.1 Site Work Zones

During any activities involving subsurface disturbance or potential exposure to contaminants, the work area must be divided into various zones to prevent the spread of contamination, ensure that proper protective equipment is donned, and provide an area for decontamination.

The Exclusion Zone is defined as the area where exposure to impacted media could be encountered. The Contamination Reduction Zone (CRZ) is the area where decontamination procedures take place and is located next to the Exclusion Zone. Control measures such as signs, caution tape, temporary fencing and/or traffic cones will be placed around the perimeter of the work area when work is being conducted to prevent entrance into the Exclusion Zone and CRZ. The Support Zone is the area where support facilities such as vehicles, fire extinguisher, and first aid supplies are located. The emergency staging area (part of the Support Zone) is the area where all workers on-site would assemble in the event of an emergency. These zones will be designated by the FSO at the beginning of work, depending on that day's activities. All field personnel will be informed of the location of these zones before work begins.

4.2 Decontamination Procedures

4.2.1 Personnel Decontamination

Personnel decontamination (decon), if deemed necessary by the FSO, will take place in a designated decontamination area. This area will be delineated during each stage of work. Personnel decontamination will consist of the following steps:

- Soap and potable water wash and potable water rinse of gloves;
- Coverall removal (if applicable);
- Glove removal;
- Disposable clothing removal; and
- Field wash of hands and face.

4.2.2 Equipment Decontamination

Any non-disposable sampling equipment for confirmatory sampling or other equipment that is contact with contaminated materials will be decontaminated in accordance with the following procedure:

- Double wash with solution of Simple Green® and clean tap water;
- Double rinse with clean tap water;
- Rinse with clean distilled water; and
- Allow equipment to air dry.

4.2.3 Vehicle Decontamination

Any trucks used to haul contaminated soil off-site will be protected against contamination by properly covering and lining them with compatible material (such as polyethylene) or by decontaminating them prior to any use other than hauling hazardous/contaminated materials. All vehicles leaving the project site will be inspected to ensure that contaminated soil adhering to the wheels or undercarriage is removed prior to the vehicle leaving the site.

5.0 ACCIDENT PREVENTION

5.1 Site-Specific Training

The FSO will conduct health and safety training for all on-site personnel at the start of each site management task, as described in Section 3.3. On a day-to-day basis, individual personnel should be constantly alert for indicators of potentially hazardous situations and for signs and symptoms in themselves and others that warn of hazardous conditions and exposures. Rapid recognition of dangerous situations can avert an emergency. Before daily work assignments, a regular meeting should be held. Discussion should include:

- Tasks to be performed;
- A review of on-site hazards specific to the tasks;
- Daily weather conditions that may effect the work (e.g., heat, wind, rain);
- Time constraints (e.g., rest breaks, cartridge changes);
- Emergency procedures.

5.2 Vehicles and Heavy Equipment

Working with large motor vehicles and heavy equipment could represent a hazard during future soil disturbance activities. Injuries can result from equipment hitting or running over personnel, impacts from flying objects, or overturning of vehicles. Vehicle and heavy equipment design and operation will be in accordance with 29 CFR, Subpart O, 1926.600 through 1926.602. In particular, the following precautions will be utilized to help prevent injuries/accidents.

- Brakes, hydraulic lines, light signals, fire extinguishers, fluid levels, steering, tires, horn, and other safety devices will be checked at the beginning of each shift;
- Large construction motor vehicles will not be backed up unless:
  - The vehicle has a reverse signal alarm audible above the surrounding noise level; or
  - The vehicle is backed up only when an observer signals that it is safe to do so;
- Heavy equipment or motor vehicle cable will be kept free of all nonessential items, and all loose items will be secured;
- Large construction motor vehicles and heavy equipment will be provided with necessary safety equipment (such as seat belts, roll-over protection, emergency shut-off in case of roll-over, backup warning lights and audible alarms); and
- Blades and buckets will be lowered to the ground and parking brakes will be set before shutting off any heavy equipment or vehicles.

5.3 Spill Control Plan

All personnel must take every precaution to minimize the potential for spills during site operations. Any spill shall be reported immediately to the FSO. Spill control apparatus (sorbent materials) will be located on-site. All materials used for the clean up of spills will be containerized and labeled separately from other wastes.

6.0 EMERGENCY RESPONSE

6.1 Emergency Procedures

In the event that an emergency develops on site, the procedures delineated herein are to be immediately followed. Emergency conditions are considered to exist if:

- Any member of the field crew is involved in an accident or experiences any adverse effects or symptoms of exposure while on site; and
- A condition is discovered that suggests the existence of a situation more hazardous than anticipated.

General emergency procedures, and specific procedures for personal injury, chemical exposure and radiation exposure, are described below. In the event of an accident or emergency, an Incident Report form should be filled out and placed in the project file. An example Incident Report form is provided in Attachment E. Information on emergency hand signals is provided in Attachment F.

6.1.1 Chemical Exposure

If a member of the field crew demonstrates symptoms of chemical exposure the procedures outlined below should be followed:

- Another team member (buddy) should remove the individual from the immediate area of contamination. The buddy should communicate to the Field Team Leader (via voice and hand signals) of the chemical exposure. The Field Team Leader should contact the appropriate emergency response agency.
- Precautions should be taken to avoid exposure of other individuals to the chemical.
- If the chemical is on the individual's clothing, the chemical should be neutralized or removed if it is safe to do so.
- If the chemical has contacted the skin, the skin should be washed with copious amounts of water.
- In case of eye contact, an emergency eye wash should be used. Eyes should be washed for at least 15 minutes.
- All chemical exposure incidents must be reported in writing to the AKRF Health and Safety Officer. The FSO or Field Team Leader is responsible for completing the Incident Report Form.

6.1.2 Personal Injury

In case of personal injury at the site, the following procedures should be followed:

- Another team member (buddy) should signal the Field Team Leader that an injury has occurred.
- A field team member trained in first aid can administer treatment to an injured worker.

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- If deemed necessary, the victim should then be transported to the nearest hospital or medical center. If necessary, an ambulance should be called to transport the victim.
- The Field Team Leader or FSO is responsible for making certain that an Incident Report Form is completed. This form is to be submitted to the AKRF Health and Safety Officer. Follow-up action should be taken to correct the situation that caused the accident.
- Any incident (near miss, property damage, first aid, medical treatment, etc.) must be reported.

A first-aid kit, eye-wash, and blood-born pathogens kit will be kept on-site during the field activities.

6.1.3 Evacuation Procedures

- The Field Team Leader will initiate evacuation procedures by signaling to leave the site or containment structure;
- All personnel in the work area should evacuate the area and meet in the common designated area;
- All personnel suspected to be in or near the contract work area should be accounted for and the whereabouts or missing persons determined immediately; and
- The Field Team Leader will then give further instruction.

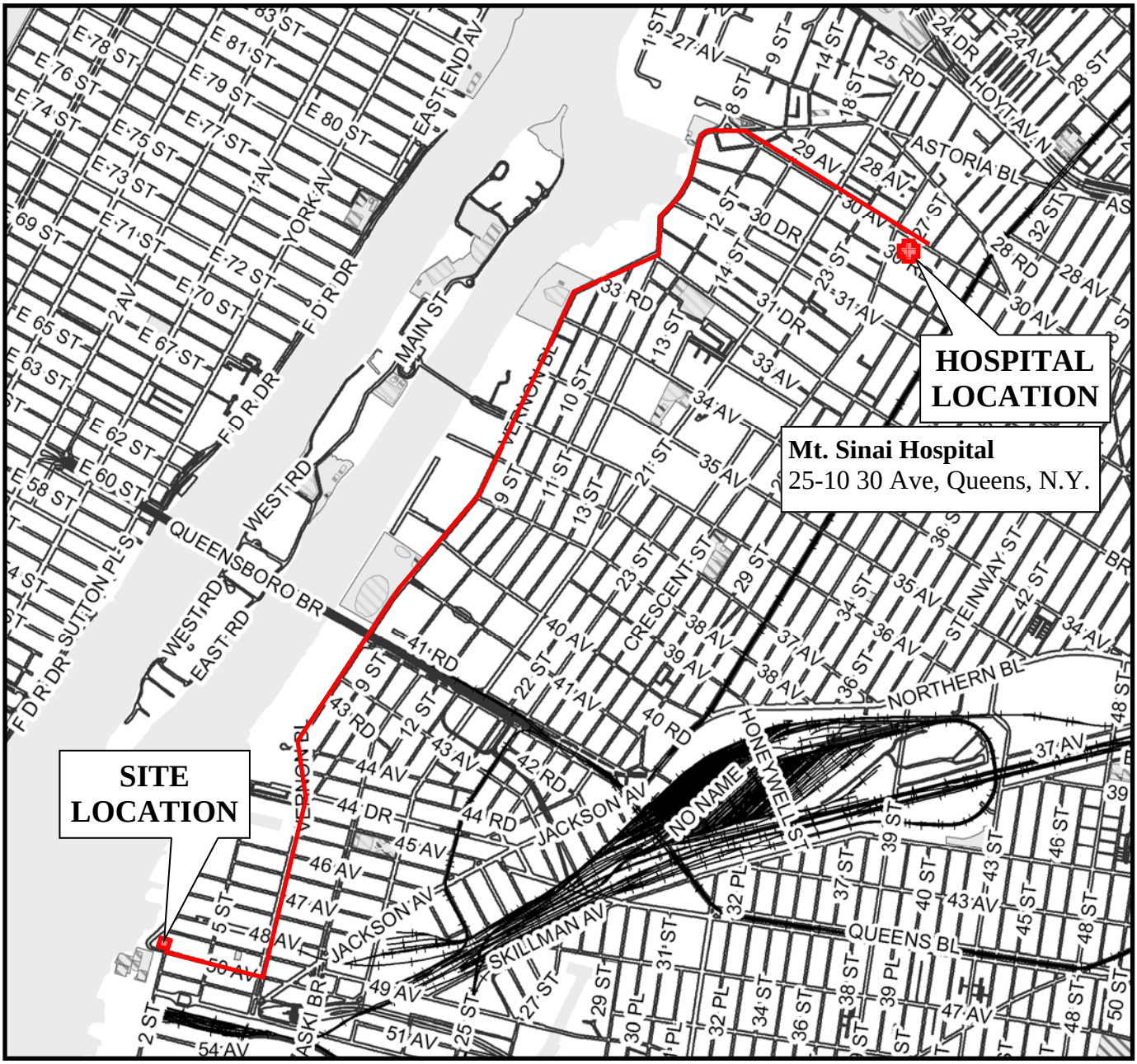
6.1.4 Procedures Implemented in the Event of a Major Fire, Explosion, or Emergency

- Notify the paramedics and/or fire department, as necessary;
- Signal the evacuation procedure previously outlined and implement the entire procedure;
- Isolate the area, and stay upwind of any fire;
- Keep the area surrounding the problem source clear after the incident occurs;
- Complete accident report for and distribute to appropriate personnel.

6.2 Hospital Directions

The address and directions to the nearest hospital to the project site are provided below:

Hospital Name:	Mt. Sinai Hospital of Queens
Phone Number:	718-932-1000
Address/Location:	25-10 30th Ave., – Long Island City, New York (30th Ave between Crescent Street and 29th Street)
Directions:	Go EAST on 50th Ave to *Vernon Blvd* LEFT onto *Vernon Blvd* RIGHT onto *30th Ave* Go past Crescent Street, the hospital will be on the right.



QUEENS WEST PARCEL 11
QUEENS, NEW YORK

HOSPITAL LOCATION MAP

AKRF
Environmental Consultants
440 Park Avenue South, New York, N.Y. 10016

DATE **02.25.08**
PROJECT No. **10913**
SCALE **AS SHOWN**
FIGURE

© 2008 AKRF, Inc. Environmental Consultants Q:\Westchester Data\AKRFData\10913 Queens West Parcel 11\SMP\SMP Appendices\Appendix C - HASP and CAMP\10913_Hosp-Route Map_Parcel 11.pub

6.3 EMERGENCY CONTACTS

Company	Individual Name	Title	Contact Number
AKRF	Marc Godick	Project Director	914-922-2356 (office) 917-991-4030 (cell)
	Becky Kinal	Project Manager	914-922-2362 (office) 914-263-8730 (cell)
AvalonBay Communities	Steve Spiro	Client Representative	212-309-1616 (office) 917-301-1325 (cell)
NYSDEC	Shaminder Singh	Project Manager	718-482-4909
	Spill Hotline		800-457-7362
NYSDOH	Dawn Hettrick		800-458-1158 ext. 27880
Ambulance, Fire Department and Police Department			911
National Response Center			800-424-8802
Poison Control Center			800-222-1222

7.0 APPROVAL AND ACKNOWLEDGEMENT OF HASP

HASP APPROVAL:

Signed:		Date:	

Project Manager

Signed:		Date:	

Field Safety Officer

Below is an affidavit that must be signed by all workers who enter the site. A copy of the HASP must be on-site at all times and will be kept by the FSO.

AFFIDAVIT

I, _____ (name), of _____ (company name), have read the Health and Safety Plan (HASP) for the Queens West Parcel 11 site. I agree to conduct all on-site work in accordance with the requirements set forth in this HASP and understand that failure to comply with this HASP could lead to my removal from the site.

Signed:		Date:	
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ATTACHMENT A

OSHA JOB SAFETY & HEALTH PROTECTION POSTER

You Have a Right to a Safe and Healthful Workplace.

IT'S THE LAW!

- You have the right to notify your employer or OSHA about workplace hazards. You may ask OSHA to keep your name confidential.
- You have the right to request an OSHA inspection if you believe that there are unsafe and unhealthful conditions in your workplace. You or your representative may participate in the inspection.
- You can file a complaint with OSHA within 30 days of discrimination by your employer for making safety and health complaints or for exercising your rights under the *OSH Act*.
- You have a right to see OSHA citations issued to your employer. Your employer must post the citations at or near the place of the alleged violation.
- Your employer must correct workplace hazards by the date indicated on the citation and must certify that these hazards have been reduced or eliminated.
- You have the right to copies of your medical records or records of your exposure to toxic and harmful substances or conditions.
- Your employer must post this notice in your workplace.



The *Occupational Safety and Health Act of 1970 (OSH Act)*, P.L. 91-596, assures safe and healthful working conditions for working men and women throughout the Nation. The Occupational Safety and Health Administration, in the U.S. Department of Labor, has the primary responsibility for administering the *OSH Act*. The rights listed here may vary depending on the particular circumstances. To file a complaint, report an emergency, or seek OSHA advice, assistance, or products, call 1-800-321-OSHA or your nearest OSHA office: • Atlanta (404) 562-2300 • Boston (617) 565-9860 • Chicago (312) 353-2220 • Dallas (214) 767-4731 • Denver (303) 844-1600 • Kansas City (816) 426-5861 • New York (212) 337-2378 • Philadelphia (215) 861-4900 • San Francisco (415) 975-4310 • Seattle (206) 553-5930. Teletypewriter (TTY) number is 1-877-889-5627. To file a complaint online or obtain more information on OSHA federal and state programs, visit OSHA's website at **www.osha.gov**. If your workplace is in a state operating under an OSHA-approved plan, your employer must post the required state equivalent of this poster.

1-800-321-OSHA
www.osha.gov

U.S. Department of Labor • Occupational Safety and Health Administration • OSHA 3165

ATTACHMENT B

MATERIAL SAFETY DATA SHEETS

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

BENZENE
CAS # 71-43-2

This fact sheet answers the most frequently asked health questions (FAQs) about benzene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Benzene is a widely used chemical formed from both natural processes and human activities. Breathing benzene can cause drowsiness, dizziness, and unconsciousness; long-term benzene exposure causes effects on the bone marrow and can cause anemia and leukemia. Benzene has been found in at least 813 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is benzene?

(Pronounced bĕn′zēn′)

Benzene is a colorless liquid with a sweet odor. It evaporates into the air very quickly and dissolves slightly in water. It is highly flammable and is formed from both natural processes and human activities.

Benzene is widely used in the United States; it ranks in the top 20 chemicals for production volume. Some industries use benzene to make other chemicals which are used to make plastics, resins, and nylon and synthetic fibers. Benzene is also used to make some types of rubbers, lubricants, dyes, detergents, drugs, and pesticides. Natural sources of benzene include volcanoes and forest fires. Benzene is also a natural part of crude oil, gasoline, and cigarette smoke.

What happens to benzene when it enters the environment?

- Industrial processes are the main source of benzene in the environment.
- Benzene can pass into the air from water and soil.
- It reacts with other chemicals in the air and breaks down within a few days.
- Benzene in the air can attach to rain or snow and be carried back down to the ground.
- It breaks down more slowly in water and soil, and can pass through the soil into underground water.
- Benzene does not build up in plants or animals.

How might I be exposed to benzene?

- Outdoor air contains low levels of benzene from tobacco smoke, automobile service stations, exhaust from motor vehicles, and industrial emissions.
- Indoor air generally contains higher levels of benzene from products that contain it such as glues, paints, furniture wax, and detergents.
- Air around hazardous waste sites or gas stations will contain higher levels of benzene.
- Leakage from underground storage tanks or from hazardous waste sites containing benzene can result in benzene contamination of well water.
- People working in industries that make or use benzene may be exposed to the highest levels of it.
- A major source of benzene exposures is tobacco smoke.

How can benzene affect my health?

Breathing very high levels of benzene can result in death, while high levels can cause drowsiness, dizziness, rapid heart rate, headaches, tremors, confusion, and unconsciousness. Eating or drinking foods containing high levels of benzene can cause vomiting, irritation of the stomach, dizziness, sleepiness, convulsions, rapid heart rate, and death.

ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html

The major effect of benzene from long-term (365 days or longer) exposure is on the blood. Benzene causes harmful effects on the bone marrow and can cause a decrease in red blood cells leading to anemia. It can also cause excessive bleeding and can affect the immune system, increasing the chance for infection.

Some women who breathed high levels of benzene for many months had irregular menstrual periods and a decrease in the size of their ovaries. It is not known whether benzene exposure affects the developing fetus in pregnant women or fertility in men.

Animal studies have shown low birth weights, delayed bone formation, and bone marrow damage when pregnant animals breathed benzene.

How likely is benzene to cause cancer?

The Department of Health and Human Services (DHHS) has determined that benzene is a known human carcinogen. Long-term exposure to high levels of benzene in the air can cause leukemia, cancer of the blood-forming organs.

Is there a medical test to show whether I've been exposed to benzene?

Several tests can show if you have been exposed to benzene. There is test for measuring benzene in the breath; this test must be done shortly after exposure. Benzene can also be measured in the blood, however, since benzene disappears rapidly from the blood, measurements are accurate only for recent exposures.

In the body, benzene is converted to products called metabolites. Certain metabolites can be measured in the urine. However, this test must be done shortly after exposure and is not a reliable indicator of how much benzene you have been exposed to, since the metabolites may be present in urine from other sources.

Has the federal government made recommendations to protect human health?

The EPA has set the maximum permissible level of benzene in drinking water at 0.005 milligrams per liter (0.005 mgL). The EPA requires that spills or accidental releases into the environment of 10 pounds or more of benzene be reported to the EPA.

The Occupational Safety and Health Administration (OSHA) has set a permissible exposure limit of 1 part of benzene per million parts of air (1 ppm) in the workplace during an 8-hour workday, 40-hour workweek.

Glossary

Anemia: A decreased ability of the blood to transport oxygen.

Carcinogen: A substance with the ability to cause cancer.

CAS: Chemical Abstracts Service.

Chromosomes: Parts of the cells responsible for the development of hereditary characteristics.

Metabolites: Breakdown products of chemicals.

Milligram (mg): One thousandth of a gram.

Pesticide: A substance that kills pests.

References

This ToxFAQs information is taken from the 1997 Toxicological Profile for Benzene (update) produced by the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services, Public Health Service in Atlanta, GA.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

TOLUENE
CAS # 108-88-3

Division of Toxicology ToxFAQs™ **February 2001**

This fact sheet answers the most frequently asked health questions (FAQs) about toluene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to toluene occurs from breathing contaminated workplace air, in automobile exhaust, some consumer products paints, paint thinners, fingernail polish, lacquers, and adhesives. Toluene affects the nervous system. Toluene has been found at 959 of the 1,591 National Priority List sites identified by the Environmental Protection Agency

What is toluene?

Toluene is a clear, colorless liquid with a distinctive smell. Toluene occurs naturally in crude oil and in the tolu tree. It is also produced in the process of making gasoline and other fuels from crude oil and making coke from coal.

Toluene is used in making paints, paint thinners, fingernail polish, lacquers, adhesives, and rubber and in some printing and leather tanning processes.

What happens to toluene when it enters the environment?

❑ Toluene enters the environment when you use materials that contain it. It can also enter surface water and groundwater from spills of solvents and petrolieum products as well as from leasking underground storage tanks at gasoline stations and other facilities.

❑ When toluene-containing products are placed in landfills or waste disposal sites, the toluene can enter the soil or water near the waste site.

❑ Toluene does not usually stay in the environment long.

❑ Toluene does not concentrate or buildup to high levels in animals.

How might I be exposed to toluene?

❑ Breathing contaminated workplace air or automobile exhaust.

❑ Working with gasoline, kerosene, heating oil, paints, and lacquers.

❑ Drinking contaminated well-water.

❑ Living near uncontrolled hazardous waste sites containing toluene products.

How can toluene affect my health?

Toluene may affect the nervous system. Low to moderate levles can cause tiredness, confusion, weakness, drunken-type actions, memory loss, nausea, loss of appetite, and

hearing and color vision loss. These symptoms usually disappear when exposure is stopped.

Inhaling High levels of toluene in a short time can make you feel light-headed, dizzy, or sleepy. It can also cause unconsciousness, and even death.

High levels of toluene may affect your kidneys.

How likely is toluene to cause cancer?

Studies in humans and animals generally indicate that toluene does not cause cancer.

The EPA has determined that the carcinogenicity of toluene can not be classified.

How can toluene affect children?

It is likely that health effects seen in children exposed to toluene will be similar to the effects seen in adults. Some studies in animals suggest that babies may be more sensitive than adults.

Breathing very high levels of toluene during pregnancy can result in children with birth defects and retard mental abilities, and growth. We do not know if toluene harms the unborn child if the mother is exposed to low levels of toluene during pregnancy.

How can families reduce the risk of exposure to toluene?

❑ Use toluene-containing products in well-ventilated areas.

❑ When not in use, toluene-containing products should be tightly covered to prevent evaporation into the air.

Is there a medical test to show whether I've been exposed to toluene?

There are tests to measure the level of toluene or its breakdown products in exhaled air, urine, and blood. To determine if you have been exposed to toluene, your urine or blood must be checked within 12 hours of exposure. Several other chemicals are also changed into the same breakdown products as toluene, so some of these tests are not specific for toluene.

Has the federal government made recommendations to protect human health?

EPA has set a limit of 1 milligram per liter of drinking water (1 mg/L).

Discharges, releases, or spills of more than 1,000 pounds of toluene must be reported to the National Response Center.

The Occupational Safety and Health Administration has set a limit of 200 parts toluene per million of workplace air (200 ppm).

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2000. Toxicological Profile for Toluene. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs™ Internet address is http://www.atsdr.cdc.gov/toxfaq.html . ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

ETHYLBENZENE
CAS # 100-41-4

Agency for Toxic Substances and Disease Registry ToxFAQs **June 1999**

This fact sheet answers the most frequently asked health questions (FAQs) about ethylbenzene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Ethylbenzene is a colorless liquid found in a number of products including gasoline and paints. Breathing very high levels can cause dizziness and throat and eye irritation. Ethylbenzene has been found in at least 731 of the 1,467 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is ethylbenzene?

(Pronounced ĕth′ əl bĕn′ zēn′)

Ethylbenzene is a colorless, flammable liquid that smells like gasoline. It is found in natural products such as coal tar and petroleum and is also found in manufactured products such as inks, insecticides, and paints.

Ethylbenzene is used primarily to make another chemical, styrene. Other uses include as a solvent, in fuels, and to make other chemicals.

What happens to ethylbenzene when it enters the environment?

- Ethylbenzene moves easily into the air from water and soil.
- It takes about 3 days for ethylbenzene to be broken down in air into other chemicals.
- Ethylbenzene may be released to water from industrial discharges or leaking underground storage tanks.
- In surface water, ethylbenzene breaks down by reacting with other chemicals found naturally in water.
- In soil, it is broken down by soil bacteria.

How might I be exposed to ethylbenzene?

- Breathing air containing ethylbenzene, particularly in areas near factories or highways.
- Drinking contaminated tap water.
- Working in an industry where ethylbenzene is used or made.
- Using products containing it, such as gasoline, carpet glues, varnishes, and paints.

How can ethylbenzene affect my health?

Limited information is available on the effects of ethylbenzene on people's health. The available information shows dizziness, throat and eye irritation, tightening of the chest, and a burning sensation in the eyes of people exposed to high levels of ethylbenzene in air.

Animals studies have shown effects on the nervous system, liver, kidneys, and eyes from breathing ethylbenzene in air.

How likely is ethylbenzene to cause cancer?

The EPA has determined that ethylbenzene is not classifiable as to human carcinogenicity.

ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html

No studies in people have shown that ethylbenzene exposure can result in cancer. Two available animal studies suggest that ethylbenzene may cause tumors.

How can ethylbenzene affect children?

Children may be exposed to ethylbenzene through inhalation of consumer products, including gasoline, paints, inks, pesticides, and carpet glue. We do not know whether children are more sensitive to the effects of ethylbenzene than adults.

It is not known whether ethylbenzene can affect the development of the human fetus. Animal studies have shown that when pregnant animals were exposed to ethylbenzene in air, their babies had an increased number of birth defects.

How can families reduce the risk of exposure to ethylbenzene?

Exposure to ethylbenzene vapors from household products and newly installed carpeting can be minimized by using adequate ventilation.

Household chemicals should be stored out of reach of children to prevent accidental poisoning. Always store household chemicals in their original containers; never store them in containers children would find attractive to eat or drink from, such as old soda bottles. Gasoline should be stored in a gasoline can with a locked cap.

Sometimes older children sniff household chemicals, including ethylbenzene, in an attempt to get high. Talk with your children about the dangers of sniffing chemicals.

Is there a medical test to show whether I've been exposed to ethylbenzene?

Ethylbenzene is found in the blood, urine, breath, and some body tissues of exposed people. The most common way to test for ethylbenzene is in the urine. This test measures substances formed by the breakdown of ethylbenzene. This test needs to be done within a few hours after exposure occurs, because the substances leave the body very quickly.

These tests can show you were exposed to ethylbenzene, but cannot predict the kind of health effects that might occur.

Has the federal government made recommendations to protect human health?

The EPA has set a maximum contaminant level of 0.7 milligrams of ethylbenzene per liter of drinking water (0.7 mg/L).

The EPA requires that spills or accidental releases into the environment of 1,000 pounds or more of ethylbenzene be reported to the EPA.

The Occupational Safety and Health Administration (OSHA) has set an occupational exposure limit of 100 parts of ethylbenzene per million parts of air (100 ppm) for an 8-hour workday, 40-hour workweek.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1999. Toxicological profile for ethylbenzene. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

XYLENE
CAS # 1330-20-7

This fact sheet answers the most frequently asked health questions (FAQs) about xylene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to xylene occurs in the workplace and when you use paint, gasoline, paint thinners and other products that contain it. People who breathe high levels may have dizziness, confusion, and a change in their sense of balance. This substance has been found in at least 658 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is xylene?

(Pronounced zī′lēn)

Xylene is a colorless, sweet-smelling liquid that catches on fire easily. It occurs naturally in petroleum and coal tar and is formed during forest fires. You can smell xylene in air at 0.08–3.7 parts of xylene per million parts of air (ppm) and begin to taste it in water at 0.53–1.8 ppm.

Chemical industries produce xylene from petroleum. It's one of the top 30 chemicals produced in the United States in terms of volume.

Xylene is used as a solvent and in the printing, rubber, and leather industries. It is also used as a cleaning agent, a thinner for paint, and in paints and varnishes. It is found in small amounts in airplane fuel and gasoline.

What happens to xylene when it enters the environment?

- Xylene has been found in waste sites and landfills when discarded as used solvent, or in varnish, paint, or paint thinners.
- It evaporates quickly from the soil and surface water into the air.
- In the air, it is broken down by sunlight into other less harmful chemicals.
- It is broken down by microorganisms in soil and water.
- Only a small amount of it builds up in fish, shellfish, plants, and animals living in xylene-contaminated water.

How might I be exposed to xylene?

- Breathing xylene in workplace air or in automobile exhaust.
- Breathing contaminated air.
- Touching gasoline, paint, paint removers, varnish, shellac, and rust preventatives that contain it.
- Breathing cigarette smoke that has small amounts of xylene in it.
- Drinking contaminated water or breathing air near waste sites and landfills that contain xylene.
- The amount of xylene in food is likely to be low.

How can xylene affect my health?

Xylene affects the brain. High levels from exposure for short periods (14 days or less) or long periods (more than 1 year) can cause headaches, lack of muscle coordination, dizziness, confusion, and changes in one's sense of balance. Exposure of

people to high levels of xylene for short periods can also cause irritation of the skin, eyes, nose, and throat; difficulty in breathing; problems with the lungs; delayed reaction time; memory difficulties; stomach discomfort; and possibly changes in the liver and kidneys. It can cause unconsciousness and even death at very high levels.

Studies of unborn animals indicate that high concentrations of xylene may cause increased numbers of deaths, and delayed growth and development. In many instances, these same concentrations also cause damage to the mothers. We do not know if xylene harms the unborn child if the mother is exposed to low levels of xylene during pregnancy.

How likely is xylene to cause cancer?

The International Agency for Research on Cancer (IARC) has determined that xylene is not classifiable as to its carcinogenicity in humans.

Human and animal studies have not shown xylene to be carcinogenic, but these studies are not conclusive and do not provide enough information to conclude that xylene does not cause cancer.

Is there a medical test to show whether I've been exposed to xylene?

Laboratory tests can detect xylene or its breakdown products in exhaled air, blood, or urine. There is a high degree of agreement between the levels of exposure to xylene and the levels of xylene breakdown products in the urine. However, a urine sample must be provided very soon after exposure ends because xylene quickly leaves the body. These tests are not routinely available at your doctor's office.

Has the federal government made recommendations to protect human health?

The EPA has set a limit of 10 ppm of xylene in drinking water.

The EPA requires that spills or accidental releases of xylenes into the environment of 1,000 pounds or more must be reported.

The Occupational Safety and Health Administration (OSHA) has set a maximum level of 100 ppm xylene in workplace air for an 8-hour workday, 40-hour workweek.

The National Institute for Occupational Safety and Health (NIOSH) and the American Conference of Governmental Industrial Hygienists (ACGIH) also recommend exposure limits of 100 ppm in workplace air.

NIOSH has recommended that 900 ppm of xylene be considered immediately dangerous to life or health. This is the exposure level of a chemical that is likely to cause permanent health problems or death.

Glossary

Evaporate: To change from a liquid into a vapor or a gas.

Carcinogenic: Having the ability to cause cancer.

CAS: Chemical Abstracts Service.

ppm: Parts per million.

Solvent: A liquid that can dissolve other substances.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1995. Toxicological profile for xylenes (update). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone:1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

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AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

NAPHTHALENE
CAS # 91-20-3

Agency for Toxic Substances and Disease Registry ToxFAQs **September 1996**

This fact sheet answers the most frequently asked health questions (FAQs) about naphthalene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to naphthalene happens mostly from breathing air contaminated from the burning of wood or fossil fuels, industrial discharges, tobacco smoke, or moth repellents. Exposure to large amounts of naphthalene may damage or destroy some of your red blood cells. Naphthalene has been found in at least 536 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is naphthalene?

(Pronounced năfʹthə-lēnʹ)

Naphthalene is a white solid that is found naturally in fossil fuels. Burning tobacco or wood produces naphthalene. It has a strong, but not unpleasant smell.

The major products made from naphthalene are moth repellents. It is also used for making dyes, resins, leather, tanning agents, and the insecticide, carbaryl.

What happens to naphthalene when it enters the environment?

- Naphthalene enters the environment from industrial uses, and from its use as a moth repellent.
- It also enters from the burning of wood or tobacco, and from accidental spills.
- Naphthalene evaporates easily.
- In air, moisture and sunlight break it down, often within 1 day.
- Naphthalene in water is destroyed by bacteria or evaporates into the air.
- Naphthalene binds weakly to soils and sediment.
- It does not accumulate in animals or fish.
- If dairy cows are exposed to naphthalene, some of it will be in their milk.
- If laying hens are exposed, some of it will be in their eggs.

How might I be exposed to naphthalene?

- Breathing low levels in outdoor air.
- Breathing air contaminated from industrial discharges or from burning wood or fossil fuels.
- Breathing air in homes or businesses where cigarettes are smoked, wood is burned, or moth repellents are used.
- Drinking water from contaminated wells.
- Touching clothing, blankets, or coverlets that are treated with naphthalene.

How can naphthalene affect my health?

Exposure to large amounts of naphthalene may damage or destroy some of your red blood cells. This could cause you to have too few red blood cells until your body replaces the destroyed cells. People, particularly children, have developed this problem after eating naphthalene-containing mothballs or deodorant blocks. Some of the symptoms of this

problem are fatigue, lack of appetite, restlessness, and pale skin. Exposure to large amounts of naphthalene may also cause nausea, vomiting, diarrhea, blood in the urine, and a yellow color to the skin.

Animals sometimes develop cloudiness in their eyes after swallowing naphthalene. It is not clear if this also develops in people.

When mice were repeatedly exposed to naphthalene vapors for 2 years, their noses and lungs became inflamed and irritated.

How likely is naphthalene to cause cancer?

The Department of Health and Human Services (DHHS), the International Agency for Research on Cancer (IARC) and the EPA have not classified naphthalene as to its human carcinogenicity.

No studies are available in people. Naphthalene has caused cancer in studies in female mice, but not in male mice or in rats of either sex.

Is there a medical test to show whether I've been exposed to naphthalene?

Tests are available that measure levels of naphthalene and its breakdown products in urine, stool, blood, or maternal milk. A small sample of your body fat can also be removed and analyzed for naphthalene. These tests are not routinely available in a doctor's office. However, a sample taken in a doctor's office can be sent to a special laboratory, if needed.

These tests cannot determine exactly how much naphthalene you were exposed to or predict whether harmful effects will occur.

Has the federal government made recommendations to protect human health?

The EPA recommends that children not drink water containing over 0.5 parts of naphthalene per million parts of water (0.5 ppm) for more than 10 days, or 0.4 ppm for longer than 7 years. Adults should not drink water with more than 1 ppm for more than 7 years. For water consumed over a lifetime, the EPA suggests it contain no more than 0.02 ppm naphthalene. The EPA requires that discharges or spills into the environment of 100 pounds or more be reported.

The Occupational Safety and Health Administration (OSHA) has set a limit of 10 parts per million (10 ppm) for the level of naphthalene in workplace air over an 8-hour workday, 40-hour workweek.

The National Institute for Occupational Safety and Health (NIOSH) considers more than 250 ppm of naphthalene in air to be immediately dangerous to life or health. This is the exposure level of a chemical that is likely to cause permanent health problems or death.

Glossary

Carcinogenicity: Ability of a substance to cause cancer.

CAS: Chemical Abstracts Service.

Insecticide: A substance that kills insects.

Sediment: Mud and debris that have settled to the bottom of a body of water.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1995. Toxicological profile for naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene (update). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Services.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

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CREOSOTE

CAS # 8021-39-4, 8001-58-9, 8007-45-2

Division of Toxicology ToxFAQs™ **September 2002**

This fact sheet answers the most frequently asked health questions (FAQs) about creosote. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Creosote is a mixture of many chemicals. Eating food or drinking water with high levels of creosote may cause burning in the mouth and throat, and stomach pain. Long-term contact with creosote has been associated with increased risk of contracting cancer. Creosote has been found in at least 46 of the 1,613 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is creosote?

Creosote is the name used for a variety of products: wood creosote, coal tar creosote, coal tar, coal tar pitch, and coal tar pitch volatiles. These products are mixtures of many chemicals created by burning of beech and other woods, coal, or from the resin of the creosote bush.

Wood creosote is a colorless to yellowish greasy liquid with a smoky odor and burned taste. Coal tar creosote is a thick, oily liquid typically amber to black in color. Coal tar and coal tar pitch are usually thick, black, or dark-brown liquids or semi-solids, with a smoky odor.

Wood creosote has been used as a disinfectant, a laxative, and a cough treatment, but has since been replaced by better medicines. Coal tar products are used in medicines to treat skin diseases such as psoriasis, and also as animal and bird repellents, insecticides, animal dips, and fungicides. Coal tar creosote is the most widely used wood preservative in the United States. Coal tar, coal tar pitch, and coal tar pitch volatiles are used for roofing, aluminum smelting, and coking.

What happens to creosote when it enters the environment?

❑ Coal tar creosote is released to water and soil mainly as a result of its use in the wood preservation industry.
❑ Components of creosote that do not dissolve in water will remain in place in a tar-like mass.
❑ Some components of coal tar creosote dissolve in water and may move through the soil to groundwater.
❑ Once in groundwater, it may take years for it to break down.
❑ Coal tar creosote can build up in plants and animals.
❑ We do not know what happens to wood creosote when it enters the environment.

How might I be exposed to creosote?

❑ Using products that contain creosote to improve skin problems such as eczema or psoriasis.
❑ Eating herbal remedies containing the leaves from the creosote bush, which are sold as dietary supplements.
❑ Working in the wood preservative, coke-producing, or asphalt industries.
❑ Using creosote-treated wood in building fences, bridges, or railroad tracks, or installing telephone poles.
❑ Living in treated-wood houses that may result in air or skin contact with creosote.
❑ Drinking water contaminated by a hazardous waste site.

How can creosote affect my health?

Eating food or drinking water contaminated with high levels of creosotes may cause a burning in the mouth and throat, and stomach pains. Taking large amounts of herbal remedies containing creosote bush leaves may cause damage to the liver or kidney.

Brief direct contact with large amounts of coal tar creosote may result in a rash or severe irritation of the skin, chemical burns of the surfaces of the eyes, convulsions and mental confusion, kidney or liver problems, unconsciousness, and even death. Longer direct skin contact with low levels of

creosote mixtures or their vapors can result in increased light sensitivity, damage to the cornea, and skin damage. Longer exposure to creosote vapors can cause irritation of the respiratory tract.

How likely is creosote to cause cancer?

Long-term exposure to low levels of creosote, especially direct contact with the skin during wood treatment or manufacture of coal tar creosote-treated products, has resulted in skin cancer and cancer of the scrotum. Cancer of the scrotum in chimney sweeps has been associated with long-term skin exposure to soot and coal tar creosotes. Animal studies have also shown skin cancer from skin exposure to coal tar products.

The International Agency for Research on Cancer (IARC) has determined that coal tar is carcinogenic to humans and that creosote is probably carcinogenic to humans. The EPA has determined that coal tar creosote is a probable human carcinogen.

How can creosote affect children?

There is no unique exposure pathway of children to creosote. Children exposed to creosote will probably experience the same health effects seen in adults exposed to creosote. Children who played on soil contaminated with creosote had more skin rashes than children who played in uncontaminated areas. We do not know whether children differ from adults in their susceptibility to health effects from creosote.

Studies in animals have shown birth defects in the young of mothers exposed to high levels of creosote during pregnancy, but we do not know whether the same effects would occur in humans. Some animal studies indicate that creosotes may cross the placenta and reach the fetus. Because chemical components (PAHs, cresol, phenols) of coal tar creosote may be stored in body fat, they may be found in breast milk and could pass to nursing infants.

How can families reduce the risk of exposure to creosote?

❑ If you live in a residential area that used to have a wood preservation facility or gas manufacturing plant nearby, wear long-sleeved shirts and long pants when working or playing outside and avoid using water contaminated with creosote.
❑ Instruct children not to come in contact with creosote-treated wood when playing on or near railroad tracks, in ditches close to utility poles, in old barns or other farm structures, or on bridges or piers.
❑ Avoid using herbal remedies containing the leaves of the creosote bush and seek alternatives to skin remedies containing creosote.
❑ If you are exposed to creosote in the workplace, make sure you do not carry the chemical home in your clothing, skin, hair, tools, or other objects from the workplace (shower before going home).

Is there a medical test to show whether I've been exposed to creosote?

There is no medical test to determine if you have been exposed to creosote. Some components of creosote mixtures can be measured in body tissues, urine, or blood after exposure to creosote. These tests cannot tell whether harmful health effects will occur. The tests are not routinely available at the doctor's office because they require special equipment.

Has the federal government made recommendations to protect human health?

The Occupational Safety and Health Administration (OSHA) has set an exposure limit of 0.2 milligrams of coal tar pitch volatiles per cubic meter of air (0.2 mg/m^3) in workplace air during an 8-hour day, 40-hour workweek.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2002. Toxicological Profile for Creosote (Update). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

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PHENOL

CAS # 108-95-2

Division of Toxicology and Environmental Medicine ToxFAQs™ **September 2006**

This fact sheet answers the most frequently asked health questions (FAQs) about phenol. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Phenol is both a manufactured chemical and a natural substance. Phenol is used as a disinfectant and is found in a number of consumer products. Skin exposure to high amounts can produce skin burns, liver damage, dark urine, irregular heart beat, and even death. Ingestion of concentrated phenol can produce internal burns. Phenol has been found in at least 595 of the 1,678 National Priority List (NPL) sites identified by the Environmental Protection Agency (EPA).

What is phenol?

Phenol is both a manufactured chemical and a natural substance. It is a colorless-to-white solid when pure. The commercial product is a liquid. Phenol has a distinct odor that is sickeningly sweet and tarry.

You can taste and smell phenol at levels lower than those that are associated with harmful effects. Phenol evaporates more slowly than water, and a moderate amount can form a solution with water. Phenol can catch fire.

Phenol is used primarily in the production of phenolic resins and in the manufacture of nylon and other synthetic fibers. It is also used in slimicides (chemicals that kill bacteria and fungi in slimes), as a disinfectant and antiseptic, and in medicinal preparations such as mouthwash and sore throat lozenges.

What happens to phenol when it enters the environment?

❏ Following small, single releases, phenol is rapidly removed from the air (generally, half is removed in less than a day).
❏ Phenol generally remains in the soil only about 2 to 5 days.
❏ Phenol can remain in water for a week or more.
❏ Larger or repeated releases of phenol can remain in the air, water, and soil for much longer periods of time.
❏ Small amounts of phenol may be found in organisms that live in contaminated water.
❏ Phenol does not build up in fish, other animals, or plants.

How might I be exposed to phenol?

❏ You may be exposed to phenol if you live near landfills or hazardous waste sites that contain phenol or near facilities manufacturing phenol.
❏ You may be exposed to very low levels in your home because it is found in a number of consumer products, including mouthwashes, gargles, and throat lozenges.
❏ You may be exposed to phenol if you undergo “chemical peels” to remove skin lesions with phenol-containing products or are treated for chronic pain or spasticity with injections of phenol.
❏ Low levels of phenol are found in some foods, including smoked summer sausage, fried chicken, mountain cheese, and some species of fish.
❏ Smoking or inhaling second hand smoke will expose you to phenol.
❏ Low levels of phenol can be present in air and drinking water.

How can phenol affect my health?

Short-term exposure to phenol in the air can cause respiratory irritation, headaches, and burning eyes. People who had skin exposure to high amounts of phenol had skin burns, liver damage, dark urine, irregular heart beat, and

some died. Ingestion of high concentrations of phenol has resulted in internal burns and death. The effects of prolonged exposure to low levels of phenol in air or of ingestion of low levels of phenol are uncertain because almost always there has been simultaneous exposure to other chemicals.

In animals, breathing air with high levels of phenol resulted in irritation of the lungs. Repeated exposures induced muscle tremors and loss of coordination. Exposure to high concentrations of phenol in the air for several weeks caused paralysis and severe injury to the heart, liver, kidneys, and lungs, and in some cases, death. Some animals that drank water with very high concentrations of phenol suffered muscle tremors and loss of coordination.

Phenol can have beneficial effects when used medically as an antiseptic or anesthetic.

How likely is phenol to cause cancer?

It is not known if phenol causes cancer in humans. Cancer developed in mice when phenol was applied to the skin several times per week for the lifetime of the animal. Phenol did not cause cancer in mice or rats that drank water containing it for 2 years. The International Agency for Research on Cancer (IARC) and the EPA have determined that phenol is not classifiable as to its carcinogenicity to humans.

How can phenol affect children?

Children are exposed to phenol in the same way adults are, except for exposures of adults at work. However, children are at greater risk of accidentally ingesting or spilling on their skin home products that contain phenol. Vomiting and lethargy were the most frequent signs of toxicity observed in children who accidentally ingested phenol and were treated at a poison control center.

Phenol has caused minor birth defects and low birth weight in animals generally at exposure levels that also were toxic to the pregnant mothers.

How can families reduce the risks of exposure to phenol?

❑ Avoiding environmental tobacco smoke, which contains phenol, will reduce phenol exposures.
❑ Always store household products and over-the-counter medications that contain phenol in their original labeled containers out of the reach of children.

Is there a medical test to determine whether I've been exposed to phenol?

There is a urine test that can tell if you have been exposed to phenol recently (within 1 or 2 days). However, the test cannot tell if you were exposed only to phenol because many substances are converted to phenol in the body. The test also cannot tell whether adverse health effects might result from the exposure. The test for phenol is not routinely performed at your doctor's office, but your doctor can take samples and send them to a testing laboratory.

Has the federal government made recommendations to protect human health?

The EPA lifetime health advisory for phenol in water is 2 milligrams per liter (2 mg/L). EPA requires that spills of 1,000 pounds or more of phenol to the environment be reported to the Agency.

The Occupational Safety and Health Administration (OSHA) has set a limit of 5 parts per million (ppm) in air to protect workers during 8-hour work shifts.

The National Institute for Occupational Safety and Health (NIOSH) recommends a limit of 5 ppm for phenol in workroom air over a 10-hour workday and that the concentration of phenol should not exceed 16 ppm during a 15-minute period.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2006. Toxicological Profile for Phenol (Draft for Public Comment). Atlanta, GA: U.S. Department of Public Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology and Environmental Medicine, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-800-232-4636, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

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POLYCYCLIC AROMATIC HYDROCARBONS (PAHs)

Agency for Toxic Substances and Disease Registry ToxFAQs **September 1996**

This fact sheet answers the most frequently asked health questions (FAQs) about polycyclic aromatic hydrocarbons (PAHs). For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to polycyclic aromatic hydrocarbons usually occurs by breathing air contaminated by wild fires or coal tar, or by eating foods that have been grilled. PAHs have been found in at least 600 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What are polycyclic aromatic hydrocarbons?

(Pronounced pŏl′ĭ-sī′klĭk ăr′ə-măt′ĭk hī′drə-kar′bənz)

Polycyclic aromatic hydrocarbons (PAHs) are a group of over 100 different chemicals that are formed during the incomplete burning of coal, oil and gas, garbage, or other organic substances like tobacco or charbroiled meat. PAHs are usually found as a mixture containing two or more of these compounds, such as soot.

Some PAHs are manufactured. These pure PAHs usually exist as colorless, white, or pale yellow-green solids. PAHs are found in coal tar, crude oil, creosote, and roofing tar, but a few are used in medicines or to make dyes, plastics, and pesticides.

What happens to PAHs when they enter the environment?

- PAHs enter the air mostly as releases from volcanoes, forest fires, burning coal, and automobile exhaust.
- PAHs can occur in air attached to dust particles.
- Some PAH particles can readily evaporate into the air from soil or surface waters.
- PAHs can break down by reacting with sunlight and other chemicals in the air, over a period of days to weeks.
- PAHs enter water through discharges from industrial and wastewater treatment plants.
- Most PAHs do not dissolve easily in water. They stick to solid particles and settle to the bottoms of lakes or rivers.
- Microorganisms can break down PAHs in soil or water after a period of weeks to months.
- In soils, PAHs are most likely to stick tightly to particles; certain PAHs move through soil to contaminate underground water.
- PAH contents of plants and animals may be much higher than PAH contents of soil or water in which they live.

How might I be exposed to PAHs?

- Breathing air containing PAHs in the workplace of coking, coal-tar, and asphalt production plants; smokehouses; and municipal trash incineration facilities.
- Breathing air containing PAHs from cigarette smoke, wood smoke, vehicle exhausts, asphalt roads, or agricultural burn smoke.
- Coming in contact with air, water, or soil near hazardous waste sites.
- Eating grilled or charred meats; contaminated cereals, flour, bread, vegetables, fruits, meats; and processed or pickled foods.
- Drinking contaminated water or cow's milk.

- Nursing infants of mothers living near hazardous waste sites may be exposed to PAHs through their mother's milk.

How can PAHs affect my health?

Mice that were fed high levels of one PAH during pregnancy had difficulty reproducing and so did their offspring. These offspring also had higher rates of birth defects and lower body weights. It is not known whether these effects occur in people.

Animal studies have also shown that PAHs can cause harmful effects on the skin, body fluids, and ability to fight disease after both short- and long-term exposure. But these effects have not been seen in people.

How likely are PAHs to cause cancer?

The Department of Health and Human Services (DHHS) has determined that some PAHs may reasonably be expected to be carcinogens.

Some people who have breathed or touched mixtures of PAHs and other chemicals for long periods of time have developed cancer. Some PAHs have caused cancer in laboratory animals when they breathed air containing them (lung cancer), ingested them in food (stomach cancer), or had them applied to their skin (skin cancer).

Is there a medical test to show whether I've been exposed to PAHs?

In the body, PAHs are changed into chemicals that can attach to substances within the body. There are special tests that can detect PAHs attached to these substances in body tissues or blood. However, these tests cannot tell whether any health effects will occur or find out the extent or source of your exposure to the PAHs. The tests aren't usually available in your doctor's office because special equipment is needed to conduct them.

Has the federal government made recommendations to protect human health?

The Occupational Safety and Health Administration (OSHA) has set a limit of 0.2 milligrams of PAHs per cubic meter of air (0.2 mg/m^3). The OSHA Permissible Exposure Limit (PEL) for mineral oil mist that contains PAHs is 5 mg/m^3 averaged over an 8-hour exposure period.

The National Institute for Occupational Safety and Health (NIOSH) recommends that the average workplace air levels for coal tar products not exceed 0.1 mg/m^3 for a 10-hour workday, within a 40-hour workweek. There are other limits for workplace exposure for things that contain PAHs, such as coal, coal tar, and mineral oil.

Glossary

Carcinogen: A substance that can cause cancer.

Ingest: Take food or drink into your body.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1995. Toxicological profile for polycyclic aromatic hydrocarbons. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

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LEAD
CAS # 7439-92-1

This fact sheet answers the most frequently asked health questions (FAQs) about lead. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to lead can happen from breathing workplace air or dust, eating contaminated foods, or drinking contaminated water. Children can be exposed from eating lead-based paint chips or playing in contaminated soil. Lead can damage the nervous system, kidneys, and reproductive system. Lead has been found in at least 1,026 of 1,467 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is lead?

(Pronounced lĕd)

Lead is a naturally occurring bluish-gray metal found in small amounts in the earth's crust. Lead can be found in all parts of our environment. Much of it comes from human activities including burning fossil fuels, mining, and manufacturing.

Lead has many different uses. It is used in the production of batteries, ammunition, metal products (solder and pipes), and devices to shield X-rays.

Because of health concerns, lead from gasoline, paints and ceramic products, caulking, and pipe solder has been dramatically reduced in recent years.

What happens to lead when it enters the environment?

- Lead itself does not break down, but lead compounds are changed by sunlight, air, and water.
- When lead is released to the air, it may travel long distances before settling to the ground.
- Once lead falls onto soil, it usually sticks to soil particles.
- Movement of lead from soil into groundwater will depend on the type of lead compound and the characteristics of the soil.
- Much of the lead in inner-city soils comes from old houses painted with lead-based paint.

How might I be exposed to lead?

- Eating food or drinking water that contains lead.
- Spending time in areas where lead-based paints have been used and are deteriorating.
- Working in a job where lead is used.
- Using health-care products or folk remedies that contain lead.
- Engaging in certain hobbies in which lead is used (for example, stained glass).

How can lead affect my health?

Lead can affect almost every organ and system in your body. The most sensitive is the central nervous system, particularly in children. Lead also damages kidneys and the reproductive system. The effects are the same whether it is breathed or swallowed.

At high levels, lead may decrease reaction time, cause weakness in fingers, wrists, or ankles, and possibly affect the memory. Lead may cause anemia, a disorder of the blood. It can also damage the male reproductive system. The connection between these effects and exposure to low levels of lead is uncertain.

How likely is lead to cause cancer?

The Department of Health and Human Services has determined that lead acetate and lead phosphate may reasonably

be anticipated to be carcinogens based on studies in animals. There is inadequate evidence to clearly determine lead's carcinogenicity in people.

How can lead affect children?

Small children can be exposed by eating lead-based paint chips, chewing on objects painted with lead-based paint, or swallowing house dust or soil that contains lead.

Children are more vulnerable to lead poisoning than adults. A child who swallows large amounts of lead may develop blood anemia, severe stomachache, muscle weakness, and brain damage. A large amount of lead might get into a child's body if the child ate small pieces of old paint that contained large amounts of lead. If a child swallows smaller amounts of lead, much less severe effects on blood and brain function may occur. Even at much lower levels of exposure, lead can affect a child's mental and physical growth.

Exposure to lead is more dangerous for young and unborn children. Unborn children can be exposed to lead through their mothers. Harmful effects include premature births, smaller babies, decreased mental ability in the infant, learning difficulties, and reduced growth in young children. These effects are more common if the mother or baby was exposed to high levels of lead.

How can families reduce the risk of exposure to lead?

Avoid exposure to sources of lead. Do not allow children to chew or mouth painted surfaces that may have been painted with lead-based paint (homes built before 1978). Run your water for 15 to 30 seconds before drinking or cooking with it. This will get rid of lead that may have leached out of pipes. Some types of paints and pigments that are used as make-up or hair coloring contain lead. Keep these kinds of products away from children. Wash children's hands and faces often to remove lead dusts and soil, and regularly clean the house of dust and tracked in soil.

Is there a medical test to show whether I've been exposed to lead?

A blood test is available to measure the amount of lead in your blood and to estimate the amount of your exposure to lead. Blood tests are commonly used to screen children for lead poisoning. Lead in teeth and bones can be measured with X-rays, but this test is not as readily available. Medical treatment may be necessary in children if the lead concentration in blood is higher than 45 micrograms per deciliter (45 µg/dL).

Has the federal government made recommendations to protect human health?

The Centers for Disease Control and Prevention (CDC) recommends that children ages 1 and 2 be screened for lead poisoning. Children who are 3 to 6 years old should be tested for lead if they have never been tested for lead before and if they receive services from public assistance programs; if they live in or regularly visit a building built before 1950; if they live in or visit a home built before 1978 that is being remodeled; or if they have a brother, sister, or playmate who has had lead poisoning. CDC considers children to have an elevated level of lead if the amount in the blood is 10 µg/dL.

The EPA requires lead in air not to exceed 1.5 micrograms per cubic meter (1.5 $\mu g/m^3$) averaged over 3 months. EPA limits lead in drinking water to 15 µg per liter.

The Occupational Health and Safety Administration (OSHA) develops regulations for workers exposed to lead. The Clean Air Act Amendments of 1990 banned the sale of leaded gasoline. The Federal Hazardous Substance Act bans children's products that contain hazardous amounts of lead.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1999. Toxicological profile for lead. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

MERCURY
CAS # 7439-97-6

Agency for Toxic Substances and Disease Registry ToxFAQs **April 1999**

This fact sheet answers the most frequently asked health questions (FAQs) about mercury. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to mercury occurs from breathing contaminated air, ingesting contaminated water and food, and having dental and medical treatments. Mercury, at high levels, may damage the brain, kidneys, and developing fetus. This chemical has been found in at least 714 of 1,467 National Priorities List sites identified by the Environmental Protection Agency.

What is mercury?

(Pronounced mŭr′kyə-rē)

Mercury is a naturally occurring metal which has several forms. The metallic mercury is a shiny, silver-white, odorless liquid. If heated, it is a colorless, odorless gas.

Mercury combines with other elements, such as chlorine, sulfur, or oxygen, to form inorganic mercury compounds or "salts," which are usually white powders or crystals. Mercury also combines with carbon to make organic mercury compounds. The most common one, methylmercury, is produced mainly by microscopic organisms in the water and soil. More mercury in the environment can increase the amounts of methylmercury that these small organisms make.

Metallic mercury is used to produce chlorine gas and caustic soda, and is also used in thermometers, dental fillings, and batteries. Mercury salts are sometimes used in skin lightening creams and as antiseptic creams and ointments.

What happens to mercury when it enters the environment?

- Inorganic mercury (metallic mercury and inorganic mercury compounds) enters the air from mining ore deposits, burning coal and waste, and from manufacturing plants.
- It enters the water or soil from natural deposits, disposal of wastes, and volcanic activity.
- Methylmercury may be formed in water and soil by small organisms called bacteria.
- Methylmercury builds up in the tissues of fish. Larger and older fish tend to have the highest levels of mercury.

How might I be exposed to mercury?

- Eating fish or shellfish contaminated with methylmercury.
- Breathing vapors in air from spills, incinerators, and industries that burn mercury-containing fuels.
- Release of mercury from dental work and medical treatments.
- Breathing contaminated workplace air or skin contact during use in the workplace (dental, health services, chemical, and other industries that use mercury).
- Practicing rituals that include mercury.

How can mercury affect my health?

The nervous system is very sensitive to all forms of mercury. Methylmercury and metallic mercury vapors are more harmful than other forms, because more mercury in these forms reaches the brain. Exposure to high levels of metallic, inorganic, or organic mercury can permanently damage the brain, kidneys, and developing fetus. Effects on brain functioning may result in irritability, shyness, tremors, changes in vision or hearing, and memory problems.

Short-term exposure to high levels of metallic mercury vapors may cause effects including lung damage, nausea,

vomiting, diarrhea, increases in blood pressure or heart rate, skin rashes, and eye irritation.

How likely is mercury to cause cancer?

There are inadequate human cancer data available for all forms of mercury. Mercuric chloride has caused increases in several types of tumors in rats and mice, and methylmercury has caused kidney tumors in male mice. The EPA has determined that mercuric chloride and methylmercury are possible human carcinogens.

How can mercury affect children?

Very young children are more sensitive to mercury than adults. Mercury in the mother's body passes to the fetus and may accumulate there. It can also can pass to a nursing infant through breast milk. However, the benefits of breast feeding may be greater than the possible adverse effects of mercury in breast milk.

Mercury's harmful effects that may be passed from the mother to the fetus include brain damage, mental retardation, incoordination, blindness, seizures, and inability to speak. Children poisoned by mercury may develop problems of their nervous and digestive systems, and kidney damage.

How can families reduce the risk of exposure to mercury?

Carefully handle and dispose of products that contain mercury, such as thermometers or fluorescent light bulbs. Do not vacuum up spilled mercury, because it will vaporize and increase exposure. If a large amount of mercury has been spilled, contact your health department. Teach children not to play with shiny, silver liquids.

Properly dispose of older medicines that contain mercury. Keep all mercury-containing medicines away from children.

Pregnant women and children should keep away from rooms where liquid mercury has been used.

Learn about wildlife and fish advisories in your area from your public health or natural resources department.

Is there a medical test to show whether I've been exposed to mercury?

Tests are available to measure mercury levels in the body. Blood or urine samples are used to test for exposure to metallic mercury and to inorganic forms of mercury. Mercury in whole blood or in scalp hair is measured to determine exposure to methylmercury. Your doctor can take samples and send them to a testing laboratory.

Has the federal government made recommendations to protect human health?

The EPA has set a limit of 2 parts of mercury per billion parts of drinking water (2 ppb).

The Food and Drug Administration (FDA) has set a maximum permissible level of 1 part of methylmercury in a million parts of seafood (1 ppm).

The Occupational Safety and Health Administration (OSHA) has set limits of 0.1 milligram of organic mercury per cubic meter of workplace air (0.1 mg/m^3) and 0.05 mg/m^3 of metallic mercury vapor for 8-hour shifts and 40-hour work weeks.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1999. Toxicological profile for mercury. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

ATTACHMENT C

INFORMATION ON WEST NILE VIRUS AND ST. LOUIS ENCEPHALITIS PREVENTION

WEST NILE VIRUS/ ST. LOUIS ENCEPHALITIS PREVENTION

"AVOID MOSQUITO BITES TO AVOID INFECTION"

TO REDUCE THE CHANCE OF MOSQUITO CONTACT:

- Stay indoors at dawn, dusk, and in the early evening.
- Wear long-sleeved shirts and long pants whenever you are outdoors.
- Spray clothing with repellents containing permethrin or DEET since mosquitoes may bite through thin clothing.
- Apply insect repellent sparingly to exposed skin. An effective repellent will contain 35% DEET (N,N-diethyl-meta-toluamide). DEET in high concentrations (greater than 35%) provides no additional protection.
- Repellents may irritate the eyes and mouth, so avoid applying repellent to the hands of children.
- Whenever you use an insecticide or insect repellent, be sure to read and follow the manufacturer's DIRECTIONS FOR USE, as printed on the product.

Note: Vitamin B and "ultrasonic" devices are NOT effective in preventing mosquito bites.

SYMPTOMS OF WEST NILE VIRUS

Most infections are mild, and symptoms include fever, headache, and body aches, occasionally with skin rash and swollen lymph glands. More severe infection may be marked by headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, paralysis, and, rarely, death.

SYMPTOMS OF ST. LOUIS ENCEPHALITIS

Mild infections occur without apparent symptoms other than fever with headache. More sever infection is marked by headache, high fever, neck stiffness, stupor, disorientation , coma, tremors, occasional convulsions (especially infants) and spastic (but rarely flaccid) paralysis.

Information provided by the CDC Division of Vector-Borne Infectious Diseases. For additional information go to the Center for Disease Control and Prevention's website located at: http://www.cdc.gov/ or the New York City Department of Health's website located at: http://nycdoh.com/

ATTACHMENT D

INFORMATION ON HEAT STRESS MONITORING

Information on Heat Stress Monitoring

To monitor worker a worker for heat stress, measure:

- **Heart rate.** Count the radial pulse during a 30-second period as early as possible in the rest period.
- If the heart rate exceeds 100 beats per minute at the beginning of the rest period, shorten the next work cycle by one-third and keep the rest period the same.
- If the heart rate still exceeds 100 beats per minute at the next rest period, shorten the following work cycle by one-third. A worker cannot return to work after a rest period until their heart rate is below 100 beats per minute.
- **Oral temperature.** Use a clinical thermometer (3 minutes under the tongue) or similar device to measure the oral temperature at the end of the work period (before drinking).
- If oral temperature exceeds 99.6°F (37.6°C), shorten the next work cycle by one-third without changing the rest period. A worker cannot return to work after a rest period until their oral temperature is below 99.6°F.
- If oral temperature still exceeds 99.6°F (37.6°C) at the beginning of the next rest period, shorten the following cycle by one-third.
- Do <u>not</u> permit a worker to wear a semi-permeable or impermeable garment when oral temperature exceeds 100.6°F (38.1°C).

Determine the frequency of monitoring based on the following table:

Adjusted Temperature[b]	**Normal Work Ensemble[c]**	**Impermeable Ensemble**
90°F or above (32.2°C) or above	After each 45 min. of work	After each 15 min. of work
87.5°F (30.8°-32.2°C)	After each 60 min. of work	After each 30 min. of work
82.5°-87.5°F (28.1°-30.8°C)	After each 90 min. of work	After each 60 min. of work
77.5°-82.5°F (25.3°-28.1°C)	After each 120 min. of work	After each 90 min. of work
72.5°-77.5°F (22.5°-25.3°C)	After each 150 min. of work	After each 120 min. of work

a For work levels of 250 kilocalories/hour.

b Calculate the adjusted air temperature (ta adj) by using this equation: ta adj °F = ta °F + (13 x % sunshine). Measure air temperature (ta) with a standard mercury-in-glass thermometer, with the bulb shielded from radiant heat. Estimate percent sunshine by judging what percent time the sun is not covered by clouds that are thick enough to produce a shadow. (100 percent sunshine = no cloud cover and a sharp, distinct shadow; 0 percent sunshine = no shadows.)

c A normal work ensemble consists of cotton coveralls or other cotton clothing with long sleeves and pants.

ATTACHMENT E

INCIDENT REPORT FORM

INCIDENT REPORT FORM

Date of Report: _____

Injured: _____

Employer: _____

Site: _____ Site Location: _____

Report Prepared By: _____ _____
Signature Title

ACCIDENT/INCIDENT CATEGORY (check all that applies)

____ Injury	____ Illness	____ Near Miss
____ Property Damage	____ Fire	____ Chemical Exposure
____ On-site Equipment	____ Motor Vehicle	____ Electrical
____ Mechanical	____ Spill	___ Other

DATE AND TIME OF ACCIDENT/INCIDENT: Narrative report of Accident/Incident: Identify: 1) actions leading to or contributing to the accident/incident; 2) the accident/incident occurrence; and 3) actions following the accident/incident.

_____

_____

_____

_____

_____

_____

WITNESS TO ACCIDENT/INCIDENT:

Name _____ Company: _____

Address: _____

Phone No.: _____

Name _____ Company: _____

Address: _____

Phone No.: _____

INJURED - ILL:

Name _____ SSN: _____

Address: _____ Age: _____

_____ _____

Length of Service: _____ Time on Present Job: _____

Time/Classification: _____

SEVERITY OF INJURY OR ILLNESS:

____ Disabling	____ Non-disabling	____ Fatality
____ Medical Treatment	____ First Aid Only	

ESTIMATED NUMBER OF DAYS AWAY FROM JOB: _____

NATURE OF INJURY OR ILLNESS: _____

_____

_____

_____

CLASSIFICATION OF INJURY:

____ Abrasions	____ Dislocations	____ Punctures
____ Bites	____ Faint/Dizziness	____ Radiation Burns
____ Blisters	____ Fractures	____ Respiratory Allergy
____ Bruises	____ Frostbite	____ Sprains
____ Chemical Burns	____ Heat Burns	____ Toxic Resp. Exposure
____ Cold Exposure	____ Heat Exhaustion	____ Toxic Ingestion
____ Concussion	____ Heat Stroke	____ Dermal Allergy
____ Lacerations		

Part of Body Affected: _____

Degree of Disability: _____

Date Medical Care was Received: _____

Where Medical Care was Received: _____

Address (if off-site): _____

(If two or more injuries, record on separate sheets)

PROPERTY DAMAGE:

Description of Damage: _____

Cost of Damage: $

ACCIDENT/INCIDENT LOCATION:

ACCIDENT/INCIDENT ANALYSIS: Causative agent most directly related to accident/incident (Object, substance, material, machinery, equipment, conditions)

Was weather a factor?:

Unsafe mechanical/physical/environmental condition at time of accident/incident (Be specific):

Personal factors (Attitude, knowledge or skill, reaction time, fatigue):

ON-SITE ACCIDENTS/INCIDENTS:

Level of personal protection equipment required in Site Safety Plan:

Modifications:

Was injured using required equipment?:

If not, how did actual equipment use differ from plan?:

ACTION TAKEN TO PREVENT RECURRENCE: (Be specific. What has or will be done? When will it be done? Who is the responsible party to insure that the correction is made?

ACCIDENT/INCIDENT REPORT REVIEWED BY:

FSO Name Printed

FSO Signature

OTHERS PARTICIPATING IN INVESTIGATION:

Signature

Title

Signature

Title

Signature

Title

ACCIDENT/INCIDENT FOLLOW-UP: Date: _____

Outcome of accident/incident: _____

_____

_____

_____

Physician's recommendations: _____

_____

_____

_____

Date injured returned to work: _____

Follow-up performed by:

_____ _____

Signature Title

ATTACH ANY ADDITIONAL INFORMATION TO THIS FORM

ATTACHMENT F

EMERGENCY HAND SIGNALS

EMERGENCY SIGNALS

In most cases, field personnel will carry portable radios for communication. If this is the case, a transmission that indicates an emergency will take priority over all other transmissions. All other site radios will yield the frequency to the emergency transmissions.

Where radio communications is not available, the following air-horn and/or hand signals will be used:

EMERGENCY HAND SIGNALS

OUT OF AIR, CAN'T BREATH!



Hand gripping throat

LEAVE AREA IMMEDIATELY, NO DEBATE!

(No Picture) Grip partner's wrist or place both hands around waist

NEED ASSISTANCE!



Hands on top of head

OKAY! – I'M ALL RIGHT!

- I UNDERSTAND!



Thumbs up

NO! - NEGATIVE!



Thumbs down

APPENDIX D

DATABASE DESCRIPTION OF PARCEL 11

APPENDIX D

ELECTRONIC DATABASE INFORMATION
Queens West Parcel 11

1. Location of the site:

   The Site is identified as Block 17 and Lots 21, 28 and 9021 on the Borough of Queens Tax Map. Addresses applicable to the property may include: 4-02 to 4-12 49th Avenue; 2-01 to 2-07 50th Avenue; and 49-11 Center Boulevard. The address for the Avalon Riverview building is 2-01 50th Avenue; the address for the Riverview Gardens building is 4-12 49th Avenue.

2. A. Current site owner: Queens West Development Corporation and River View HDFC, Inc.

   B. Party implementing the Site Management Plan: AvalonBay Communities, Inc. and River View HDFC, Inc.

3. Site summary:

   The Parcel 11 Site is an approximately 1.16-acre property located on the northeastern corner of Center Boulevard and 50th Avenue, in Long Island City, Queens, New York. The Site is currently divided into two parcels: the southern and western portions of the Site are occupied by Avalon Riverview, a residential apartment complex containing a high rise apartment building, parking garage, and ground level retail; the northeastern portion of the Site is occupied by River View Gardens, a federally-subsidized senior housing complex.

4. Current status of remedial activity:

   Queens West Parcel 11 was remediated in accordance with the NYSDEC-approved Remediation Work Plan under Voluntary Cleanup Agreement (VCA) Index #D2-0003-00-09, Site #V00194B. Remedial action work on the Parcel 11 Site began in December 2001, with the groundbreaking for the high-rise building, and was completed in late 2005, with completion of the senior housing complex. A Site Management Plan (SMP) was prepared to manage residual contamination on Parcel 11 in perpetuity or until extinguishment of the Deed Restriction.

5. Contact name and phone number of persons knowledgeable about the Deed Restriction requirements:

   Simon Wyn, Esq.
   Senior Counsel for Empire State Development Corporation

   and

   Richard C. Singer, Esq.
   Hirschen Singer & Epstein, LLP
   Counsel to River View HDFC, Inc.

APPENDIX E

MONITORING AND INSPECTION LOGS

SITE CAP INSPECTION FORM
QUEENS WEST PARCEL 11
50th AVE. AND CENTER BLVD., LONG ISLAND CITY, NEW YORK

Inspector:

Date:

1. Courtyard/landscaped areas:

Adequate top soil cover present?

Signs of erosion?

Recommended corrective action:

2. Outdoor paving/sidewalks:

Note any signs of cracking or other damage:

Note any areas where greater than 25% of surface is cracked/damaged:

Recommended corrective action:

3. Lower level garage slab:

Note any signs of cracking or other damage:

Note any areas where greater than 25% of surface is cracked/damaged:

Recommended corrective action:

Comments (attach photos/sketches to illustrate any damage noted):

SITE WIDE INSPECTION FORM
QUEENS WEST PARCEL 11
50th AVE. AND CENTER BLVD., LONG ISLAND CITY, NEW YORK

Inspector: _____

Date: _____

1. Site Use Restrictions

No on-site vegetable gardens?

No groundwater withdrawal for potable/non-potable use?

Restricted residential maintained (single owner, or common ownership)?

2. Site Cap

Note the date that the annual site cap inspection was performed:

Repairs made as noted during inspection?

3. Soil Management

Note the date(s) of any soil disturbance activities conducted during the past year:

Proper soil management procedures implemented (cite appropriate close out reports)?

8. Recordkeeping

Check that the following records/reports are being maintained/completed (note report/log dates as appropriate):

1) Annual site cap inspection log

2) Close-out report(s) for soil disburbance activities (including manifests for soil disposal)

9. Comments

(Note any deficiencies and recommendations for corrective actions.)

ENCLOSURE 1
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
INSTITUTIONAL AND ENGINEERING CONTROLS CERTIFICATION FORM

SITE DETAILS

SITE NO.	**V00194B**
SITE NAME:	**Queens West Parcel 11**
SITE ADDRESS:	20-01 50th Street
ZIP CODE:	11101
CITY/TOWN:	Long Island City
COUNTY:	New York
CURRENT USE:	Residential

CURRENT CERTIFICATION FREQUENCY: EVERY 1 YEAR(S)

VERIFICATION OF SITE DETAILS

		YES	NO
1.	Are the SITE DETAILS above, correct?	☐	☐
	If NO, are changes handwritten above or included on a separate sheet?	☐	
2.	Has some or all of the site property been sold, subdivided, merged, or undergone a tax map amendment since the initial/last certification?	☐	☐
	If YES, is documentation or evidence that documentation has been previously submitted included with this certification?	☐	
3.	Have any federal, state, and/or local permits (e.g., building, discharge) been issued for or at the property since the initial/last certification?	☐	☐
	If YES, is documentation or evidence that documentation has been previously submitted included with this certification?	☐	
4.	Has a change of use occurred since the initial/last certification?	☐	☐
	If YES, is documentation or evidence that documentation has been previously submitted included with this certification?	☐	
5.	Has any new information come to your attention to indicate that assumptions made in the qualitative exposure assessment for offsite contamination are no longer valid (applies to non-significant threat sites subject to ECL 27-1415.7(c)?	☐	☐
	If YES, is the new information or evidence that new information has been previously submitted included with this certification?	☐	
6.	Are the assumptions in the qualitative exposure assessment still valid (must be certified every five years for non-significant threat sites subject to ECL 27-1415.7(c)?	☐	☐
	If NO, are changes in the assessment included with this certification:	☐	☐

Description of Institutional/Engineering Control	Control Certification
	YES
ENVIRONMENTAL EASEMENT	☐
DEED RESTRICTIONS	☐
OTHER CONTROLS	
COVER MATERIAL	☐

CONTROL CERTIFICATION STATEMENT

For each institutional or engineering control listed above, I certify by checking “Yes” that all of the following statements are true:

(a) 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;’

(b) nothing has occurred that would impair the ability of such control to protect public health and the environment;

(c) nothing has occurred that would constitute a violation or failure to comply with any Site Management Plan for this control; and

(d) 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.

(e) if a financial assurance mechanism is required under the remedial work plan for the site, the mechanism remains valid and sufficient for their intended purpose under the work plan.

SITE OWNER OR DESIGNATED REPRESENTATIVE SIGNATURE

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 _____ (print name), _____

(print business address), am certifying as _____ (Owner or Owner's Designated Site Representative (if the site consists of multiple properties, I have been authorized and designated by all site owners to sign this certification) for the Site named in the Site Details section of this form.

_____ _____

Signature of Site Owner or Representative Rendering Certification Date

QUALIFIED ENVIRONMENTAL PROFESSIONAL (QEP) SIGNATURE

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 _____ (print name), _____

(print business address), am certifying as a Qualified Environmental Professional for the _____

_____ (Owner or Owner's Representative) for the Site named in the Site Details section of this form.

Signature of Qualified Environmental Professional, for Site Owner or Representative, Rendering Certification | Stamp (if Required) | Date

Enclosure 2

Certification of Institutional Controls/Engineering Controls (ICs/ECs)
Step-by-Step Instructions, Certification Requirements and Definitions

The Site owner, or Site owner's representative, and when necessary, a Professional Engineer (P.E.), or the Qualified Environmental Professional (QEP), must review and complete the IC/EC Certification Form, sign it, and return it, along with the Periodic Site Management Report, within 45 days of the date of this notice.

Institutional Controls (defined below) are organized into 4 categories: Governmental Controls (e.g., groundwater-use restrictions), Proprietary Controls (e.g., Environmental Easements), Enforcement and Permit Tools (e.g., Consent Orders), and Information Devices (e.g., State Registries of Inactive Hazardous Waste Sites). The Certification Form shows the Control information the Department has for this Site. Please use the following instructions to complete the IC/EC Certification.

I. Verification of Site Details (First and Second Boxes):

1. Verify the accuracy of information in the **Site Details** section by answering the 6 questions. If necessary, you and/or your P.E. or QEP may handwrite changes and submit supporting documentation.

II. Verification of Institutional/Engineering Controls (Third and Fourth Boxes):

1. Review the listed Institutional/Engineering Controls and select "YES" or "NO" for **Control Certification** for each IC/EC, based on Sections (a)-(d) of the **Control Certification Statement.**

2. If you cannot certify "Yes" for each Control, please continue to complete the remainder of this **Control Certification** form. Attach supporting documentation that explains why the **Control Certification** cannot be rendered, as well as a statement of proposed corrective measures, and an associated schedule for completing the corrective measures. Note that this **Control Certification** form must be submitted even if an IC or EC cannot be certified; however, the certification process will not be considered complete until corrective action is conducted.

   If the Department concurs with the explanation, the corrective measures, and the proposed schedule, a letter authorizing the implementation of those corrective measures will be issued. If the Department has any questions or concerns regarding the completion of the certification, the Project Manager will contact you.

III. Certification of Signature (Fifth and Sixth Boxes):

1. WHY IC/EC Certification is required:
The Section of the New York Environmental Conservation Law that includes the requirement of a periodic certification of IC(s) and EC(s) is as follows:

For Environmental Restoration Projects: N.Y. Envtl Conserv. Law Section 56-0503 (Environmental restoration projects; state assistance)

For State Superfund Projects: Envtl Conserv. Law Section 27-1415. (Remedial program requirements)

Voluntary Cleanup Program: Applicable program guidance.

2. To determine WHO signs the **Control Certification,** please use the following table:

Signature Requirements for IC/EC Certification Form		
Type of Control	**Example of IC/EC**	**Required Signatures**
IC	Environmental Easement Deed Restriction.	Site Owner or their designated representative, e.g., a Property Manager.
EC with no treatment system, or engineered caps.	Fence, Clean Soil Cover.	Site Owner or their designated representative, and QEP. (P.E. license not required)
EC that includes treatment systems, or engineered caps.	Pump & Treat System providing hydraulic control of a plume, Part 360 Cap.	Site Owner or his designated representative, and QEP with P.E. License.

3. WHERE to mail the signed Certification Form within 45 days of the date of the notice:

New York State Department of Environmental Conservation
Division of Environmental Remediation, Region 2
47-40 21st Street
Long Island City, NY 11101-5407
Attn: Shaminder Chawla, Project Manager

Please note that extra postage may be required.

IV. Definitions:

"Engineering Control" (EC), means any physical barrier or method employed to actively or passively contain, stabilize, or monitor any hazardous waste or petroleum waste to ensure the long-term effectiveness of an inactive site remedial program or brownfield site remedial program or environmental restoration project, or to eliminate potential exposure pathways to any such hazardous waste or petroleum waste. Engineering Controls include, but are not limited to: pavement, caps, covers, subsurface barriers and slurry walls; building ventilation systems; fences, other barriers and access controls; and provision of alternative water supplies via connection to an existing public water supply, addition of treatment technologies to an existing public water supply, and installation of filtration devices on an existing private water supply.

"Institutional Control" (IC), means any non-physical means of enforcing a restriction on the use of real property, that limits human or environmental exposure to any hazardous waste or petroleum waste, restricts the use of groundwater; provides notice to potential owners, operators, or members of the public; or prevents actions that would interfere with the effectiveness of an inactive site remedial program or brownfield site remedial program or environmental restoration project, or with the effectiveness and/or integrity of Site Management activities at or pertaining to any site.

"Professional Engineer" means a person, including a firm headed by such a person, who holds a current New York State Professional Engineering license or registration, and has the equivalent of three (3) years of full-time relevant experience in site investigation and remediation of the type detailed in this Control Certification.

"Property Owner" means, for purposes of an IC/EC certification, the actual owner of a property. If the site has multiple properties with different owners, the Department requires that the owners be represented by a single representative to sign the certification.

"Oversight Document" means any document the Department issues pursuant to each Remedial Program (see below) to define the role of a person participating in the investigation and/or remediation of a site or area(s) of concern. Examples for the various programs are as follows:

BCP (after approval of the BCP application by DEC) – Brownfield Site Cleanup Agreement.
ERP (after approval of the ERP application by DEC) – State Assistance Contract.
Federal Superfund Sites - Federal Consent Decrees, Administrative Orders on Consent or Unilateral Orders issued pursuant to CERCLA.
Oil Spill Program – Order on Consent, or Stipulation pursuant to Article 12 of the Navigation Law (and the New York Environmental Conservation Law).
State Superfund Program – Administrative Consent Order.
VCP (after approval of the VCP application by DEC) – Voluntary Cleanup Agreement.
RCRA Corrective Action Sites - Federal Consent Decrees, Administrative Orders on Consent or permit conditions issued pursuant to RCRA.

“Qualified Environmental Professional” (QEP), means a person, including a firm headed by such a person, who possesses sufficient specific education, training, and experience necessary to exercise professional judgment, to develop opinions and conclusions regarding the presence of releases or threatened releases to the surface or subsurface of a property or off-site areas, sufficient to meet the objectives and performance factors for the areas of practice identified by this guidance (DER10 Technical Guide).

1. Such a person must:
   i. Hold a current Professional Engineering or a Professional Geologist license or registration, and have the equivalent of three (3) years of full-time relevant experience in site investigation and remediation of the type detailed in this guidance; or
   ii. Be a site remediation professional licensed or certified by the federal government, a state; or a recognized, accrediting agency, to perform investigation or remediation tasks identified by this guidance, and have the equivalent of three (3) years of full-time relevant experience. Examples of such license or certification include, but are not limited to, the following titles:
      - Licensed Site Professional, by the State of Massachusetts
      - Licensed Environmental Professional, by the State of Connecticut
      - Qualified Environmental Professional, by the Institute of Professional Environmental Practice
      - Certified Hazardous Materials Manager, by the Institute of Hazardous Materials Management

2. The definition of QEP provided above does not preempt State Professional licensing or registration requirements such as those for a Professional Geologist, Engineer, or Site Remediation Professional. Before commencing work, a person should determine the applicability of State professional licensing or registration laws to the activities to be undertaken pursuant to section 1.5 (DER10 Technical Guide).

3. A person who does not meet the above definition of a QEP under the foregoing definition may assist in the conduct of all appropriate investigation or remediation activities in accordance with this document is such person is under the supervision or responsible charge of a person meeting the definition provided above.

“Remedial Party” means any person or persons, as defined in 6NYCRR 375, who executes, or is otherwise subject to, an oversight document (State Superfund, BCP, ERP or VCP Program). For purposes of this guidance, remedial party also includes:

1. Any person or persons who is performing the investigation and/or remediation, or has control over the person (for example, contractor or consultant) who is performing the investigation and/or remediation, including, without limitation, an owner, operator or volunteer; and

2. The DER for State-funded investigation and/or remediation activities.

“Site Management” (SM) means the activities included in the last phase of the remediation of a site, in accordance with a Site Management Plan, which continue until the remedial action objectives for the project are met and the site can be closed-out. Site Management includes the management of the institutional and engineering controls required for a site, as well as the implementation of any necessary long-term monitoring and/or operation and maintenance of the remedy. (Formerly referred to as Operation and Maintenance (O&M)).

“Site Management Plan” (SMP) means a document which details the steps necessary to assure that the institutional and engineering controls required for a site are in-place, and any physical components of the remedy are operated, maintained and monitored to assure their continued effectiveness, developed pursuant to Section 6 (DER10 Technical Guide).

“Site Owner” means the actual owner of a site. If the site has multiple owners of multiple properties with ICs and/or ECs, the Department requires that the owners designate a single representative for IC/EC Certification activities.

“Site Owner’s Designated Representative” means a person, including a firm headed by such a person, who has been designated in writing by the Site Owner(s) to complete and sign the Institutional and Engineering Controls Certification Form.