2477 Third Avenue

Block 2320 Lot 11

BRONX, NEW YORK

Remedial Action Work Plan / Remedial Work Plan

AKRF Project Number: 11160

NYSDEC BCP Number: C203047

Prepared for:

Jiten LLC
30 Byrd Avenue
Carle Place, NY 11514

Prepared by:

AKRF, Inc.
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JUNE 2011

CERTIFICATIONS

I, Michelle Lapin, am currently a registered professional engineer licensed by the State of New York. I have primary direct responsibility for implementation of the remedial program for the 2477 Third Avenue Site (NYSDEC Site No. C203047).

I certify that the Site description presented in this Remedial Action Work Plan/ Remedial Work Plan (RAWP/RWP) is identical to the Site descriptions presented in the Brownfield Cleanup Agreement for the Site and related amendments.

I certify that this plan includes proposed use restrictions, Institutional Controls, Engineering Controls, and plans for all operation and maintenance requirements applicable to the Site and provision for development of an Environmental Easement to be created and recorded pursuant ECL 71-3605. This RAWP/RWP requires that all affected local governments, as defined in ECL 71-3603, will be notified that such Easement has been recorded. This RAWP/RWP requires that a Site Management Plan must be submitted by the Volunteer for the continual and proper operation, maintenance, and monitoring of all Engineering Controls employed at the Site, including the proper maintenance of all remaining monitoring wells, for approval by the Department.

I certify that this RAWP/RWP has a plan for transport and disposal of all soil, fill, fluids and other material removed from the property under this Plan, and that all transport and disposal will be performed in accordance with all local, State and Federal laws and requirements. All exported material will be taken to facilities licensed to accept this material in full compliance with all Federal, State and local laws.

I certify that this RAWP/RWP has a plan for import of all soils and other material from off-Site and that all activities of this type will be in accordance with all local, State and Federal laws and requirements.

I certify that that this RAWP/RWP has a plan for nuisance control during the remediation and all invasive development work, including a dust, odor and vector suppression plan and that such plan is sufficient to control dust, odors and vectors and will prevent nuisances from occurring.

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

NYS Professional Engineer No.	Date	Signature
	6-8-11	

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

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LIST OF ACRONYMS

BCP – Brownfield Cleanup Program

BTEX – Benzene, Toluene, Ethylbenzene, and Xylenes

CCP – Citizen Participation Plan

DER – Department of Environmental Remediation

DO – Dissolved Oxygen

ELAP – Environmental Laboratory Accreditation Program

FER – Final Engineering Report

GPR – Ground-Penetrating Radar

HASP – Health and Safety Plan

MNA – Monitored Natural Attenuation

NAPL – Non Aqueous Phase Liquid

NYCRR – New York Code of Rules and Regulations

NYSDEC – New York State Department of Environmental Conservations

NYSDOH – New York State Department of Health

ORP – Oxidation-Reduction Potential

PAHs – Polycyclic Aromatic Hydrocarbons

PCBs – Polychlorinated Biphenyls

PID – Photoionization Detector

PPB – Parts Per Billion

PPE – Personal Protective Equipment

PPM – Parts Per Million

QAPP – Quality Assurance Project Plan

QA/QC – Quality Assurance/Quality Control

RAOs – Remedial Action Objectives

RAP – Remedial Action Plan

RAWP/RWP – Remedial Action Work Plan / Remedial Work Plan

RI – Remedial Investigation

RIR – Remedial Investigation Report

RSCOs – Recommended Soil Cleanup Objectives

SCGs – Standards, Criteria, and Guidance

SCOs – Soil Cleanup Objectives

SEQRA – State Environmental Quality Review Act

SMP – Site Management Plan

SSDS – Sub-Slab Depressurization System

SSC – Site Safety Coordinator

SVOCs – Semivolatile Organic Compounds

SWPPP – Storm Water Pollution Prevention Plan

TAGM – Technical and Administrative Guidance Memorandum

TIC – Tentatively Identified Compounds

USGS – United States Geological Survey

UST – Underground Storage Tank

VOCs – Volatile Organic Compounds

EXECUTIVE SUMMARY

Site Description/Physical Setting/Site History

The 2477 Third Avenue site (the Site) is located at 2477 Third Avenue in the Bronx, New York, as shown on Figure 1, and is legally defined as Tax Block 2320, Lot 11. The 0.214-acre property is bound to the northeast by East 136th Street, to the southeast by Third Avenue, to the southwest by East 135th Street and the Major Deegan Expressway, and to the northwest by Tax Block 2320, Lot 10. The Site is located in a commercial and industrial area that is characterized by a variety of warehouse, trucking, auto repair, and manufacturing businesses. The Brownfield Cleanup Program (BCP) volunteer (Jiten LLC) also currently owns Block 2320, Lots 5 and 7 through 11 on the same block; however, only Lot 11 was entered into the Brownfield Cleanup Program (BCP).

The Sanborn maps indicate that the Site was occupied by a Drain Pipes and Fireproof Materials company and was developed with several structures including a store house and stable prior to 1891. A wagon yard occupied the Site in 1908. From 1951 through 1989, the Site comprised a gasoline filling station. Throughout the development history of the Site, the surrounding area was predominantly commercial and industrial with some residential properties. Several auto repair shops, factories, garages and filling stations were located north of the Site in the 1951 through 2006 maps.

Measurable free product was reported in several on-site monitoring wells between 1984 and 1986. Field observations and analytical data of subsequent investigations indicated that gasoline-related contamination existed in soil and groundwater at the Site at concentrations that exceeded the New York State Department of Environmental Conservation (NYSDEC) Recommended Soil Cleanup Objectives (RSCOs) and Drinking Water Standards. A plume consisting of gasoline-related hydrocarbons [including benzene, toluene, ethylbenzene and xylene and methyl tert butyl ether (MTBE)] was identified in groundwater migrating southeast from the former on-site gasoline station. Regulatory records identified three 4,000-gallon gasoline underground storage tanks (USTs), one 4,000-gallon diesel UST, and three 12,000-gallon gasoline USTs at the site. These tanks were registered as closed and removed; however, based on AKRF's field observations, the 4,000-gallon USTs remained in place. Up to seven additional 550-gallon gasoline USTs are suspected to have been present at the Site; however, these tanks were never registered with the NYSDEC.

A gasoline spill (Spill No. 0230034) was reported to the NYSDEC on January 31, 2002. The spill was attributed to releases from on-site gasoline USTs; however, the exact location of the origin of the spill is not known. The spill record remains open under a Stipulation Agreement.

A hazardous materials E-designation (E-227) was assigned to lots 5 through 11 on June 30, 2009 as part of the Lower Concourse Rezoning.

Summary of the Remedial Investigation

A Remedial Investigation (RI) was conducted at the Site in accordance with AKRF's March 2010 Remedial Investigation Work Plan (RIWP), which was approved by the NYSDEC in a letter dated March 16, 2010. The RI sampling program consisted of:

- A geophysical survey to search for, and delineate, on-site USTs;
- Advancement of five soil borings and the collection of soil samples for laboratory analysis, including from the bedrock surface;
- A soil vapor sampling plan including the collection of soil gas samples from the five soil boring locations;

- Installation of three deep monitoring wells at three of the soil boring locations to triangulate the deep aquifer and obtain groundwater flow direction, and the collection and laboratory analysis of deep aquifer groundwater samples;
- Collection and laboratory analysis of groundwater samples from the nine existing on-site shallow wells installed by Advanced Site Restoration, LLC (ASR); and
- Collection of one soil surface sample from the unpaved/uncapped area of the Site to evaluate the potential exposure from contaminants in surface soils.

The geophysical survey delineated the four previously identified USTs; no additional anomalies consistent with the presence of USTs were detected by the geophysical survey.

Fourteen soil samples, one surface soil sample, four soil vapor samples, eight shallow groundwater samples, and three deep aquifer groundwater samples were submitted for laboratory analysis. Results of the soil analytical data detected levels of volatile and semivolatile organic compounds (VOCs and SVOCs), metals, and pesticides consistent with the presence of urban fill. However, some of the pesticide detections may be attributable to past on-site landscaping activities. One surface soil sample was collected for laboratory analysis from soil stockpiled on the concrete pavement on the eastern portion of the site. The soil comprised urban fill with sand, silt and gravel, and included fragments of concrete, brick and asphalt. The concentrations of compounds and metals detected in the surficial soil sample are attributable to the urban fill and not to a spill or leak.

In general, the predominant environmental issue identified for the Site by the RI was the elevated levels of gasoline-related VOCs detected in the shallow groundwater in the southern half of the site [2,2,4-trimethylpentane, benzene, methyl tert butyl ether (MTBE), n-hexane, propylene, and toluene]. The VOCs are likely from the past use of the Site as a gasoline station. A few gasoline-related compounds were detected at low concentrations in a groundwater sample from a deep well in the southern portion of the Site, suggesting that the contamination migrated downward in the water column or may be from an off-site source [off-site gasoline and automotive-related facilities were identified in AKRF's 2009 Phase I Environmental Site Assessment (ESA) in upgradient areas].

Soil vapors at the property exhibit elevated levels of the same gasoline-related VOCs as a result of those present in the shallow groundwater [31.5 micrograms per cubic meter ($\mu g/m^3$) to 31,600 $\mu g/m^3$]. Although low levels of solvent-related VOCs (2 butanone, acetone, carbon disulfide, cyclohexane, heptane, and isopropanol) were detected in soil vapor, the concentrations ranged from 18.2 $\mu g/m^3$ to 4,800 $\mu g/m^3$, which are significantly lower than the concentrations of the gasoline-related compounds in the same samples. Furthermore, no significant on-site source of solvent-related VOCs was identified at the property.

Qualitative Human Health Exposure Assessment

Based on results of the RI, the contaminated media consist of soil, groundwater, and soil vapor. Exposure could involve accidental ingestion of VOC-contaminated media, inhalation of VOC vapors, inhalation of particulates, or dermal contact with soil, groundwater, or vapors. Potential receptors include: on-site environmental and construction workers for the proposed redevelopment, future occupants of the proposed development, future on-site maintenance workers, off-site residents, and off-site surface water (via migration of the groundwater plume to the Harlem River, approximately 800 feet west-southwest of the Site). A detailed Exposure Assessment was included in AKRF's December 23, 2010 Remedial Investigation Report (RIR) Addendum.

Summary of the Remedy

The selected Remedial Action Objectives (RAOs) and a detailed Alternatives Analysis of potential remedial strategies are included this RAWP/RWP. A Track 4 remedial program has been selected for this site, in accordance with Part 375-3.8(e) and Title 14 - § 27-1415, which impose cleanup requirements consistent with the restricted use specific to this Site (i.e., commercial use). The remedial action goals for the site are: to be protective of public health and the environment given the intended use of the site; and to remove or eliminate identifiable sources of contamination to the extent feasible.

The preferred remedial alternative selected to address contamination at the Site consists of the following components:

- Removal of the four on-site USTs and any potential associated contaminated soil;
- Excavation of a test pit in the former suspected UST area to confirm soil quality;
- Application of chemical oxidation product during Site development and subsequent monitoring for the degradation of gasoline-related hydrocarbons in the groundwater;
- Excavation and disposal of soil for construction;
- Installation of a vapor barrier beneath the foundation of the entire building structure at the Site and for the construction on Lots 7 through 10;
- Site cap in the form of structures and pavement or the importation of two feet of clean fill in landscaped areas;
- Implementation of institutional controls, including a Site Management Plan (SMP) and Environmental Easement to ensure continual and proper management of any residual contamination; and
- Soil vapor intrusion investigation if an approved vapor barrier is not installed beneath the proposed structure.

Under the preferred alternative, soil remediation would entail removal of the USTs and any associated soil contamination. The preferred alternative also includes the excavation of test pits in the area of former USTs and in the location of soil boring SB/SG/MW-105, where elevated levels of petroleum-related compounds were detected. Subsequent delineation and removal of all petroleum-contaminated soil would be conducted. Lot 11 will also require excavation to a maximum depth of four feet below existing grade for construction of the foundation and utilities for the hotel driveway/parking area and a small portion of the hotel lobby, but could include additional excavation below four feet, if necessary.

A vapor barrier will be installed beneath the entire new building to prevent the potential intrusion of subsurface vapors. A sub-slab depressurization system (SSDS) is not necessary for the Site, as 93% of the ground floor of this portion of the proposed hotel will comprise a driveway/parking area that is open to the exterior. Natural ventilation of the driveway/parking area would occur and there would be no threat of significant vapors penetrating into the new construction in these areas. Approximately 1,300 square feet of the hotel lobby and small stairwell will be constructed on Lot 11, which will be the only enclosed portion of the structure constructed on Lot 11. These areas will be at grade and naturally ventilated by movement in and out of the area (frequent opening of the lobby doors by guests and hotel workers). Furthermore, there will be no subgrade levels or ground floor guest rooms on Lot 11. Nonetheless, the vapor barrier will be installed beneath the entire new building foundation and subgrade walls, including the entirety of Lots 7 through 11. The selected vapor barrier is able to withstand exposure to gasoline-range volatile organic compounds.

In-situ groundwater treatment would be achieved through injecting a chemical oxidation product in an approximately 3,600-square foot area located in the southern portion of Lot 11 where gasoline-related concentrations of VOCs were elevated. Since excavation to the water table is not necessary for construction in this area, AKRF proposes injecting the product via a Geoprobe® direct-push drill rig. The injection would occur before conducting any surface soil disturbance associated with construction, which would destroy the monitoring wells. Following injection of the chemical oxidation product, groundwater would be monitored via new, post-construction monitoring wells installed in this portion of the site. The analytical results of a general chemistry analysis conducted on shallow groundwater samples, supported with the field measurements for dissolved oxygen, oxygen reduction potential (ORP), and pH, suggests that reducing conditions exist at the Site that are favorable for the natural biodegradation of the gasoline-related hydrocarbons in groundwater.

1.0 INTRODUCTION

This Remedial Action Work Plan/Remedial Work Plan (RAWP/RWP) was prepared on behalf of Jiten LLC [the Brownfield Cleanup Program (BCP) Volunteer and property owner] for the 2477 Third Avenue site in the Bronx, New York (the Site). The Site is also defined as Tax Block 2320, Lot 11. It should be noted that Jiten LLC currently owns Block 2320, Lots 5 and 7 through 11; however, only Lot 11 was entered into the Brownfield Cleanup Program (BCP) under BCP Site No. C203047. The site is designated for construction of a four-story commercial hotel, described further in Section 1.2. Lot 6 is not owned by the Volunteer and will not be developed as part of the proposed development project.

This RAWP/RWP summarizes the nature and extent of contamination as determined from data gathered during the Remedial Investigation (RI), performed by AKRF between May 25, 2010 and June 16, 2010, and information obtained from previous reports summarized in Section 2.3.2. The remedy described in this document is consistent with the procedures defined in DER-10 and complies with all applicable standards, criteria and guidance. The remedy described in this document also complies with all applicable Federal, State and local laws, regulations and requirements. The RI for this Site did not identify fish and wildlife resources.

An assessment of potential exposure pathways with respect to on-Site contamination was evaluated in AKRF's December 23, 2010 RIR Addendum. The evaluation of appropriate remedial alternatives and the selection of a preferred remedial alternative are provided in Section 3.0 of this RAWP/RWP. The objectives of this RAWP/RWP are to: summarize results from the RI; present the remedial goals for the Site; and present a preliminary design of the preferred alternative. A complete description of the preferred alternative is presented in Section 3.0.

1.1 SITE LOCATION AND DESCRIPTION

The Site is located in the Bronx, New York and is identified as Block 2320, Lot 11 on the New York City Tax Map. The Site address is 2477 Third Avenue, Bronx, New York. A United States Geological Survey (USGS) topographical quadrangle map (Figure 1) shows the Site location. The Site is situated on an approximately 0.214-acre area bound to the northeast by East 136th Street, to the southeast by Third Avenue, to the southwest by East 135th Street and the Major Deegan Expressway, and to the northwest by Tax Lot 10, as shown on Figure 2. The property is fully described in Appendix A – Metes and Bounds.

1.2 CONTEMPLATED REDEVELOPMENT PLAN

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

The Site (Lot 11) is designated for development of a four-story hotel and associated parking, which will also encompass Lots 7 through 10. Lot 6 is not owned by the Volunteer and will not be developed as part of the proposed development project.

The proposed development will involve excavation of Lot 11 to approximately four feet below grade for the installation of a foundation and utilities, but could include additional excavation below four feet, if necessary. The first floor of the portion of the building on Lot 11 will be an open driveway exposed to the exterior with the second through fourth floors of the hotel overhanging Lot 11. The first floor will also comprise approximately 3,000 square feet of hotel lobby space (approximately 1,300 square feet over Lot 11), including offices, seating areas, the

registration desk, an elevator, and two stairwells. Lots 7 through 10 will be excavated to approximately 12 feet below existing grade for the construction of a single basement level used for meeting rooms, fitness room, laundry room, break room, locker room, compactor room, storage room and mechanical rooms. An appropriate vapor barrier able to withstand gasoline-range volatile organic compounds will be installed beneath the entire new building, including beneath the foundation and along subgrade walls of the portion of the building on Lots 7 through 10, which are not in the State BCP.

Given the reported depth to groundwater, dewatering may be required for the proposed construction on Lots 7 through 10. Development of Lot 5 will include paving the entire lot and installing a sign for the newly constructed hotel. Since the lots are vacant, no demolition will be required for development of the site. Architectural plans of the proposed development plan are provided in Appendix B.

1.3 DESCRIPTION OF SURROUNDING PROPERTY

The Site is located in a commercial and industrial area characterized by a variety of warehouse, trucking, auto repair, and manufacturing businesses. Properties to the east and northeast contain a mix of industrial/commercial properties and residential housing. The Harlem River is located approximately 800 feet southwest of the Site.

2.0 DESCRIPTION OF REMEDIAL INVESTIGATION FINDINGS

The Site was investigated in accordance with the scope of work presented in AKRF's NYSDEC-approved Remedial Investigation Work Plan (RIWP) dated March 2010. The investigation was conducted between May 25, 2010 and June 16, 2010. The Remedial Investigation Report (RIR) was submitted to NYSDEC on August 30, 2010 for approval.

2.1 SUMMARY REMEDIAL INVESTIGATIONS PERFORMED

The following is a summary of work performed on the Site (Lot 11), which is detailed in AKRF's November 2010 RIR.

2.1.1 Borings, Wells and Samples Collected

Five soil borings (SB/SG/MW-101, SB-102, SB/SG-103, SB/SG/MW-104 and SB/SG/MW 105) were advanced to characterize and field-screen subsurface materials. Three of the soil borings (SB/SG/MW-101, SB/SG/MW-104 and SB/SG/MW 105) were retrofitted with deep aquifer monitoring wells installed to the presumed bedrock surface. Nine existing monitoring wells installed previously on Lot 11 by Advanced Site Restoration LLC (ASR) were sampled as part of the RI (the installation of ASR's wells is described in Section 2.3.2). Fourteen soil samples, one surface soil sample, four soil vapor samples, eight shallow groundwater samples, and three deep aquifer groundwater samples were submitted for laboratory analysis. A summary of the soil boring locations and sample types is provided in Table 1:

Table 1
Summary of RI Borings and Sample Types

Boring ID Number	Sample Types
SB/SG/MW-101	Soil, Soil Gas, and Deep Aquifer Groundwater Samples
SB-102	Soil and Soil Gas Samples
SB/SG-103	Soil and Soil Gas Samples
SB/SG/MW-104	Soil and Deep Aquifer Groundwater Samples
SB/SG/MW-105	Soil, Soil Gas, and Deep Aquifer Groundwater Samples

2.1.2 Chemical Analytical Work Performed

Soil and groundwater samples collected were analyzed in a New York State Department of Health Environmental Laboratory Approval Program (NYSDOH-ELAP) laboratory following NYSDEC ASP Category B deliverables for volatile organic compounds (VOCs) using EPA Method 8260, semi-volatile organic compounds (SVOCs) using EPA Method 8270, pesticides using EPA Method 8081, polychlorinated biphenyls (PCBs) using EPA Method 8082, and Target Analyte List (TAL) metals (6000/7000 series). Soil gas samples were analyzed for VOCs by EPA Method TO-15.

2.1.3 Geophysical Work

A geophysical investigation was conducted at the Site to map out known underground storage tanks (USTs) and determine whether unknown USTs are present beneath the project site. The geophysical investigation comprised a ground-penetrating radar (GPR) survey and a magnetometer survey. The survey was conducted throughout the entire

property. The geophysical survey delineated the four previously identified USTs; no unexpected anomalies consistent with the presence of USTs were detected by the geophysical survey. Therefore, no other USTs are suspected at the property.

2.1.4 Documentation

The RI was documented in AKRF's November 2010 RIR. Soil at the Site comprised urban fill with sand, silt and gravel, and included concrete, brick and asphalt. Results of the soil analytical data detected levels of VOCs, SVOCs, metals, and pesticides consistent with typical values in urban fill. However, some of the pesticide detections may be attributable to past on-site landscaping activities. One surface soil sample for laboratory analysis was collected from loose soil stockpiled on the concrete pavement on the eastern portion of the Site. The concentrations of compounds and metals detected in the surficial soil sample are attributable to the urban fill and not to a spill or leak, suggesting that the loose soil was shallow urban fill excavated from the site.

In general, the predominant environmental issue identified for the Site by the RI is the elevated levels of gasoline-related VOCs [2,2,4-trimethylpentane, benzene, methyl tert butyl ether (MTBE), n-hexane, propylene, and toluene] detected in the shallow groundwater in the southern half of the Site (Lot 11). The gasoline-related VOCs are likely from the past use of the Site as a gasoline station. Gasoline-related compounds were detected in a groundwater sample from the deep well in the southern portion of the Site, suggesting that the contamination migrated downward in the water column or may be from an off-site source (off-site upgradient gasoline and automotive-related facilities were identified in AKRF's 2009 Phase I ESA).

Soil vapors at the Site exhibit elevated levels of the same types of VOCs as a result of the gasoline-related VOCs present in the shallow groundwater. Although low levels of solvent-related VOCs (2 butanone, acetone, carbon disulfide, cyclohexane, heptane, and isopropanol) were detected in soil vapor, the concentrations were significantly lower than the concentrations of the gasoline-related compounds in the same samples [18.2 micrograms per cubic meter ($\mu g/m^3$) to 4,800 $\mu g/m^3$]. Furthermore, no significant on-site source of solvent-related VOCs was identified at the Site in the Phase I ESA.

2.2 SITE HISTORY

The Site history was developed from several sources included in previous investigations conducted by AKRF and others.

2.2.1 Past Uses and Ownership

Historic Sanborn fire insurance maps indicated that the Site was developed with a portion of a Drain Pipes and Fireproof Materials company and several structures in 1898, and was occupied by a wagon yard in 1908. From 1951 through 1989, the Site comprised a gasoline filling station. Throughout the development history of the Site, the surrounding area was predominantly commercial and industrial with some residential properties. Several auto repair shops, factories, garages and filling stations were noted north of the Site on the 1951 through 2006 maps. Pertinent ownership history for the Site is summarized in Table 2:

Table 2
Past Site Ownership

List of Property Owners/Operations	Years of Ownership	Status of Entity	Current/Last Known Address
Jiten, LLC	2009 to Present	Active	30 Byrd Avenue, Carle Place, NY
Paco Third Avenue, LLC	2002 to 2009	Unknown	89 Kings Point Rd, Kings Point, NY
2477 3rd Avenue Corp	1992 to 2002	Unknown	364 Maspeth Avenue, Brooklyn, NY
Gene Shapiro	1984 to 1992	Unknown	218 Beach 131st St, Bell Harbor, NY
Ethel Scoppa	1972 to 1984	Unknown	1414 Arnow Ave, Bronx, NY
Getty Oil Company, Inc. (Lessee)	1972 to 1977	Inactive	660 Madison Ave, New York, NY
Getty Oil Company (Lessee)	1950 to 1972	Inactive	3810 Wilshire Blvd, Los Angeles, CA

2.2.2 Phase I and Phase II Reports

Field Notes and Product Recovery Data, Getty Oil – 2477 Third Avenue, Bronx, New York, Soil Mechanics, 1984 to 1986

A request for information under the Freedom of Information Law (FOIL) from the NYSDEC in Long Island City, New York yielded documents from Soil Mechanics of Seaford, New York relating to the gauging and recovery of petroleum product from 15 groundwater monitoring/recovery wells at the former gasoline station at the Site. Product gauging and recovery logs indicated that measurable product was detected in approximately half of the on-Site wells. According to the reviewed data, periodic bailing of the wells between 1984 and 1986 reduced the product thickness from a maximum of approximately 16 inches to "trace" levels. Field notes from March 21, 1986 stated that six 550-gallon gasoline underground storage tanks (USTs) were removed from the Site and oily water from inside on of the tanks was released onto the ground surface during the removal activities (no spill was called into the NYSDEC for this release). Furthermore, petroleum-contaminated soil noted around the tanks reportedly was left in the tank excavation. The monitoring/recovery wells were reported to have been destroyed during the tank removal activities.

The information received from the FOIL request included a plan indicating the locations of nine soil borings advanced by Soil Mechanics in April 1984 and the results of a laboratory gas chromatograph analysis of soil samples collected from the borings. Results of the soil analysis identified concentrations of analytes ranging from 40 to 1,240 parts per million (ppm), though the type of analytes detected were not indicated in the data obtained. No further information about the soil analysis was provided.

Baseline Acquisition Assessment Report – Proposed BP Service Station Number 17782, Existing Gaseteria Service Station – Third Avenue, 2477 Third Avenue, Bronx, New York, Delta Environmental Consultants, Inc., October 2, 2002

Delta Environmental Consultants, Inc. conducted an assessment of the 2477 Third Avenue Gaseteria property that included a regulatory file review and the advancement of four soil borings on Lot 11 (the Site) and one boring on Lot 7. Four soil samples and five groundwater samples were submitted for laboratory analysis.

New York State Department of Environmental Conservation (NYSDEC) records identified three 4,000-gallon gasoline and one 4,000-gallon diesel USTs registered for Lot 11. Soil samples, obtained from Lot 11 only, contained elevated gasoline-related compounds, including concentrations of methyl tert butyl ether (MTBE) above NYSDEC Technical and Administrative Guidance Memorandum (TAGM) No. 4046 Recommended Soil Cleanup Objectives. One groundwater sample was obtained from Lot 7 and four groundwater samples were obtained from Lot 11 for laboratory analysis. Groundwater analytical results identified elevated levels of benzene, toluene, ethylbenzene, and xylenes (BTEX), MTBE and other gasoline-related compounds in the samples. It should be noted that TAGM was used for evaluation of the analytical data because NYSDEC Part 375 soil criteria were not available in 2002.

Phase I Environmental Site Assessment (ESA), 2477 Third Avenue, Bronx, New York, AKRF, October 2007

AKRF performed a Phase I Environmental Site Assessment (ESA) at the Site (Lot 11) and Lots 5 through 10 in October 2007. At the time of the assessment, access was not provided to the site; the site reconnaissance was conducted from public rights-of-way. Recognized Environmental Conditions (RECs) noted in the report for the Site included:

- One on-site active gasoline spill was reported for Lot 11 on January 31, 2002. A baseline assessment, conducted by Delta Environmental, reported MTBE contamination in on-site soil borings at six to eight feet below grade and BTEX contamination in groundwater. At the time of Delta's 2002 assessment, the Site was an active Gaseteria service station that contained three 4,000-gallon gasoline underground storage tanks and one 1,000-gallon fuel oil underground storage tank. During the Site inspection conducted by AKRF, five vent pipes were observed at the western border of Lot 11 and manhole covers, used to access USTs, were observed near the gas pumps. A review of the State regulatory records identified three 4,000-gallon gasoline USTs, one 4,000-gallon diesel UST and three 12,000-gallon gasoline USTs with tank status listed as "closed and removed"; however, man-way covers for the on-site underground storage tanks were observed to be intact, indicating that the tanks had not been removed.
- Lot 11, the former Gaseteria service station, contained several structures with painted surfaces. A review of historic Sanborn fire insurance maps showed Lot 11 as occupied by a gas station beginning circa 1951. Based on the age of these structures, it was concluded that lead-based paint may have been present.
- Historical land use maps, the regulatory database search, and results of the Site reconnaissance indicated that the surrounding area had a long history of industrial, manufacturing, and commercial operations, including auto-related facilities. Such uses would include gasoline storage tanks and the use of solvents and oils, which could have affected on-site soil and/or groundwater conditions.

Investigation Summary Report and Updated Investigation Summary Report, 2477 Third Avenue Bronx, NY, NYSDEC Spill 02-30034, Advanced Site Restoration, LLC, December 2007 and September 24, 2008

On behalf of Gaseteria Oil Corp., Advanced Site Restoration, LLC (ASR) installed four groundwater monitoring wells on and off the Site in November 2007 and collected soil and groundwater samples for laboratory analysis, as described in a report dated

December 2007. Laboratory results indicated elevated levels of VOCs, including BTEX, and MTBE, and SVOCs in soil and groundwater samples. ASR recommended quarterly groundwater monitoring and additional monitoring well installations to further delineate subsurface contamination following NYSDEC approval of an investigation work plan.

Based on the findings of their 2007 subsurface investigation, ASR installed and sampled four additional on-Site and two off-site groundwater monitoring wells between March and August 2008 after consultation with the NYSDEC. In a report dated September 2008, ASR reported that laboratory analytical results revealed elevated VOCs concentrations in on- and off-site soil. On- and off-site groundwater samples contained elevated levels of VOCs, including BTEX and MTBE. Soil samples were collected from directly above the soil-groundwater interface.

A survey of water table elevations was conducted and groundwater was determined to be flowing in a south-southwesterly direction across the Site. ASR determined that a dissolved hydrocarbon plume migrating from the southeastern corner of the Site (Lot 11) had not been fully delineated to the south. ASR recommended additional quarterly groundwater monitoring and consultation with the NYSDEC to determine whether additional downgradient monitoring well installations were required to further delineate off-site contamination. Preparation of a Remedial Action Plan (RAP) for future site development was recommended by ASR.

Phase I Environmental Site Assessment (ESA), 2477 Third Avenue, Bronx, New York by AKRF, January 2009

AKRF conducted a Phase I Environmental Site Assessment at the Site in January 2009 to update the 2007 Phase I ESA at the Site (Lot 11) and Lots 5 through 10. In addition to the Recognized Environmental Conditions (RECs) identified by AKRF's October 2007 Phase I ESA, the following RECs in connection with the Site were noted:

- Advanced Site Restoration, LLC (ASR) conducted additional investigations in November 2007 and between March and August 2008 (summarized above). The investigations included the installation of additional groundwater monitoring wells and the collection of soil and groundwater samples for laboratory analysis. Laboratory results indicated elevated levels of VOCs including BTEX and MTBE and SVOCs in soil and groundwater.
- Title information indicated that Lots 5, 7, 8, 9 and 10 were owned by Urban Cleaning Contractors, Inc. from 1987 through 2002. Interviews with knowledgeable personnel indicated that industrial solvents were stored on-site by Urban Cleaning Contractors, Inc., the previous owners of these lots. Such uses were reported to have the potential to affect soil and groundwater beneath the site.
- It was noted that the Site has been filled to grade with fill of unknown origin.

Based on AKRF's 2007 and 2009 Phase I ESAs, AKRF recommended conducting a Subsurface (Phase II) Investigation to determine whether the historical and current uses of the Site and the surrounding properties had affected on-site environmental conditions.

Limited Subsurface (Phase II) Investigation, 2477 Third Avenue, Bronx, New York, AKRF, February 2009

AKRF conducted a subsurface investigation that included the advancement of eight soil borings and the collection of soil and groundwater samples for laboratory analysis from

Tax Block 2320, Lots 5, 7, 8, 9, and 10. In addition, existing monitoring wells on the former gasoline station property on Tax Lot 11 (the Site) were gauged for potential non-aqueous phase liquid (NAPL). No testing was able to be conducted on Tax Lot 6 because access was not available.

Results of the soil sample analyses conducted on the lots northwest of the Site were as follows:

- Gasoline-related VOCs were detected in four of the eight soil samples analyzed. These samples were collected from directly above the water table and may be reflective of contaminated groundwater.
- SVOCs were detected in five of the eight soil samples analyzed, with some polycyclic aromatic hydrocarbons (PAHs) at concentrations above the NYSDEC 6 NYCRR Part 375 Remedial Program Soil Cleanup Objectives (SCOs) for Unrestricted or Commercial use. Two petroleum-related SVOCs (2-methylnaphthalene and naphthalene) were detected in one soil sample from directly above the water table, suggesting petroleum contamination in groundwater beneath the northwest-adjacent lots.
- Metals were detected in all of the soil samples analyzed, in some cases at concentrations above their respective Part 375 SCOs and NYSDEC TAGM 4046 Eastern United States background levels.
- No PCBs were detected in any of the soil samples analyzed.
- Pesticides were detected in two soil samples at concentrations below their respective Part 375 SCOs.
- Over 40 unknown hydrocarbons were detected in three samples during analysis for Tentatively Identified Compounds (TICs).
- Analysis of one soil sample by EPA Method 8015 indicated that the sample contained a petroleum product similar to No. 2 fuel oil or diesel at a concentration of 5,000 parts per million (ppm). The pattern of hydrocarbons suggested that this material had degraded with age. Based on the history of the Site, the contamination may be from possible heating oil tanks associated with the former residential structures on Lots 5 through 10 or from fuel oil possibly used during past manufacturing activities on these lots.

Results of the groundwater sample analyses collected from the northwest-adjacent lots were as follows:

- VOCs were detected in three of the five groundwater samples analyzed at concentrations below their respective Class GA standards. Compounds detected (1,2,4,5-tetramethylbenzene, naphthalene, sec-butylbenzene, and toluene) are typically associated with gasoline and may be attributable to the industrial and manufacturing history of the Site and surrounding area, which included auto-related uses.
- SVOCs were detected in four of the five groundwater samples, in some cases at concentrations above the Class GA standards. Pentachlorophenol and 2-methylnaphalene were detected in groundwater sample MW-1, which are compounds typically associated with industrial and/or manufacturing operations.

- Sixteen metals were detected in the groundwater samples in the unfiltered (total) analyses, twelve of which were at concentrations above Class GA standards. In the filtered (dissolved) analyses, only eight metals were detected and six were at concentrations above Class GA standards. These results suggest that a portion of the detections in the total metals analyses are due to suspended sediments in the samples. Barium was detected in all groundwater samples (both filtered and unfiltered) at concentrations significantly above the Class GA standards. Barium at these levels may be attributable to contamination from former industrial and manufacturing activities.
- No PCBs or pesticides were detected in the groundwater samples analyzed.
- Six existing monitoring wells on Lot 11 were gauged with an oil/water interface probe. Although no measurable NAPL (floating product) was detected in the wells, petroleum-like odors were noted in two of the wells, one located on the southern portion of the Site and one on the sidewalk at the intersection of Third Avenue and East 135th Street.

2.2.3 Sanborn Maps

The Sanborn maps indicate that the Site was occupied by a Drain Pipes and Fireproof Materials company and was developed with several structures including a store house and stable in 1891. The Site contained a wagon yard in 1908 and a gasoline station in 1951 through 1989, and was vacant by 2006. A summary of the historic Site use and surrounding properties is summarized in Table 3:

Table 3
Historical On-Site and Area Uses

Year	On-site Uses	Adjacent Areas
1891	The Site was developed with a Drain Pipes and Fireproof Materials company and several structures, including a store house and stable.	The southwestern property across Third Avenue was developed with several residential properties. The Mott Haven Canal was located north of the Site. The Mott Iron Works manufacturing facility was located to the west beyond 134th Street. A plumbing supplies manufacturer and an enameling shop were located to the northeast across 136th Street.
1908	The Site was labeled as a wagon yard.	Five dwellings with basements were located northwest of the Site (on Lots 6 through 10), and an unknown manufacturing facility was present on Lot 5. The property to the southwest was developed with a store, a storage facility and a bank. Structures to the northwest comprised a cornice maker with a stable and a furniture storage shop. The Harlem Transfer Co. Freight House and Rail Yard was located across the Mott Haven Canal to the northwest. Three coal yards were located to the northwest across Rider Avenue, along the Mott Haven Canal. Properties to the northeast across 136th Street, including the Henry Huber Co. Brass Foundry, were primarily industrial, with some residential development.
1951	The Site was a gasoline filling station.	Five dwellings were northwest of the Site (on Lots 6 through 10), and a calcimine bagging manufacturing facility was on Lot 5. The Major Deegan Expressway was depicted to the west across East 135th Street. A cosmetics manufacturer, floor covering manufacturer, Collen Fuel Co., a paint manufacturer and General Building Supplies, Inc. were located to the west. A laundry and two private garages were located to the northeast across 136th Street. A lumber yard was located to the north across Rider Avenue. A coal yard containing four gasoline tanks and a fuel oil company were located to the northwest beyond Canal Place. A tissue paper manufacturer and commercial properties were located to the southeast across Third Avenue.
1968	The Site was a gasoline filling station.	Five dwellings were northwest of the Site (on Lots 6 through 10), and Lot 5 was vacant. Some vacant/unlabeled structures to the west including the former cosmetic manufacturer, floor covering manufacturer and. Collen Fuel Co. Properties to the northeast across 136th Street included two auto repair shops and industrial facilities with some residential development. The lumber yard noted on the 1951 map to the north across Rider Avenue was labeled United Parcel Service (UPS). A coal yard and fuel oil company were located to the northwest across Canal Place.
1978	The Site was a gasoline filling station.	Dwellings were on Lots 7 and 8 and lots 5, 6, 9 and 10 were vacant. Additional auto repair shops were shown to the northeast across 136th Street.
1989	The Site was a gasoline filling station.	Lots 5 through 10 were vacant. Lots 5 and 6 were labeled as a parking lot. The auto repair shops on the northern block noted on the 1968 and 1978 maps across East 136th Street comprised a warehouse and a storage yard. The surrounding area remained a mixture of commercial, industrial and residential properties.
2006	The Site was vacant.	Lots 5 through 10 were vacant. An auto repair shop was shown on the north side of the northern block. No further significant changes were noted in the surrounding area.

2.3 GEOLOGICAL CONDITIONS

The surface topography at the Site is generally level. According to a survey performed by Montrose Surveying Co., LLP, the outdoor portions of the Site are generally at an elevation of 8.5 to 10 feet above the Bronx Topographical Bureau datum, which is 2.608 feet above mean sea level. On-site investigations indicated that surficial soil beneath the site consists of fill materials underlain by sand (possibly native). The water table is approximately 7 to 10 feet below grade and was determined by the elevation survey conducted as part of AKRF's November 2010 RI to flow in a south-southwesterly direction towards the Harlem River, approximately 800 feet west-southwest of the site. A groundwater flow map is shown in Figure 3. Water in the Harlem River is tidally influenced and brackish. The Site lies within the 500-year flood plain and the northwestern corner of the Site lies within the 100-year flood plain.

A geotechnical investigation was conducted by D.K. Drilling of Bayside, New York in February 2009 over the entire block (Lots 5 through 11) that included the advancement of six borings, two of which were on Lot 11. Bedrock on Lots 5 through 10 was encountered at depths ranging from approximately 65 to 80 feet below surface grade; bedrock was not encountered in the two borings on Lot 11, which were advanced to depths of approximately 60 and 82 feet below grade. AKRF's November 2010 RI found presumed bedrock beneath Lot 11 (the Site) at depths ranging from 55 to 150 feet below surface grade.

2.4 CONTAMINATION CONDITIONS

Results of the RI were provided in AKRF's November 2010 RIR, which included tables indicating exceedances of applicable standards. The report included spider maps indicating the locations of contaminant concentrations above the standards. The following sections describe the distribution of contaminants at the Site.

2.4.1 Conceptual Model of Site Contamination

Contamination identified for the subject property is predominantly associated with the elevated levels of gasoline-related VOCs detected in the shallow groundwater in the southern half of the Site. The contamination detected appears to be from gasoline tanks located in the southern half of the Site, though the exact source/tank has not been determined. This contamination has resulted in elevated levels of gasoline-related vapors in the soil gas. No on-site source of contamination has been identified in soil; contaminants identified in soil are attributable to the urban fill at the Site.

2.4.2 Description of Areas of Concern

Areas of concern at the Site are associated with the petroleum USTs at the Site and the former use of the Site as a gasoline station. Releases from on-site gasoline tanks resulted in the current active spill reported for the Site. The known and presumed locations of USTs are provided in Figure 2.

2.4.3 Soil/Fill Contamination

VOCs were detected above the Unrestricted SCOs in only one soil sample. The detections were in soil sample collected from directly above the water table and are attributable to the gasoline-related contamination in groundwater in the southern portion of the Site. SVOCs and metals were detected in soil at concentrations attributable to the urban fill and not to a specific release or spill. The pesticide heptachlor epoxide was detected in a soil sample at a concentration of 0.0209 parts per million (ppm), below the

Unrestricted SCO of 0.10 ppm. No other pesticides were detected in the samples. The detection may be due to past landscaping activities or may be attributable to the urban fill.

One surface soil sample for laboratory analysis was collected from loose soil stored on the concrete pavement on the eastern portion of the site. The soil comprised urban fill with sand, silt and gravel, and included concrete, brick and asphalt. The concentrations of compounds and metals detected in the surficial soil sample are attributable to the urban fill and not to a spill or leak.

2.4.4 Groundwater Contamination

Gasoline-related VOCs above Class GA standards were detected in five shallow monitoring wells and in one deep aquifer well located in the southern half of the Site. Low levels of gasoline and solvent-related VOCs were detected in all three deep wells, which are likely indicative of general groundwater conditions in this area of the Bronx and are attributable to a long history of industrial/manufacturing activities. Only three VOCs, 1,2,4-trimethylbenzene, xylenes and cis-1,2-dichloroethene, were detected in deep well MW-105 (located within the area of the identified contaminant plume) at concentrations above the Class GA Standards, suggesting potential contaminant migration downward in the groundwater column at that area of the Site.

SVOCs were detected in the shallow groundwater samples which, based on the analytical results and that the samples were not filtered, are attributable to the particles of urban fill entrained in the samples. No SVOCs were detected in the deep groundwater samples.

Metals detected in the shallow and deep groundwater samples, including those at concentrations above the Class GA standards, are primarily attributable to the presence of urban fill or are naturally occurring. Some influence from past industrial/manufacturing operations in this area of the Bronx cannot be ruled out.

Pesticides were only detected in shallow groundwater samples and are attributable to past on-site landscaping activities or the urban fill.

2.4.5 Soil Vapor Contamination

The concentrations of gasoline-related VOCs (2,2,4-trimethylpentane, benzene, MTBE, n-hexane, propylene, and toluene) were detected in the soil gas samples analyzed at concentrations suggesting an on-site source; the concentrations ranged from 31.5 $\mu g/m^3$ to 31,600 $\mu g/m^3$. The detections are attributable to the gasoline contamination detected in the shallow groundwater.

Concentrations of solvent-related VOCs (2-butanone, acetone, carbon disulfide, cyclohexane, heptane, and isopropanol) were detected in the soil gas samples analyzed, but at concentrations ranging from 18.2 $\mu g/m^3$ to 4,800 $\mu g/m^3$, significantly lower than the concentration of gasoline-related VOCs detected. No significant on-site source of these solvent-related VOCs were detected in the soil and groundwater samples analyzed.

2.5 ENVIRONMENTAL AND PUBLIC HEALTH ASSESSMENTS

2.5.1 Qualitative Human Health Exposure Assessment

Potentially exposed populations and potential exposure pathways for on-site contamination were evaluated in AKRF's December 2010 RIR Addendum. The assessment included an analysis of both complete and incomplete exposure pathways. Based on results from the RI, the contaminated media consists of urban fill, groundwater, and soil vapor. Exposure could involve accidental ingestion of VOC-contaminated media, inhalation of VOC-containing air, or dermal contact with soil, groundwater, or vapors. A significant exposure via a complete pathway is expected to be most likely for personnel on-site during development/construction of the property. Such exposure would be mitigated or minimized by the implementation of a construction Health and Safety Plan (HASP) to be approved by the NYSDEC. Trespassers, off-site residents and off-site workers/businesses may be exposed to dust and vapors during remediation. However, a Community Air Monitoring Plan (CAMP) will be implemented to minimize or eliminate their exposure.

2.5.2 Fish & Wildlife Remedial Impact Analysis

No potential impact to fish and wildlife was identified for the contamination identified at the Site.

2.6 INTERIM REMEDIAL ACTION

No Interim Remedial Actions (IRMs) have been performed at the Site.

2.7 REMEDIAL ACTION GOALS AND STANDARDS, CRITERIA, AND GUIDANCE

The remedial action goals for the site are: to be protective of public health and the environment given the intended use of the site; and to remove or eliminate identifiable sources of contamination to the extent feasible. These two goals will be applied to the site as the site-specific Standards, Criteria, and Guidance (SCGs). SCGs broadly mean standards and criteria that are generally applicable, consistently applied, officially promulgated, and either directly applicable or not directly applicable but relevant and appropriate. Whether they are directly applicable, relevant and/or appropriate is a function of both legal/regulatory judgments and technical/scientific reasoning. For example, Class GA Ambient Water Quality Standards (which are based on use as a potable supply) are legally applicable throughout New York State but are likely of lesser importance in determining the optimal remedial alternative where potable use (or other exposure pathways) is absent. The goals for this site are:

- Commercial Use Soil Cleanup Objectives (SCOs), as outlined in 6 NYCRR §375-6.8(b).
- Achieving spill closure from the NYSDEC with respect to the groundwater contaminants (Spill No. 0230034). It should be noted that an Environmental Easement on the property will ensure that no water supply wells will be installed/used at the Site, preventing exposure to residual contamination.

2.8 REMEDIAL ACTION OBJECTIVES

Remedial Action Objectives (RAOs) are site-specific objectives developed for the protection of public health and the environment and are themselves based on the SCGs. Implementation of the remedial strategy ultimately approved for the Site will achieve the following RAOs developed for the Site in accordance with regulatory requirements:

Soil

- Prevent, to the extent practicable, ingestion/direct contact with contaminated soil.

Groundwater

- Prevent, to the extent practicable, contact with, or ingestion of, contaminated groundwater associated with the Site.
- Reduce, to the extent feasible, the gasoline-related hydrocarbon contamination in shallow groundwater.
- Address, to the extent feasible, the on-site plume and prevent the further migration of any plume off-site at the property boundary.
- Prevent, to the extent practicable, the off-site migration of contaminated groundwater.

Soil Vapor

- Prevent, to the extent practicable, inhalation of contaminants volatilizing from groundwater into the proposed new construction.
- Reduce, to the extent feasible, the gasoline-related hydrocarbon vapors in the soil via the reduction of the gasoline-related hydrocarbon contamination in shallow groundwater.

The objective of the remedial activities for this Site are to achieve Track 4 cleanup levels under the NYSDEC BCP, which relies on institutional and engineering controls consistent with the proposed commercial end use. Specifically, the Commercial Use SCOs, as outlined in 6 NYCRR §375-6.8(b) have been selected for this Site.

The contamination identified at the Site is attributed to releases from the past on-site gasoline USTs. Four petroleum USTs remain at the Site (three gasoline and one diesel); however, product from all four USTs was completely removed on March 5, 2009. Based on the results of the geophysical survey conducted at the property, all other suspected historic tanks have been removed.

As noted in AKRF's November 2010 RIR, concentrations of VOCs above the Unrestricted SCOs in the soil samples analyzed were only detected in one soil sample [SB/SG/MW-105 (9.5')]. This sample was collected from directly above the water table in a tidally influenced area. The sample was collected in June when the water levels are generally lower and was likely collected from within the groundwater contaminant smear zone. In addition, field screening results did not detect evidence of contamination (i.e., staining, odors or PID readings) in the overlying soil at the same boring location. Therefore, the concentrations detected may be primarily, or at least partly, attributable to the well documented underlying groundwater contamination.

To achieve the RAOs, the existing tanks will be removed in accordance with all applicable regulations. In addition, during tank removal activities, soil in the vicinity of soil sample SB/SG/MW-105 (9.5'), which is adjacent to the existing UST field, will be delineated/excavated to ensure that all petroleum-contaminated soil in this area is removed. Furthermore, a test pit investigation will be conducted in the location of the former seven 550-gallon gasoline USTs identified by Soil Mechanics in 1984 to ensure that no residual soil contamination is present.

Remediation of groundwater will include removal of contaminant sources (petroleum-contaminated soil and USTs) to insure that contaminants in groundwater will be reduced over time. The remedial action will also include treatment of the on-site groundwater to reduce the contaminant concentrations to asymptotic levels. Although, groundwater in the Bronx is not used as a potable source, an Environmental Easement on the property will ensure that no water supply wells will be installed/used at the Site, and prevent a complete exposure pathway. Associated contaminants in soil vapor would also be reduced.

3.0 DESCRIPTION OF REMEDIAL ACTION PLAN

3.1 EVALUATION AND SELECTION OF REMEDIAL ALTERNATIVES

The purpose of remedy selection is to identify, evaluate and select a remedy or alternative remedies to address the contamination identified by the remedial investigation, especially the complete exposure pathways identified by the exposure assessment. This is accomplished by ensuring that the remedial alternative selected achieves the RAOs developed and is consistent with the NYSDEC's "Track" approach to remediation selected for the Site. For this Site, a Track 4 remedial program level of cleanup under the NYSDEC BCP will be pursued, which relies on institutional and engineering controls consistent with the proposed commercial end use.

Alternatives are developed by assembling various combinations of technologies or alternative components (which may address one or more media) that, taken cumulatively, address contamination on a site-wide basis. The alternatives are evaluated against the following seven criteria (community acceptance will also be considered but not until after public review of the remedy selection process):

- Overall protection of public health and the environment;
- Reduction in toxicity, mobility and volume of hazardous waste (e.g., by thermal destruction, biological or chemical treatments or containment wall construction);
- Long-term effectiveness and permanence;
- Short-term effectiveness and potential impacts during remediation;
- Implementation and technical reliability;
- Compliance with statutory requirements; and
- Cost.

For this alternatives analysis, a discussion of development of the site and appropriate remedial alternatives will address not only the development of Lot 11 (the portion of the property in the BCP), but the development of the entire site as owned by the BCP volunteer (Lots, 5, 7, 8, 9, 10 and 11). Lot 6 is not owned by Jiten LLC and is, therefore, not included in the proposed development nor addressed in this report.

Lot 11 will not contain subgrade levels. The first floor/ground floor of Lot 11 will comprise a concrete-paved open driveway (exposed to exterior atmosphere) for hotel guests to access the lobby and a registration desk located on Lot 10. The second through fourth floors of the hotel on Lot 11 will be constructed over this open driveway, as an overhanging structure.

Lots 7 through 10 will be completely excavated to approximately 12 feet below existing grade for construction of the subgrade level, which will comprise meeting rooms, a fitness room, laundry room, break room, locker room, compactor room, storage room and mechanical rooms. Vehicle parking will be constructed on the first floor of Lots 7 through 10, which will be accessible through the open driveway on the ground floor of Lot 11. Development of Lot 5 will include paving the entire lot; no soil excavation will occur and no structures will be constructed. An elevation plan of this design in included in Appendix B.

Development of Remedial Alternatives

Based on the exposure assessment and remedial action objectives previously presented, three remedial alternatives that address site-wide contamination are discussed in the following

subsections. Note that a "No Further Action" alternative is always included in accordance with DER-10, as is an alternative that either fully removes the contamination or at least, allows unrestricted use of the site. NYSDEC's hierarchy of preference for remedial approaches (from most to least preferred) is; 1) removal and/or treatment; 2) containment; 3) elimination of exposure, and; 4) treatment of the source at the point of exposure. Remedial cost estimates are provided in Appendix C.

3.1.1 Alternative 1: No Further Action

Alternative 1 involves conducting no further remedial activities at the site. Consideration of this alternative fulfills NYSDEC guidance requiring analysis of the "No Further Action" alternative. For this alternative, the Site would not be developed with the proposed project (no soil excavation, and no groundwater or soil vapor mitigation activities) and the Site would remain as an unused vacant property. However, the open spill would still require remediation in accordance with the NYSDEC Spills Program.

3.1.2 Alternative 2: Exposure Reduction and Treatment

Alternative 2 consists of the following components:

- Excavation and disposal of soil for construction;
- Removal of the four on-site underground storage tanks (USTs);
- Test pit excavation to the water table in the area of highest soil contamination (SB/SG/MW-105) and in the area of the former seven 550-gallon gasoline UST area to ensure the complete removal of petroleum-contaminated soil from the Site.
- Installation of a vapor barrier beneath the foundation of the entire building structure (Lots 7 through 11);
- Site cap in the form of structures, pavement or the importation of two feet of clean fill in landscaped areas; and
- Application of chemical oxidation product during site development and monitoring of gasoline-related hydrocarbons to reduce contaminant levels in the groundwater to achieve closure with respect to the active spill.
- Institutional controls to prevent on-site groundwater use and uncontrolled excavation of residual contamination. These controls would be specified in an Environmental Easement, which would require implementation of a NYSDEC-approved SMP for long-term management of any contaminated materials left in place.

<u>Soil</u>

As noted in AKRF's November 2010 RIR, concentrations of VOCs above the Unrestricted and Commercial SCOs in soil samples analyzed were only detected in one soil sample [SB/SG/MW-105 (9.5')]. This sample was collected from directly above the water table at a time when tidal fluctuations were lower; at least a portion of the concentrations detected are likely attributable to the contamination to underlying groundwater since the samples was collected from within the smear zone. To achieve the RAOs, the existing tanks will be removed in accordance with all applicable regulations. Although Lot 11 will require only minimal surficial excavation for construction of the hotel driveway, for Alternative 2, soil in the vicinity of soil sample SB/SG/MW-105 (9.5'), which is adjacent to the existing UST field designated for excavation and removal,

will be delineated/excavated to ensure that all petroleum-contaminated soil in this area is removed. Furthermore, a test pit investigation will be conducted in the location of the former seven 550-gallon gasoline USTs identified by Soil Mechanics in 1984 to ensure that no residual soil contamination is present, as described in Section 5.4. These measures are expected to achieve the RAOs for the Site, particularly the Commercial SCOs designated as the Site-specific SCG for soil.

Should the test pit excavation activities and/or UST removal activities reveal other areas of contaminated soil at the Site, excavation will be conducted in these areas (in accordance with Section 5.2.7) until all contaminated soil is removed or until further excavation is no longer feasible. If excavation is not feasible, in-situ treatment may be appropriate, including the expansion of ORC treatment described in Section 5.5 to these areas.

Although not part of the State BCP, for Lot 7 through 10, development/remediation would include soil excavation and disposal to 12 feet below grade, which is below the water table.

Soil Vapor

A sub-slab depressurization system (SSDS) cannot be installed beneath the portion of the proposed hotel building on Lots 7 and 10, as the foundation of the structure will be at or below the water table. Nonetheless a vapor barrier/water proofing membrane will be installed beneath the foundation and along all subgrade walls.

An SSDS is not proposed for Lot 11, as the ground floor of the proposed hotel will comprise primarily a driveway that is open to the exterior. The only enclosed inhabitable space on the first floor includes an approximately 3,000-square foot hotel lobby, 1,300 square feet of which will be on Lot 11. Natural ventilation of the majority of the first floor would occur and there would be no threat of significant vapors penetrating into the new construction. However, a vapor barrier will be installed beneath the entire hotel lobby portion of the Site as an added precaution. Since no habitable structures will be constructed on Lot 5 (the lot will comprise a paved vacant lot, possibly with a sign), no vapor barrier, SSDS or other vapor mitigation plan is warranted.

Groundwater

Subsequent to the contaminant source removal activities (i.e., UST and petroleum-contaminated soil removal), in-situ groundwater treatment would be conducted through injecting a chemical oxidation product in an approximately 3,600-square foot area located in the southern portion of Lot 11 where gasoline-related concentrations of VOCs were elevated. AKRF proposes injecting the chemical oxidation product via a Geoprobe® direct push rig, as described in Section 5.4. Following injection of the chemical oxidation product, groundwater would be monitored via new, post-construction monitoring wells installed in this portion of the site, as described in Section 5.5. Should long term monitoring of the groundwater reveal that a reduction in the target hydrocarbon levels is not occurring, a revised chemical oxidation injection/treatment plan would be developed for the site and submitted to the NYSDEC for review and approval.

3.1.3 Alternative 3: Removal Plus Treatment for Unrestricted Use

Alternative 3 consists of the following components:

- Excavation and disposal of all soil to the water table for construction (Lots 7 through 11);
- Removal of the four on-site underground storage tanks (USTs);
- A pump and treat system to reduce groundwater contaminant levels to below Class GA standards.

For Alternative 3, all soil in the approximately 19,000-square foot area comprising Lots 7 through 11 would be excavated to approximately 12 feet below grade. This would total approximately 8,500 cubic yards of soil (or approximately 12,750 tons). Following excavation of the Site, a pump and treat system would be designed and installed in the southern approximately 2,500-square foot contaminant plume area. Subsequent groundwater monitoring would be conducted by the installation of post-construction monitoring wells. However, a pump and treat system is typically decommissioned once the system has been shown to be ineffective in reducing residual contaminant concentrations. According to the NYSDEC spill manager for the Site, this system was used in the past. It is, therefore, unlikely that implementing another pump and treat remedial strategy will be effective, particularly for achieving the RAOs for this Site.

3.2 ANALYSIS OF THE REMEDIAL ALTERNATIVES

In this section, the remedial alternatives are evaluated against the following seven criteria:

- Overall protection of public health and the environment, i.e., how each alternative would eliminate, reduce or control through removal, treatment, containment, engineering controls or institutional controls any existing or potential pathways of exposure to public health or environmental impacts identified by the RI.
- Compliance with statutory requirements.
- Short-term effectiveness and potential impacts during remediation; e.g., potential adverse impacts including loss of use of the property, traffic, odors, vapors, dust, and noise.
- Long-term effectiveness and permanence, i.e., if contamination would remain after the remedy has been implemented, whether it could result in exposure.
- Reduction in toxicity, mobility and volume of contaminants, i.e., the ability of each alternative to achieve each of the RAOs, whether it conforms to the SCGs and if it does not, why conformity should be dispensed with, e.g., if it would result in greater risk to public health than alternatives or be technically impracticable or equivalent to that required by the SCG through another approach. Preference is given to remedies that permanently or significantly reduce the toxicity, mobility or volume of contamination.
- Implementation and technical reliability, i.e., the technical and non-technical feasibility of an alternative, such as the difficulties associated with construction and monitoring the effectiveness, potential difficulties in obtaining approvals, and the reliability of implementation of institutional or engineering controls.
- Cost effectiveness, i.e., whether the remedy's costs are proportional to its effectiveness.

3.2.1 Alternative 1: No Action

Overall Protection of Public Health and the Environment

Alternative 1 would provide some protection of the environment because elevated levels of contaminants in the groundwater, and consequently those in the soil vapor, would need to be mitigated in the NYSDEC Spills Program; however, off-site mitigation of groundwater and soil vapor contamination would need to be addressed to ensure the protection of public health.

Compliance with Standards, Criteria, and Guidance (SCGs)

Alternative 1 would not comply with the SCGs or Track 4 remedial program requirements because the concentrations in groundwater would not be reduced and the spill could not be remediated/closed.

Short-Term Effectiveness

Alternative 1 would not provide short-term effectiveness because there would be no remedial actions or controls executed and none of the contaminated material would be removed, stabilized, or treated.

Long-Term Effectiveness and Permanence

Alternative 1 would not provide long-term effectiveness because there would be no remedial actions or controls executed and none of the contaminated material would be removed, stabilized, or treated.

Reduction of Toxicity, Mobility or Volume with Treatment

Contaminant toxicity, mobility, and volume would not be reduced if Alternative 1 is selected, as none of the contaminated material would be removed, stabilized, or treated.

Implementability

Alternative 1 requires no action and, therefore, could be easily implemented.

Cost

There would be no costs associated with Alternative 1.

3.2.2 Alternative 2: Exposure Reduction and Treatment

Overall Protection of Public Health and the Environment

Alternative 2 would help protect the environment, as it would provide for the reduction of contaminants in groundwater. Alternative 2 would also provide overall protection of public health in consideration of current and potential future land use. Exposure pathways to any potential, post-remediation residual contaminants would remain incomplete. A vapor barrier would help protect occupants of the proposed hotel structure from possible vapor intrusion. A soil management plan would be developed that would include protocols for groundwater monitoring to ensure that the proposed treatment remedies are effective and, if not, provide for the development of additional treatments/remedies as necessary. In addition, an Environmental Easement will require that any subsurface contamination remaining and all necessary institutional controls will be managed pursuant to the SMP, as described in Section 5.7.

Compliance with Standards, Criteria, and Guidance (SCGs)

Alternative 2 would comply with the SCGs as much of the soil, and tanks, would be removed. Furthermore, any remaining soil would be capped to prevent exposure to humans. Alternative 2 would comply with the SCGs with respect to groundwater contaminants, as the levels would be reduced and, consequently, the source of gasoline-related soil vapors would be reduced.

Short-Term Effectiveness

Alternative 2 would provide short-term effectiveness with the installation of a vapor barrier below the new construction and the capping of the site. All potential exposure pathways would remain incomplete following construction. Implementation of a Construction HASP would prevent unacceptable exposure during remediation and construction activities.

Long-Term Effectiveness and Permanence

Alternative 2 would provide long-term effectiveness and permanence with the installation of a vapor barrier below the new construction and capping of the site. Although contamination reduction would require some time, exposure to this contamination would be prevented by severing the exposure pathways from the subsurface contamination to the inside of the new building or surrounding community (vapor barrier and site cap). Reduction in subsurface contaminants via treatment would reduce potential off-site migration of groundwater and soil vapor contaminants.

Reduction of Toxicity, Mobility or Volume with Treatment

Alternative 2 would reduce the toxicity, mobility and volume of contamination through the removal of the USTs and any potential associated contaminated soil encountered and the application of in-situ treatment of the contaminant source (groundwater). Treatment of the groundwater would result in reduction of soil vapor contaminants. The SMP would ensure continued groundwater monitoring and treatment (as necessary) to reduce subsurface contaminants in accordance with the SCGs.

Implementability

The technology for the groundwater treatment alternative is readily available. The effectiveness of the treatment can be frequently determined in a short period of time (weeks or months), though careful monitoring would be required. The installation of a vapor barrier is an effective way to prevent vapors from entering the new construction. Such barriers are readily installed as part of the waterproofing systems beneath new construction. Furthermore, the majority of the Site will be paved; only small areas of landscaping will be open to the subsurface. For these landscaped areas, the importation of a two-foot cap of certified clean fill is easily implemented.

Cost

The estimated cost associated with Alternative 2 is approximately $1,280,000, including two years of groundwater monitoring. Estimated remediation costs are provided in Appendix C. The costs are only for remediation of Lot 11 and include: excavation of soil to four feet below grade for foundation and utilities (possibly deeper, if necessary); removal of the USTs; in-situ groundwater treatment; installation of a vapor barrier; and monitoring well installations.

3.2.3 Alternative 3: Removal Plus Treatment for Unrestricted Use

Overall Protection of Public Health and the Environment

Alternative 3 would provide overall protection of public health and the environment in consideration of current and potential future land use. This alternative would result in removal of all soil to the water table from the property, which was found to contain contaminants at levels typical of urban fill in developed areas of the Bronx. Soil removal would not directly address groundwater or soil gas, and since no contaminant source has been identified in soil, its removal is not expected to further facilitate attenuation in groundwater over time.

Implementation of a construction HASP, which would include a Community Air Monitoring Plan (CAMP) in accordance with NYSDOH guidelines, would prevent unacceptable exposure during remediation and construction activities. The installation of a vapor barrier would prevent unacceptable exposure to future building users. Restrictions requiring appropriate engineering controls during future excavation activities and prohibiting work that could affect/damage the vapor barrier and pump and treat system would protect future maintenance workers and building users from subsurface residual contaminants.

The pump and treat system would help protect the environment, as it would reduce contaminants in groundwater and resulting vapors in the soil. The SMP would include protocols for inspections to ensure proper long-term functioning of the remedy.

Compliance with Standards, Criteria, and Guidance (SCGs)

Alternative 3 would comply with the SCGs, as all soil to a depth of 12 feet below grade would be backfilled with clean fill. Alternative 3 would comply with the SCGs with respect to groundwater contaminants, as the levels would be reduced and, consequently, the source of gasoline-related soil vapors would be reduced.

Short-Term Effectiveness

Alternative 3 would provide short-term effectiveness with the removal of all soil to 12 feet below grade, the installation of a vapor barrier in the new construction, and the capping of the site. All potential exposure pathways would remain incomplete following construction.

Long-Term Effectiveness and Permanence

Alternative 3 would provide long-term effectiveness and permanence, though institutional (e.g., implementation of an SMP), engineering controls (i.e., site cap, vapor barrier and pump and treat system) and long-term monitoring would be needed to ensure a reduction in groundwater contamination.

Reduction of Toxicity, Mobility or Volume with Treatment

Alternative 3 would reduce contaminant mobility and volume, as the urban fill with concentrations exceeding the SCOs would be removed. The pump and treat system would help reduce contaminant levels in groundwater and reduce contaminant migration. A reduction in groundwater contaminant levels would results in a reduction of soil vapor contaminants. However, the effectiveness of a pump and treat system at the site is questionable since, according to Mr. Andre Obligado, NYSDEC Region 2 Project

Manager for the on-site active spill, such a system was installed and operated previously at the Site. This system was abandoned, suggesting that it had achieved the maximum reduction in contaminant levels possible.

Implementability

The evaluation of implementability of the remedial components of Alternative 3 is similar to Alternative 2. The technology for the groundwater pump and treat alternative is readily available. The effectiveness of the treatment will require careful monitoring.

Cost

The estimated cost associated with Alternative 3 is approximately $2,008,368, including two years of monitoring. Estimated remediation costs are provided in Appendix C. The costs are only for remediation of Lot 11 and include: excavation of soil to 12 feet below grade; removal of the USTs; installation of a pump and treat system and subsequent well installations and monitoring; and installation of a vapor barrier.

3.3 SELECTION OF THE PREFERRED REMEDY

Alternative 1 is not considered a reasonable remedial option because it does not accomplish the remedial action goals of protection of public health and the environment and would not likely achieve the RAOs selected for this site, particularly in addressing the on-site contaminated soil or the groundwater contaminant plume, and preventing further migration of any plume off-site at the property boundary. Alternative 3 provides greater reduction of contamination in soil, but not necessarily a reduction in groundwater contaminants and, therefore, soil vapor, than Alternative 1. Furthermore, Alternative 3 includes significantly greater costs than Alternative 2. Groundwater sampling has indicated that the contaminants of concern for the subject property (gasoline-related contaminant plume in groundwater) is limited in extent and has not traveled a significant distance. Based on the levels of contaminants detected in the groundwater, the effort required for the installation and maintenance of a pump and treat system is not warranted and is not likely to achieve a significant reduction in the levels presently detected at the site. Pump and treat systems typically take longer to reduce contaminant levels in groundwater than chemical oxidation methods. Furthermore, a pump and treat system was formerly installed at the site. Although no formal record of the effectiveness of the system was obtained, such systems are typically abandoned once it is determined that it is no longer facilitating a reduction in the target contaminant levels, therefore, installing a second pump and treat system would not be expected to effectively treat the residual groundwater contamination.

In-situ remediation via chemical oxidation is a more appropriate, cost effective and targeted remedy and is expected to have a similar effect on reducing contaminants in the media of concern (groundwater) as a pump and treat system. Furthermore, the removal of all soil to the water table outlined in Alternative 3 is not warranted for Lot 11 (there is no planned subgrade level on Lot 11) and, based on the investigations conducted to date, would not materially contribute to reduction of contaminants in the groundwater.

Alternative 2 was selected as the preferred remedial option because it is protective of the public health and environment, effective and permanent, easily implementable, and the toxicity and volume of contamination would be reduced over time. This remedy is also anticipated to achieve the Track 4 remedial program requirements and RAOs selected for this Site, including the Commercial SCOs and NYSDEC closure of the spill. With implementation of an SMP, the long-term protection of public health and the environmental from any residual contamination, which is

expected only in the groundwater, would be ensured. Alternative 2 is expected to accomplish the same remedial action goals as Alternative 3 with a more targeted and cost effective approach. The greater cost of Alternative 3 is not justified.

3.3.1 Zoning

The preferred remedy will not have any effect on land use or zoning.

3.3.2 Applicable comprehensive community master plans or land use plans

The preferred remedy will not interfere with, or have any effect on, any land use or zoning plans.

3.3.3 Surrounding property uses

The preferred remedy will not have any adverse effect on surrounding property use.

3.3.4 Citizen participation;

In accordance with the NYSDEC- and NYSDOH-approved Citizen Participation Plan (CPP), a fact sheet describing the remedy will be distributed and made available for public comment and review prior to implementation.

3.3.5 Environmental justice concerns

The preferred remedy does not pose any known environmental justice concerns.

3.3.6 Land use designations

The preferred remedy is compatible with the proposed use of the Site.

3.3.7 Population growth patterns

The preferred remedy should have no adverse effect on population growth.

3.3.8 Accessibility to existing infrastructure

The preferred remedy should have no effect on the accessibility to existing infrastructure.

3.3.9 Proximity to cultural resources

The preferred remedy should have no effect on any cultural resources in the area.

3.3.10 Proximity to natural resources

The preferred remedy should have no adverse effect on any natural resources in the area.

3.3.11 Off-Site groundwater impacts

Off-site groundwater impacts are being addressed by others in conjunction with the NYSDEC.

3.3.12 Proximity to floodplains

The site is not in close proximity to a floodplain.

3.3.13 Geography and geology of the Site

The preferred remedy is consistent with the geography and geology of the Site.

3.3.14 Current Institutional Controls

The preferred remedy should have no effect on any current institutional controls in the area. There are no previous institutional controls on the Site.

3.4 SUMMARY OF SELECTED REMEDIAL ACTIONS

A complete description of the selected remedial action activities is provided in Section 5.0. The alternative selected for the Site consists of the following components:

- Removal of the four on-site USTs;
- Test pits in suspected former UST areas to confirm soil quality;
- Application of chemical oxidation product during site development and subsequent monitoring of gasoline-related hydrocarbons in the groundwater.
- The excavation and disposal of soil for construction;
- The installation of a vapor barrier beneath the foundation of the entire building structure at the Site and for the construction on Lots 7 through 10; and
- Site cap in the form of structures and pavement or the importation of two feet of clean fill in landscaped areas.
- Recording of an Environmental Easement that includes a listing of engineering controls and institutional controls and notice that these controls must be maintained within an SMP to prevent future exposure to residual soil/fill.

USTs

Four 4,000-gallon USTs (three gasoline and one diesel) will be removed from the Site in accordance with all applicable regulations.

Test Pits

Test pits will be excavated in the suspected area of the former seven 550-gallon USTs to confirm complete removal of petroleum-contaminated soil from the Site.

Groundwater

In-situ groundwater treatment would be achieved through injecting a chemical oxidation product in an approximately 3,600-square foot area located in the southern portion of Lot 11 where elevated concentrations of gasoline-related VOCs were detected. Following injection of the chemical oxidation product, groundwater would be monitored via new, post-construction monitoring wells installed in this portion of the site. A quarterly groundwater monitoring plan would be outlined in the forthcoming SMP developed for the Site. Should long term monitoring of the groundwater reveal that a reduction in the target hydrocarbon levels is not occurring, a revised chemical oxidation injection/treatment plan would be developed for the Site and submitted to the NYSDEC for review and approval.

Soil

Since the results of the RIR found no significant contamination or source of contamination in the soil, no remediation would be performed relative to soil other than excavation in the areas required for the proposed construction and any contaminated soil discovered during excavation of the proposed test pits. Lot 11 will require excavation to a maximum depth of four feet below

grade for construction of a foundation and utilities for the driveway/parking area and a portion of the hotel lobby.

Soil Vapor

A vapor barrier will be installed beneath the entire new building to prevent the potential intrusion of subsurface vapors. An SSDS is not necessary for the Site, as 93% of the ground floor of this portion of the proposed hotel will comprise a driveway/parking area that is open to the exterior. Natural ventilation of the driveway/parking area would occur and there would be no threat of significant vapors penetrating into the new construction in these areas. Approximately 1,300 square feet of the hotel lobby and small stairwell will be constructed on Lot 11, which will be the only enclosed areas constructed on Lot 11. These areas will be at grade and naturally ventilated by movement in and out of the area (frequent opening of the lobby doors by guests and hotel workers). Furthermore, there will be no subgrade levels or ground floor guest rooms on Lot 11. Nonetheless, the vapor barrier will be installed beneath the entire new building, including the entirety of Lot 11. This engineering control is sufficient in assuring that no vapors enter the building.

Remedial activities will be performed at the Site in accordance with this NYSDEC-approved RAWP/RWP. All deviations from the RAWP/RWP will be promptly reported to NYSDEC for approval and fully explained in the FER.

Institutional Controls

Upon completion of the remedial activities, an Environmental Easement will be recorded and SMP will be prepared to specify future soil handling requirements and Site use restrictions (discussed further in Section 5.7).

4.0 REMEDIAL ACTION PROGRAM

4.1 GOVERNING DOCUMENTS

4.1.1 Site Specific Health & Safety Plan (HASP)

A Site Specific Health and Safety Plan (HASP) has been created for the Site and is included as Appendix D. All remedial work performed under this plan will be in full compliance with governmental requirements, including Site and worker safety requirements mandated by Federal OSHA.

The HASP and requirements defined in this RAWP/RWP pertain to all remedial and invasive work performed at the Site until the issuance of a Certificate of Completion. A resume of the Site Safety Coordinator (SSC) will be provided to NYSDEC prior to the start of remedial construction.

No confined space entry is anticipated for this project. Nonetheless, should confined space entry be required, it will comply with all OSHA requirements to address the potential risk posed by combustible and toxic gasses.

4.1.2 Quality Assurance Project Plan (QAPP)

Any sampling associated with this project will be conducted in accordance with the Quality Assurance Project Plan (QAPP) included in Appendix F.

4.1.3 Storm Water Pollution Prevention Plan (SWPPP)

Based on the size of the Site (0.214 acres), a Storm Water Pollution Prevention Plan (SWPPP) is not required for construction at this site. Nonetheless, the erosion and sediment controls will be in conformance with requirements presented in the New York State Guidelines for Urban Erosion and Sediment Control. To prevent the potential off-site transport of dust, the dust control measures outlines in Section 5.2.9 will be implemented during construction.

4.1.4 Contractors Site Operations Plan (SOP)

The Remediation Engineer will ensure that all later document submittals for this remedial project, including contractor and sub-contractor document submittals, are in compliance with this RAWP/RWP. All remedial documents will be submitted to NYSDEC and NYSDOH in a timely manner and prior to the start of work.

4.1.5 Citizen Participation Plan (CPP)

A Project Fact Sheet for the RAWP/RWP phase of this project was submitted to the NYSDEC for review and approval. The approved Fact Sheet will be sent via certified mail to persons on the Project mailing list in accordance with the NYSDEC and NYSDOH-approved CPP prepared by AKRF and dated February 2010.

A certification of mailing will be sent by the Volunteer to the NYSDEC project manager following the distribution of all Fact Sheets and notices that includes: (1) certification that the Fact Sheets were mailed, (2) the date they were mailed; (3) a copy of the Fact Sheet, (4) a list of recipients (contact list); and (5) a statement that the repository was inspected on (specific date) and that it contained all of applicable project documents.

No changes will be made to the approved Fact Sheets authorized for release by NYSDEC without written consent of the NYSDEC. No other information, such as brochures and flyers, will be included with the Fact Sheet mailing.

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

New York Public Library
Mott Haven Branch
321 East 140th Street
Bronx, NY 10454
(718) 665-4878

NYSDEC, Region #2 Office
47-40 21st Street
Long Island City, NY 11101
(718) 482-4891

Bronx Community Board 1
3024 Third Avenue
Bronx, NY 10455
(718) 402-2270

4.2 GENERAL REMEDIAL CONSTRUCTION INFORMATION

4.2.1 Project Organization

The project team will be drawn from AKRF professional and technical personnel and AKRF's subcontractors. All field personnel and subcontractors will have completed a 40-hour training course and updated 8-hour refresher course that meet the Occupational Safety and Health Administration (OSHA) requirements of 29 CFR Part 1910. The following sections describe the key project personnel and their responsibilities. Resumes of key personnel involved in the Remedial Action are included in Appendix E.

The project director will be responsible for the general oversight of all aspects of the project, including scheduling, budgeting, data management and decision-making regarding the field program. The project director will communicate regularly with all members of the AKRF project team, the NYSDEC, and to ensure a smooth flow of information between involved parties. Michelle Lapin will serve as the Project Director.

The project manager will be responsible for directing and coordinating all elements of the RAWP/RWP. The project manager will prepare reports and participate in meetings with Jiten LLC and/or the NYSDEC. Axel Schwendt will serve as the project manager for the RAWP/RWP.

4.2.2 Remedial Engineer

The Remedial Engineer for this project will be Ms. Michelle Lapin of AKRF. The Remedial Engineer is a registered professional engineer licensed by the State of New York. The Remedial Engineer will have primary direct responsibility for implementation of the remedial program for the 2477 Third Avenue Site (NYSDEC Site No. C203047). The Remedial Engineer will certify in the Final Engineering Report (FER) that the remedial activities were observed by qualified environmental professionals under her supervision and that the remediation requirements set forth in the RAWP/RWP and any other relevant provisions of ECL 27-1419 have been achieved in full conformance with that Plan. Other Remedial Engineer certification requirements are listed later in this RAWP/RWP.

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

The Remedial Engineer will review all pre-remedial plans submitted by contractors for compliance with this RAWP/RWP and will certify compliance in the FER.

4.2.3 Work Hours

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

4.2.4 Site Security

The Site will be completely closed from public access via secure construction fencing. No unauthorized personnel will be able to access the site. During off hours, the site will be completely enclosed with a locked gate.

4.2.5 Traffic Control

It is not anticipated that traffic will be disrupted during construction. Sidewalk closure on all sides of the Site will be required during construction/remediation activities. A Maintenance and Protection of Traffic Plan (MPT) for the sidewalk closure would be submitted for NYSDOT approval prior to such activities.

4.2.6 Worker Training and Monitoring

All those who enter the work area while intrusive activities are being performed must recognize and understand the potential hazards to health and safety. All construction personnel upon entering the site must attend a brief training meeting, its purpose being to:

- Make workers aware of the potential hazards they may encounter;
- Instruct workers on how to identify potential hazards,
- Provide the knowledge and skills necessary for them to perform the work with minimal risk to health and safety;
- Make workers aware of the purpose and limitations of safety equipment; and
- Ensure that they can safely avoid or escape from emergencies.

Each member of the construction crew will be instructed in these objectives before he/she goes onto the site. Construction personnel will be responsible for identifying potential hazards in the work zone. The project manager will be responsible for insuring that the training is conducted. Others who enter the site must be accompanied by a suitably-trained construction worker.

4.2.7 Agency Approvals

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

4.2.8 NYSDEC BCP Signage

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

4.2.9 Pre-Construction Meeting with NYSDEC

A pre-construction meeting with the NYSDEC will take place prior to the start of major construction activities.

4.2.10 Emergency Contact Information

An emergency contact sheet with names and phone numbers is included in the Site-Specific HASP provided in Appendix D. That document will define the specific project contacts for use by NYSDEC and NYSDOH in the case of a day or night emergency.

4.2.11 Remedial Action Costs

An itemized and detailed summary of estimated costs for all remedial activity was provided in the Alternatives Analysis included in AKRF's November 2010 RIR. The estimate will be revised based on actual costs and submitted as an Appendix to the Final Remediation Report.

4.3 SITE PREPARATION

Prior to conducting any intrusive activities for site remediation activities, the work zone(s), designated entry points, soil stockpile staging areas, decontamination zones, and truck routes will be established, as applicable. The site plan will be updated as necessary to reflect any changes in operations during the course of the intrusive work. During remediation activities, construction fencing will be installed along the perimeter of the Site. Dust control measures will be installed prior to any intrusive activities, as noted in Section 5.2.9. Additional details of site preparation activities are provided in the following sections.

4.3.1 Stabilized Construction Entrance(s)

Stabilized construction entrances (gravel pads) and wash stations will be placed at access points to prevent tracking dust out. All vehicles leaving the project site will be inspected to ensure that soil adhering to the wheels or undercarriage is removed by washing prior to the vehicle leaving the site. Any situations involving material spilled in transit or mud and dust tracked off-site will be remedied. The access routes will be inspected for road conditions, overhead clearance, and weight restrictions.

4.3.2 Utility Marker and Easements Layout

The Volunteer and its contractors are solely responsible for the identification of utilities that might be affected by work under the RAWP/RWP and implementation of all required, appropriate, or necessary health and safety measures during performance of

work under this RAWP/RWP. The Volunteer and its contractors are solely responsible for safe execution of all invasive and other work performed under this RAWP/RWP. The Volunteer and its contractors must obtain any local, State or Federal permits or approvals pertinent to such work that may be required to perform work under this RAWP/RWP. Approval of this RAWP/RWP by NYSDEC does not constitute satisfaction of these requirements.

4.3.3 Sheeting and Shoring

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

4.3.4 Equipment and Material Staging

Staging and storage of equipment and materials will be contained within the secured Site. By the nature of the work involved in this project, equipment and materials will be moved to different areas within the secured Site as work progresses.

4.4 REPORTING

A project logbook will be maintained during all remediation activities, and will be available for NYSDEC and NYSDOH inspection. The following information will be recorded in the project logbook:

- Date, weather, and site conditions;
- Names and companies of all on-site personnel;
- Makes, models, and calibration records for all monitoring equipment;
- Makes and models of remediation equipment;
- Sample numbers and descriptions;
- A truck log listing license plate numbers and arrival/departure times; and
- Site sketches showing excavation areas, sampling locations, and stockpiles (if any).

Copies of all waste manifests and bills of lading will be maintained with the project logbook. All daily and monthly reports will be included in the Final Engineering Report (FER).

4.4.1 Daily Reports

Daily reports will be provided to the NYSDEC/NYSDOH project managers via email during excavation activities. The reports will include a summary of daily activities and air sampling results (including any exceedances), and will describe any odor or dust problems and corrective actions taken. A site map will be submitted, as required, to identify work areas described in the reports. Any time-sensitive information (e.g., the occurrence of a spill or an emergency situation) will be communicated directly to the NYSDEC project manager.

Daily reports will be submitted to NYSDEC and NYSDOH Project Managers and will include:

- An update of progress made during the reporting day;
- Locations of work and quantities of material imported and exported from the Site;
- A summary of any and all complaints with relevant details (names, phone numbers);
- A summary of monitoring findings;
- An explanation of notable Site conditions.

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

The NYSDEC assigned project number will appear on all reports.

4.4.2 Monthly Reports

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

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

4.4.3 Final Engineering Report

Upon completion of Site remediation, a Final Engineering Report (FER) will be prepared and submitted to the NYSDEC and NYSDOH. Details of the FER are provided in Section 6.0.

4.4.4 Deviations from the Remedial Action Work Plan / Remedial Work Plan

All deviations from the RAWP/RWP will be promptly reported to NYSDEC for approval and fully explained in the FER. At a minimum, the following issues will be addressed:

- Reasons for deviating from the approved RAWP/RWP;
- Approval process to be followed for changes/editions to the RAWP/RWP; and
- Effect of the deviations on overall remedy.

5.0 REMEDIAL ACTION ACTIVITIES

The remedial actions consist of the following components:

- Removal of the four on-site USTs;
- A test pit in suspected former 550-gallon UST area to confirm soil quality;
- Application of chemical oxidation product during site development and subsequent monitoring of gasoline-related hydrocarbons in the groundwater;
- Excavation and disposal of soil for construction;
- Installation of a vapor barrier beneath the foundation of the entire building structure at the Site; and
- Site cap in the form of structures, pavement or the importation of two feet of clean fill in landscaped areas.

The actions outlined in this RAWP/RWP will be conducted in accordance with the QAPP provided in Appendix F.

5.1 SOIL REMOVAL AND ESTIMATED QUANTITIES

Based on the results of AKRF's November 2010 RIR, soil at the Site was determined to comprise urban fill; no gasoline-related or other form of contamination was detected in the soil. As such, no targeted soil removal will be conducted. Soil will be excavated for the installation of a foundation and utilities only. No subgrade levels (i.e., parking or basements) will be constructed on the Site (Lot 11). The USTs will also be removed, and although no gasoline-related source of soil contamination was identified by the RIR, any contaminated soil discovered during the tank removals will also be excavated for off-site disposal.

For the purpose of this RAWP/RWP, it is estimated that the Site will be excavated to a maximum depth of four feet below grade. A maximum total of approximately 1,300 cubic yards of soil would be transported off-site for disposal.

The development plan for the Site includes planting eight new trees along the East 136th Street, Third Avenue and East 135th Street sidewalks. The trees will be planted in eight openings in the sidewalk, encompassing approximately five square feet each. A minimum of two feet of certified clean fill will be imported as a cap for these areas. The estimated quantity of soil to be imported into the Site for cover soil is approximately 15 cubic yards.

5.2 SOIL/MATERIALS MANAGEMENT PLAN

Soil encountered during AKRF's November 2010 RIR consisted of primarily urban fill from the ground surface to approximately eight feet below grade. The urban fill layer was underlain by brown fine sand and silt. The water table was encountered between 7 to 10 feet below grade during the investigation. The following sections describe the soil management procedures to be followed during all earth-moving activities, including contingency measures for addressing environmental issues, including the discovery of unforeseen USTs. Removal of the known USTs are described in Section 5.3.

5.2.1 Soil Screening Methods

Visual, olfactory and photoionization detector (PID) soil screening and assessment will be performed by a qualified environmental professional during all soil excavation activities. Soil screening will be performed regardless of when the invasive work is done

and will include all excavation and invasive work performed during the remedy and during development phase, such as excavations for foundations and utility work, prior to issuance of the Certificate of Completion (COC).

5.2.2 Stockpile Methods

No significant soil excavation is anticipated for the Site and, therefore, no extensive stockpiling activities will be conducted. Nonetheless, any stockpiles will be inspected daily and after every storm event. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by NYSDEC.

Stockpiles will be kept covered at all times with appropriately anchored tarps. The covers will be routinely inspected and damaged tarp covers will be promptly replaced.

Alternative procedures to stockpiling could include, but are not limited to, agreement(s) from the intended disposal or treatment facilities to accept analytical data previously obtained so that materials may be directly loaded onto trucks for shipment to the disposal facility.

5.2.3 Trucking and Disposal

Transportation of material leaving the site for off-site disposal will be in accordance with federal, state and local requirements (including 6NYCRR Part 364 and U.S. DOT regulations) covering licensing of haulers and trucks, placarding, truck routes, manifesting, etc. A truck route map is provided as Figure 4, which shows the route to the northbound Major Deegan. Once on the Major Deegan, trucks will drive north for 1.8 miles to Exit 7 and take Interstate 95.

Trucks will be protected by properly covering and lining them with compatible material (such as polyethylene) or by decontamination prior to any use other than hauling contaminated materials. The Site Safety Coordinator (SSC) designated in the HASP will be responsible for insuring that no truck will leave the site without being covered by a tarp. The transporter will not deliver waste to any facility other than the disposal facility(s) listed on the shipping manifest.

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

A truck wash will be operated on-Site. The SSC will be responsible for ensuring that all outbound trucks carrying petroleum-contaminated soil will be washed at the truck wash before leaving the Site until the remedial construction is complete. Locations where vehicles enter or exit the Site shall be inspected daily for evidence of off-Site sediment tracking.

The Volunteer 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). Site development activities will not interfere with, or otherwise impair or compromise, remedial activities proposed in this RAWP/RWP.

5.2.4 Materials Reuse On-Site

Soil excavated for the foundation and utilities will be reused on-site as necessary. Soil to be reused on-site will be tested for VOCs, SVOCs, pesticides, PCBs, and Target Analyte List (TAL) metals by a New York State-certified laboratory. The sampling would be conducted in accordance with DER-10 Section 5.4(e). The results will be compared to the Part 375 Commercial Soil Cleanup Objectives (SCOs) and submitted to the NYSDEC for review and approval prior to on-site reuse. No construction and demolition (C&D) debris will be reused on-site.

5.2.5 Fluids Management

Based on proposed excavation depth, dewatering should not be necessary during project construction at the Site. Nonetheless, if dewatering is required, regulatory protocols may require pretreatment of water pumped from the Site before its discharge into the sewer system. Prior to initiating any dewatering activities, discharge water would be analyzed to ensure it meets the New York City Department of Environmental Protection (NYCDEP) criteria for effluent to municipal sewers as part of the application process for the NYCDEP Bureau of Wastewater Treatment (BWT) Wastewater Quality Control Permit. Any contaminated water generated by construction dewatering will be treated on-site, if necessary, to meet discharge limitations. Following on-site treatment, the water would be discharged to the City sewer with the appropriate permit. The dewatering permit application would be submitted prior to any dewatering activities.

5.2.6 Backfill from Off-Site Sources

Most surfaces on the Site will be covered by building or pavement. Development plans for the Site include planting eight new trees along the East 136th Street, Third Avenue and East 135th Street sidewalks. The trees will be planted in openings in the sidewalk encompassing approximately five square feet. A minimum of two feet of certified clean fill will be imported as a cap for these areas. The estimated quantity of soil to be imported into the Site for cover soil is approximately 15 cubic yards.

Any such fill imported to the site would meet the criteria outlined in 6 NYCRR Part 375. Non-virgin imported material that does not have an approved NYSDEC Beneficial Use Determination will be tested from a segregated stockpile at the originating facility for full list VOCs, SVOCs, pesticides, PCBs, and Target Analyte List (TAL) metals by a New York State-certified laboratory. The sampling should be conducted by an environmental professional in accordance with DER-10 Section 5.4(e). The results will be compared to the appropriate Part 375 SCOs and submitted to the NYSDEC for review and approval prior to importing of the material from a segregated stockpile. No construction and demolition (C&D) debris will be imported to the site for use as fill.

Material from industrial sites, spill sites, other environmental remediation sites or other potentially contaminated sites will not be imported to the Site. Solid waste will not be imported onto the Site. 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 plan should be construed as an approval for this purpose.

Trucks entering the Site with imported soil will be securely covered with tarps.

5.2.7 Contingency Plan

Four USTs exist at the property. These tanks, and any unforeseen USTs, will be removed in accordance with the procedures outlined in Section 5.3. Upon discovery of an unknown source of contamination or area of concern that may require remediation (stained soil, drums, etc.), the procedures in this section will be implemented.

- Spill reporting to the NYSDEC Spill Hotline (800-457-7362) will be conducted, as necessary.
- The suspected soil will be sampled for laboratory analyses. Soil samples will be analyzed for parameters required by the intended disposal facility.
- If the suspect soil is contaminated based on sampling results, it will be excavated and removed in accordance with the stockpiling and/or direct-loading procedures presented in Section 5.2.2. Soils intended for off-site disposal will be disposed of in accordance with applicable federal, state and local requirements and tested in accordance with the requirements of the receiving facility. Additional sample analysis may be required by alternative disposal facilities. Additional analysis may be run on existing sample material at the laboratory as long as all holding time and preservation requirements have not been exceeded. If there are exceedances to these requirements or if additional sampling material is required by the laboratory to complete the required analysis, additional samples may be collected.
- The excavated soil will then be disposed of in accordance with all applicable federal, state and local regulations, as described in Section 5.2.3.
- The excavation will continue vertically until no evidence of contamination is noted in the base of the excavation or until groundwater is encountered. The excavation will continue horizontally until no evidence of contamination is noted in the sidewalls of the excavation. Post-excavation endpoint samples will be collected from the sides and bottom of the excavated area, as required by the NYSDEC. Analytic parameters for post excavation soil samples will be determined based on NYSDEC. If post-excavation samples exceed action levels, then additional excavation will be performed, as warranted.
- Copies of correspondence with disposal facilities concerning classification of materials, testing results, and permits/approvals will be maintained by the project manager and will be submitted to NYSDEC in a Final Engineering Report (FER).

5.2.8 Community Air Monitoring Plan (CAMP)

Community air monitoring will be conducted during all intrusive site activities in compliance with the NYSDOH Generic Community Air Monitoring Plan (CAMP) and as described in the HASP provided in Appendix D. The HASP includes work-zone air monitoring to protect field and construction personnel during implementation of the remedial activities outlined in this RAWP/RWP.

5.2.9 Odor and Dust Control Plan

To prevent the potential off-site transport of dust that may contain above-background levels of contaminants, the following dust control measures will be implemented during all earth-disturbing operations:

- Water will be available (and used) on-site for sprinkling/wetting to suppress dust in dry weather or as necessary.
- All haul trucks will have tarp covers.
- Stabilized construction entrances (gravel pads) and wash stations will be placed at access points to prevent tracking out of dust.

All work that involves soil disturbance or otherwise generates dust will be performed utilizing methods to minimize dust generation to the extent practicable. Particulate air monitoring requirements will be conducted as discussed in the HASP in Appendix D.

Based on the nature of the proposed development and results of the investigation conducted at the Site, nuisance odors are not expected to be a problem at the Site. Should nuisance odors be detected and noted extending beyond the perimeter of the work area, an odor control plan will be developed and implemented in coordination with the NYSDEC. Trucks will be tarped prior to leaving the site to minimize odors from the material in the truck bed.

5.3 UNDERGROUND STORAGE TANK (UST) REMOVALS

Four known 4,000-gallon underground storage tanks (USTs) (three gasoline tanks and one diesel tank) are present at the Site. A geophysical survey of Lot 11 did not detected any other anomalies that would be consistent with the presence of a UST. Known USTs (and piping or other associated equipment), and unforeseen USTs encountered during construction, will be cleaned, removed and disposed of in accordance with accepted industry standards and applicable federal, state, and local regulatory agency requirements. Tank and soil removal from the vicinity of any discovered underground storage tanks will be conducted in accordance with the NYSDEC DER-10 Section 5.5. Laboratory testing of both characterization samples and of endpoint samples obtained from the excavation areas will also be conducted in accordance with DER-10 Section 5.5.

According to 6 NYCRR Part 612.2, the existing State Petroleum Bulk Storage listing for the site must be updated to reflect the discovery and subsequent removal of any known or additional tanks from the site. Tank removal activities and any associated petroleum-contaminated soil removal must be documented in a Spill Closure Report, which will be submitted to NYSDEC. In addition, the removal of any gasoline underground storage tanks must be reported to the New York City Fire Department.

Typical tank removal procedures are summarized as follows:

1. Open fill cap or vent pipe and measure for product. Collect a sample of the product. Tank contents will be sampled in accordance with applicable federal, state and local requirements and tested in accordance with the requirements of the receiving facility. Proper disposal of tank contents at an approved facility will be dictated by sample results.
2. Excavate to expose the tank. Vacuum liquid tank contents and pumpable tank bottom residue.
3. Excavate around the tank with care to avoid release of tank and piping contents. Hand excavation around the tank may be necessary. The sides of all excavated areas will be properly stabilized in accordance with OSHA regulations. Continuously monitor the excavated areas in the worker breathing zone for the presence of flammable, toxic or oxygen deficient atmosphere with a photoionization detector (PID), a combustible gas indicator (CGI), and an oxygen meter.

4. Inert the tank of flammable vapors using dry ice and verify using an oxygen meter (less than 7 percent). An access hole will be cut in the tank and the tank will be thoroughly cleaned of residual liquids and sludges.
5. Entry of the tank, if necessary, will be conducted in conformance with OSHA confined space requirements.
6. Remaining fuels, loose slurry, sludge materials and wastewater will be collected in Department of Transportation (DOT)-approved drums, sampled and analyzed for disposal characterization. After disposal characterization, waste material will be removed and disposed of in accordance with applicable regulations.
7. Remove the tank and all associated piping from the ground and clean the outside of the tank. The tank and piping will be rendered "not reusable," removed from the site and disposed of according to applicable regulations with proper documentation. Remove and dispose of all concrete tank support structures or vaults as encountered.
8. Spill reporting to the NYSDEC Spill Hotline (800-457-7362) will be conducted, as necessary.
9. After tank removal, examine for evidence of petroleum releases. If there is evidence of a petroleum release, the procedures outlined in Section 5.2.7 Contingency Plan will be followed.
10. Suspect materials will be field-screened with a PID. If soil contamination is present, excavate and remove contaminated soil from the tank areas in accordance with the stockpiling and/or direct-loading procedures presented in Sections 5.2.2 and 5.2.3. Material will be excavated until field screening with a PID yields concentrations of less than 20 ppm and until there are no remaining visible signs of contamination or odors. After contaminated soil removal, collect endpoint samples at each sidewall and at the bottom of the excavation for analytical testing as specified in DER-10 Section 5.5.
11. Photo-document all procedures and record all procedures in a bound field notebook.
12. Copies of all testing results, correspondence with disposal facilities concerning classification of materials, and permits/approvals will be maintained by the project manager and will be submitted to the NYSDEC in a Tank Closure Report.
13. A signed affidavit will be prepared by the licensed tank installation (removal) contractor and submitted to the New York City Fire Department (FDNY) certifying proper removal of the tank(s).
14. Any tanks not previously registered will be administratively registered and closed in accordance with FDNY/NYSDEC regulations.

5.4 TEST PIT

A backhoe will be used to excavate a test pit in the area of the suspected former location of the seven 550-gallon gasoline USTs to insure that no petroleum-contaminated soil remains in this area. In addition, a test pit will be excavated at the location of soil boring SB/SG/MW-105 where the only soil samples exhibiting concentrations of VOCs above Part 375 Unrestricted SCOs were detected. The test pit will be excavated to the top of the water table at the location of the former tanks and soil boring SB/SG/MW-105, as depicted on Figure 5. Soil will be inspected for

evidence of contamination (i.e., staining and odors) and will be screened with a PID for organic vapors.

Any petroleum-contaminated soil will be remediated in accordance with the procedures outlined in Section 5.2.7 and transported off-Site for disposal in accordance with Section 5.2.3. If no petroleum-contaminated soil is encountered, the test pit will be backfilled in accordance with the procedures outlines in Section 5.2.4. Post excavation soil sampling will be conducted to ensure that all contaminated soil was properly removed from the site. Endpoint sampling for contaminated soil excavation areas will be conducted in conjunction with NYSDEC approval and as specified in the NYSDEC DER-10 Section 5.5.

Should test pit excavation activities and/or UST removal activities reveal other areas of contaminated soil at the Site, further excavation will be conducted in these areas (in accordance with Section 5.2.7) until all contaminated soil is removed or until further excavation is no longer feasible. If excavation is not feasible, in-situ treatment may be appropriate, including the expansion of ORC treatment described in Section 5.5 to these areas. All adjustments to the remedial strategies described in this report would be conducted in conjunction with, and with approval from, the NYSDEC.

5.5 GROUNDWATER TREATMENT AND MONITORING

In-situ shallow groundwater treatment will be achieved through injecting a chemical oxidation product in an approximately 3,600-square foot area located in the southern portion of Lot 11 where elevated concentrations of gasoline-related VOCs were detected by AKRF's November 2010 RIR and October 2009 quarterly groundwater sampling event (Figures 5 and 6). In-situ remediation will consist of the injection of Regenesis Oxygen Release Compound (ORC) Advanced® and Regenox™ to facilitate contaminant reduction by biodegradation and chemical oxidation of elevated gasoline-related VOCs, including BTEX and MTBE.

Regenesis was consulted with respect to the most aggressive strategy for addressing the on-Site contamination to shallow groundwater. The treatment will consist of 70 pounds of ORC Advanced® and 200 pounds Regenox™ in each injection point. The products will be mixed in accordance with manufacturer's recommendations and injected via 18 temporary Geoprobe direct-push injection points at the locations shown on Figure 6; no permanent wells will be installed for product injection purposes. The spacing will be 15 feet on center (i.e., 15 feet between points and 15 feet between rows). The distance between points was selected to ensure that the minimum area of influence/dispersion of the product was achieved, as shown by the shaded area on Figure 6. The radius of dispersion at each injection point is a minimum of 15 feet.

The product will be applied as a blended material using the direct push technology. Based on the depth of groundwater and extent of contamination, the product will be injected at approximately 10 to 20 feet below grade (at and below the water table). To accomplish this, direct-push drive rods will be advanced to the bottom of the contaminated zone and the chemical oxidant will be injected as the rods are withdrawn. Based on the analytical data for this Site, the Geoprobe rod will be advanced to 20 feet below grade and withdrawn in approximately 1 foot intervals as the material is pumped in. The product injection quantities will be 27 gallons per foot, which is a relatively high volume designed to ensure a sufficient emplacement volume (i.e., pore volume displaced by the injected liquid) and achieve good contact between the product solution and the soil contamination.

The product stays active for approximately 30 days. During that time, advection and dispersion may increase its radius of influence up to an additional 20% to 30% of the original emplacement

volume. Therefore, the larger emplacement volume selected is expected to have a greater radius of influence than is shown on Figure 6 and create a scenario where there is better contact between the product and the contaminants of concern.

Following injection of the chemical oxidation product, groundwater would be monitored via four new, post-construction monitoring wells installed in this portion of the site to evaluate the effectiveness of the in-situ groundwater treatment. The monitoring wells will be screened across the water table and installed in accordance with the QAPP provided in Appendix F. The wells will be installed at the locations shown on Figure 6. Details of the chemical oxidation products and application process are included in Appendix G.

The analytical results of a general chemistry analysis conducted on shallow groundwater samples during AKRF's November 2010 RIR, supported with the field measurements for dissolved oxygen, oxygen reduction potential (ORP), and pH, suggest that reducing conditions exist at the Site that are favorable for the natural biodegradation of the gasoline-related hydrocarbons in groundwater. Therefore, based on the site conditions delineated by the RI, in-situ treatment is expected to reduce the contaminant levels in the shallow groundwater.

Should long term monitoring of the groundwater reveal that a reduction in the target hydrocarbon levels is not occurring, a revised chemical oxidation injection/treatment plan would be developed for the site and submitted to the NYSDEC for review and approval. Furthermore, should test pit excavation and UST removal activities reveal contamination in other areas, the groundwater treatment plan described in this section would be modified accordingly in consultation with, and with approval from, the NYSDEC.

5.6 ENGINEERING CONTROLS

As a precaution to prevent potential vapors from entering new construction, a vapor barrier will be installed as part of the waterproofing system beneath the proposed building at the Site. The vapor barrier will consist of Grace Preprufe 300R below the foundation slab, which is capable of withstanding exposure to the gasoline-range VOCs at the Site. Although Lots 7 through 10 are not in the BCP, a vapor barrier will also be installed along the subgrade walls of this portion of the proposed project construction. The barrier will be installed in accordance with the manufacturer's specifications, including sealing of any penetrations through the foundations. Proof of installation of the vapor barrier will be included in the Professional Engineer (P.E.)-certified Final Engineering Report (FER) discussed in Section 6.0. The vapor barrier specifications and a letter from the manufacturer certifying the Grace product's resistance to gasoline-range organics are provided in Appendix H. Appendix H also includes a technical letter from Grace noting that test studies published by the American Society for Testing and Materials (ASTM) indicate that the vapor barrier material is resistant to petroleum-based hydrocarbons and is expected to last for several hundred years, beyond the life expectancy of the proposed building.

5.7 INSTITUTIONAL CONTROLS

After the remedy is complete, the Site will have residual contamination remaining in place. Engineering controls for the residual contamination have been incorporated into the remedy to render the overall Site remedy protective of public health and the environment. Two elements have been designed to ensure continual and proper management of residual contamination in perpetuity: an Environmental Easement and an SMP. These elements are described in this Section. A Site-specific Environmental Easement will be recorded with Bronx County to provide an enforceable means of ensuring the continual and proper management of residual contamination and protection of public health and the environment in perpetuity or until released in writing by

NYSDEC. It requires that the grantor of the Environmental Easement and the grantor's successors and assigns adhere to all Engineering and Institutional Controls placed on this Site by this NYSDEC-approved remedy. Institutional Controls provide restrictions on Site usage and mandate operation, maintenance, monitoring and reporting measures for all Engineering and Institutional Controls. The SMP describes appropriate methods and procedures to ensure compliance with all Engineering and Institutional Controla that are required by the Environmental Easement. Once the SMP has been approved by the NYSDEC, compliance with the SMP is required by the grantor of the Environmental Easement and grantor's successors and assigns.

5.7.1 Site Management Plan (SMP)

Site Management is the last phase of remediation and begins with the approval of the Final Engineering Report and issuance of the Certificate of Completion (COC) for the Remedial Action. The Site Management Plan (SMP) is submitted as part of the FER but will be written in a manner that allows its removal and use as a complete and independent document. Site Management continues in perpetuity or until released in writing by NYSDEC. The property owner is responsible to ensure that all Site Management responsibilities defined in the SMP are performed. The SMP will include the following:

1. As-built drawings and descriptions of vapor barrier installation, including specifications, certification of installation, and photographs of the installation process;
2. A groundwater monitoring plan to evaluate the performance of the remedial strategy;

5.7.2 Environmental Easement

An Environmental Easement, as defined in Article 71 Title 36 of the Environmental Conservation Law, is required when residual contamination is left on-Site after the Remedial Action is complete. If the Site will have residual contamination after completion of all Remedial Actions, then an Environmental Easement is required. As part of this remedy, an Environmental Easement approved by NYSDEC will be filed and recorded with the Bronx County Clerk. The Environmental Easement will be submitted as part of the Final Engineering Report.

The Environmental Easement renders the Site a Controlled Property. The Environmental Easement must be recorded with the Bronx County Clerk before the Certificate of Completion can be issued by NYSDEC. A series of Institutional Controls are required under this remedy to implement, maintain and monitor these Engineering Control systems, prevent future exposure to residual contamination by controlling disturbances of the subsurface soil and restricting the use of the Site to commercial use only. These Institutional Controls are requirements or restrictions placed on the Site that are listed in, and required by, the Environmental Easement. Institutional Controls can, generally, be subdivided between controls that support Engineering Controls, and those that place general restrictions on Site usage or other requirements. Institutional Controls in both of these groups are closely integrated with the SMP, which provides all of the methods and procedures to be followed to comply with this remedy.

5.7.3 Annual Certification

An Annual Certification will be submitted to the New York State Department of Environmental Conservation (NYSDEC) to document the efficacy of the remedy. The

Annual Certification will be signed by a Professional Engineer (P.E.), and will certify that: the institutional and/or engineering controls are unchanged from the previous certification; nothing has occurred that would impair the ability of the controls to protect public health and the environment; and no violations of the Site Management Plan have occurred. The certification will include the monitoring data collected during the reporting period as specified in the Site Management Plan.

6.0 FINAL ENGINEERING REPORT

A Final Engineering Report (FER) and Certificate Of Completion (COC) will be submitted to NYSDEC following implementation of the Remedial Action defined in this RAWP/RWP. The FER provides the documentation that the remedial work required under this RAWP/RWP has been completed and has been performed in compliance with this plan. The FER will provide a comprehensive account of the locations and characteristics of all material removed from the Site. At a minimum, the contents of the FER will include the requirements as stated in NYSDEC DER-10 Section 5.8, including, but not limited to:

- Photographs of remedial activities;
- Tables and figures pursuant to DER-10 Section 3.14 containing all pre- and post-remedial data keyed appropriately so that completion of the remedial action is documented. The figures will clearly indicate the volume of contaminated soil which was remediated, as well as contamination remaining at the Site to be managed by the SMP.
- Monitoring and documentation sampling results collected during implementation of the remedy;
- SMP for the remedy;
- Groundwater Monitoring Plan;
- Daily field logs and monthly reports;
- Proof of vapor barrier installation beneath all slabs and foundation walls in the form of a certified letter indicating that the installation was conducted in accordance with the manufacturer's specifications;
- Accounting of the destination of all material removed from the site and associated manifests/bills of lading and certificates of disposal from the respective receiving facilities;
- Documentation of source approval and sampling for backfill materials imported from off-site, if any;
- Site plan showing locations of all primary contaminant sources identified during investigation and remediation activities; and
- Itemized description of costs incurred during site remediation.

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

Job-site record keeping for all remedial work will be appropriately documented. These records will be maintained on-site at all times during the project and be available for inspection by NYSDEC and NYSDOH staff. Before approval of an FER and issuance of a Certificate of Completion, all project reports must be submitted in digital form on electronic media (PDF). The Final Engineering Report will

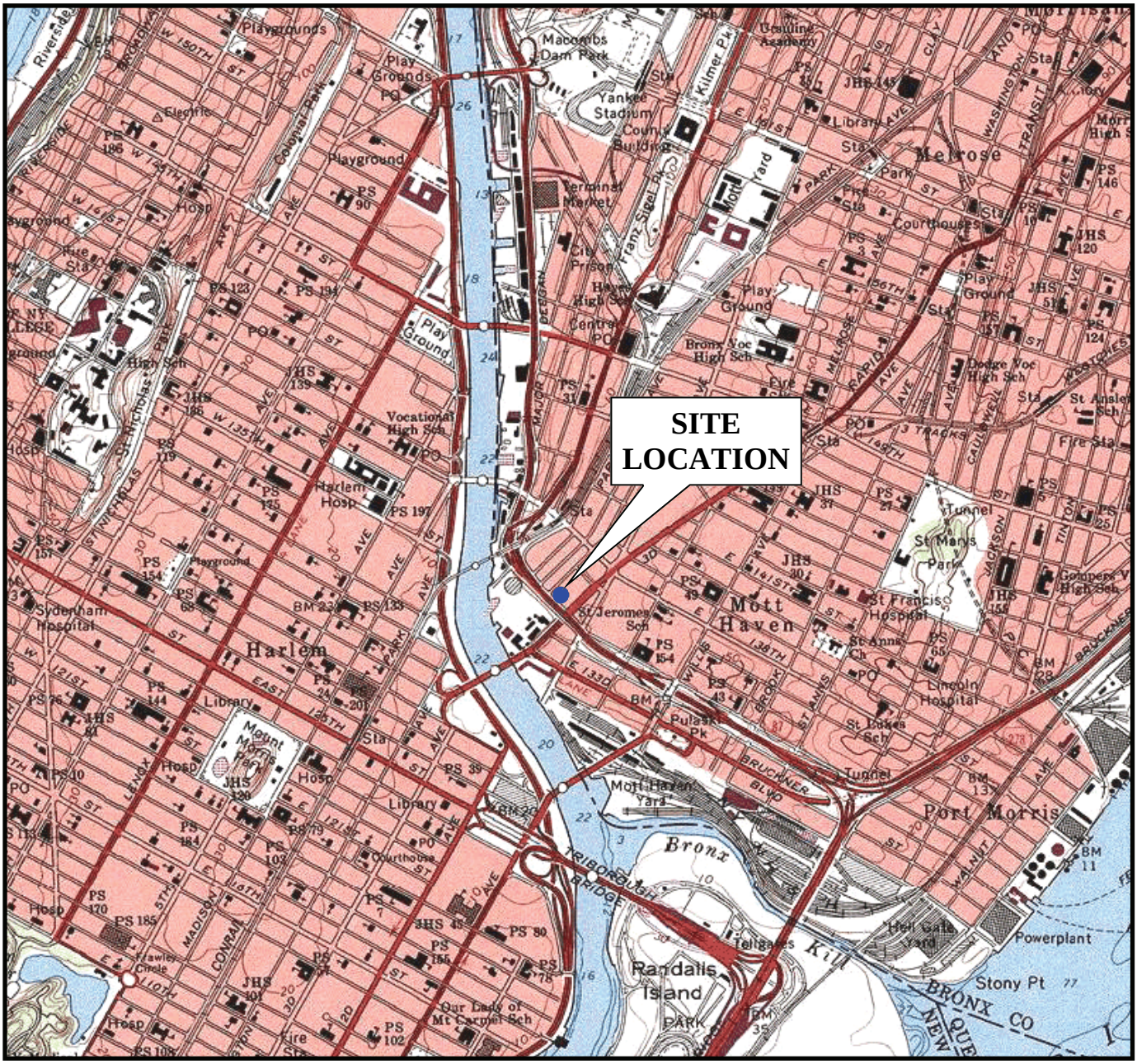
be certified by the Remedial Engineer, Michelle Lapin, who is a Professional Engineer registered in New York State. This certification will be appropriately signed and stamped.

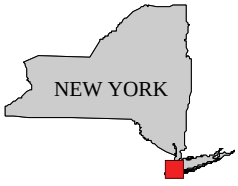
7.0 SCHEDULE

Field work will be scheduled from 7:00 AM to 6:00 PM on weekdays. Appropriate approvals will be obtained for work conducted outside of these hours. The remediation work is scheduled to begin immediately following the public comment period and final approval of this RAWP/RWP by the NYSDEC. This will consist of the tank removals and the in-situ groundwater treatment and will be conducted prior to soil disturbing activities associated with the development of the Site.

Since a construction schedule for the proposed project has not been completely developed, an exact schedule of the remedial activities cannot be accurately estimated at this time. Furthermore, development of the Volunteer's project includes construction of the proposed hotel on Lots 7 through 10, northwest-adjacent to the Site (Lot 11). The schedule for certain remedial elements (i.e., installation of the vapor barrier and post-construction monitoring wells) will be subject to the construction schedule on those lots. Appendix I provides a current tentative schedule of the remediation work. As the construction schedule is developed, the schedule may be revised and an updated schedule will be provided to the NYSDEC for review and approval.

FIGURES





SCALE IN FEET

0’ 1000’ 2000’ 4000’

SCALE: 1”=2000’

N

SOURCE:

7.5 MINUTE SERIES USGS TOPOGRAPHIC MAP
QUADRANGLE: CENTRAL PARK, NY 1995

2477 THIRD AVENUE
BRONX, NEW YORK

PROJECT SITE LOCATION

AKRF

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

DATE	1.29.09
PROJECT No.	11160
SCALE	AS SHOWN
FIGURE	1

LEGEND:

- PROJECT SITE BOUNDARY
- SB/SG-102 — SOIL BORING AND SOIL VAPOR SAMPLING LOCATION
- SB/SG/MW-101 — SOIL BORING, SOIL VAPOR SAMPLING AND DEEP WELL LOCATION
- SS-101 — SURFACE SOIL SAMPLE
- ASR\ MW-8 — SHALLOW MONITORING WELLS INSTALLED BY ADVANCED SITE RESTORATION, LLC (ASR) FROM 2007 TO 2008
- 4,000 GALLON UST (EXISTING)
- SUSPECTED LOCATION OF 7 FORMER 550 GALLON GASOLINE USTs (from Soil Mechanics, 1984)
- ASPHALT PATCH; SUSPECTED LOCATION OF THREE 12,000 GASOLINE USTs (REMOVED)

0' 15' 30' 60'
SCALE IN FEET

AKRF
Environmental Consultants
440 Park Avenue South, New York, NY 10016

2477 THIRD AVENUE
BRONX, NEW YORK

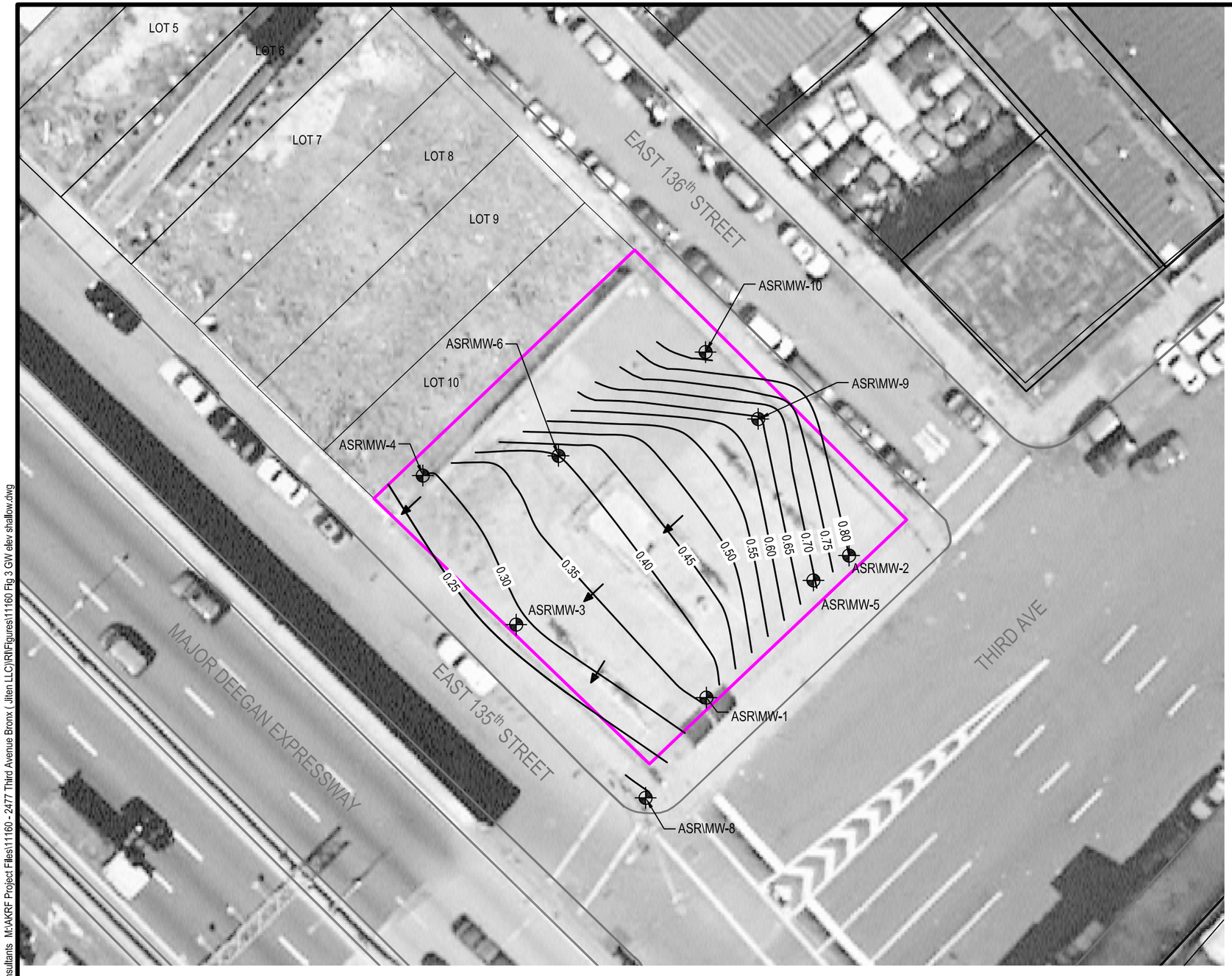
SITE PLAN

DATE
8.23.10

PROJECT NO.
11160

SCALE
as shown

FIGURE
2



LEGEND:

- PROJECT SITE BOUNDARY
- 0.45 — GROUNDWATER ELEVATION CONTOUR (BRONX TOPOGRAPHICAL BUREAU DATUM)
- ASR\MW-8 — SHALLOW AQUIFER MONITORING WELL
- GROUNDWATER FLOW DIRECTION

0' 15' 30' 60'
SCALE IN FEET

AKRF
Environmental Consultants
440 Park Avenue South, New York, NY 10016

2477 THIRD AVENUE
BRONX, NEW YORK

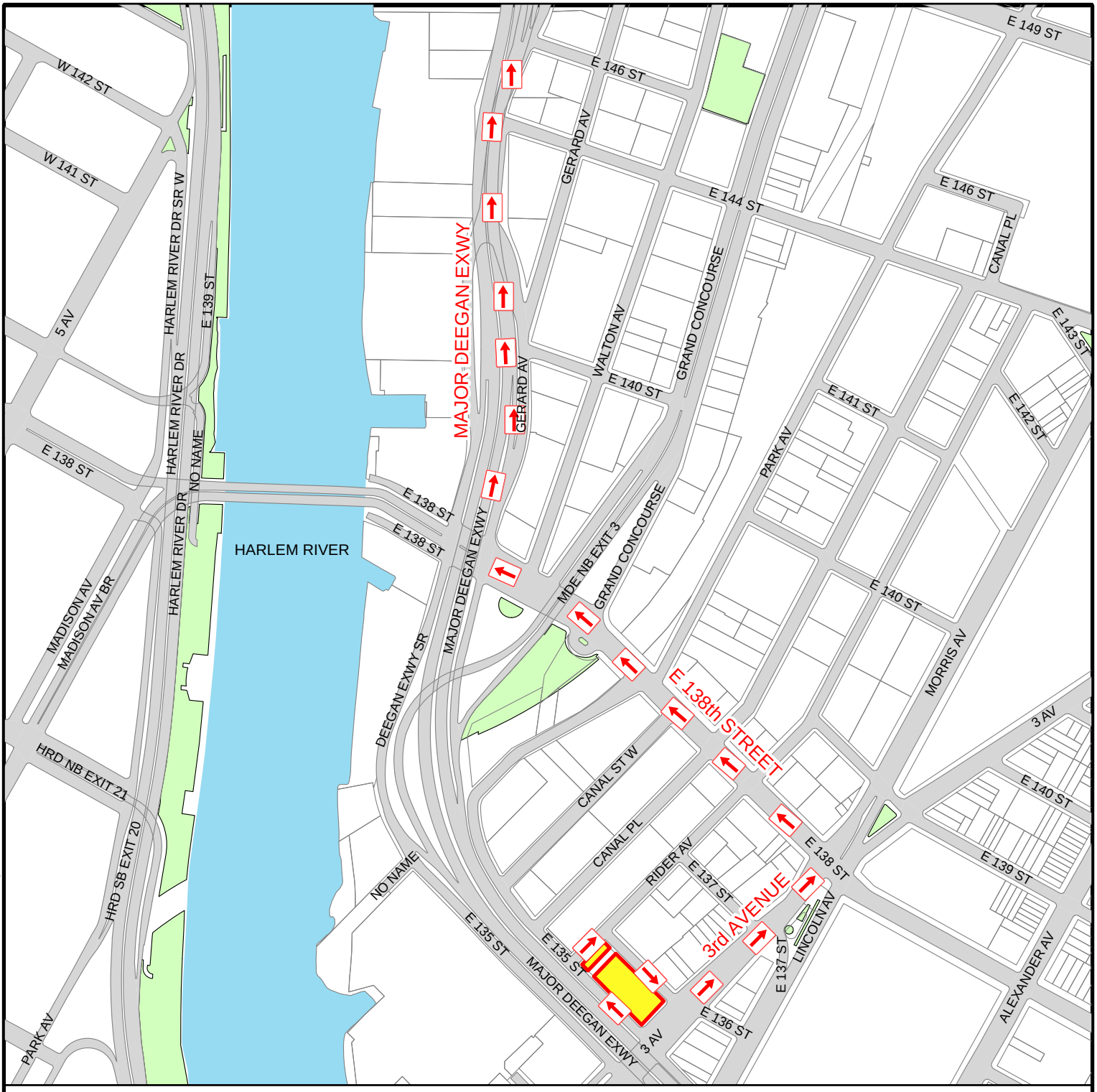
SHALLOW AQUIFER WATER TABLE ELEVATIONS

DATE
8.19.10

PROJECT NO.
11160

SCALE
as shown

FIGURE
3



Legend

- Truck Route
- Project site Location

0 500 1,000 Feet

2477 THIRD AVENUE
BRONX, NEW YORK

TRUCK ROUTE MAP

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

DATE
2.14.11

PROJECT No.
11160

FIGURE
4

ASR MW-4

COMPOUND	Nov-10	Oct-09
1,2,4,5-Tetramethylbenzene	12	NE
1,2,4-Trimethylbenzene	130	ND
1,3,5-Trimethylbenzene	31	ND
Ethylbenzene	47	NE
Hexachloroethane	9.9	NA
Isopropylbenzene	6.7	NE
Naphthalene	26	ND
n-Propylbenzene	17	NE
o-Xylene	43	ND
p/m-Xylene	160	ND
Total	483	ND

ASR MW-6

COMPOUND	Nov-10	Oct-09
VOCs	ND	ND

ASR MW-10

COMPOUND	Nov-10	Oct-09
VOCs	ND	ND

ASR MW-9

COMPOUND	Nov-10	Oct-09
VOCs	ND	ND

ASR MW-3

COMPOUND	Nov-10	Oct-09
1,2,4,5-Tetramethylbenzene	96	NA
1,2,4-Trimethylbenzene	200	91
1,3,5-Trimethylbenzene	57	34
Benzene	42	72
Ethylbenzene	350	400
Isopropylbenzene	85	95
Methyl tert butyl ether	28	46
Naphthalene	54	92
n-Butylbenzene	43	37
n-Propylbenzene	270	400
o-Xylene	450	82
p/m-Xylene	980	630
sec-Butylbenzene	38	32
Toluene	410	36
Total	3103	2049

ASR MW-2

COMPOUND	Nov-10	Oct-09
1,2,4,5-Tetramethylbenzene	61	NA
1,2,4-Trimethylbenzene	14	46
Ethylbenzene	7.9	23
Isopropylbenzene	12	26
n-Butylbenzene	33	81
n-Propylbenzene	84	100
sec-Butylbenzene	33	70
p/m xylene	2.3	6
Total	247	352

ASR MW-8

COMPOUND	Nov-10	Oct-09
1,2,4,5-Tetramethylbenzene	26	NA
1,2,4-Trimethylbenzene	420	5.5
1,3,5-Trimethylbenzene	75	ND
Benzene	33	ND
Ethylbenzene	920	NE
Isopropylbenzene	90	NE
Naphthalene	51	ND
n-Butylbenzene	9.1	ND
n-Propylbenzene	180	NE
o-Xylene	620	ND
p/m-Xylene	1900	NE
sec-Butylbenzene	8.4	NE
Toluene	770	ND
Total	5103	5.5

ASR MW-1

COMPOUND	Nov-10	Oct-09
1,2,4,5-Tetramethylbenzene	72	NA
1,2,4-Trimethylbenzene	220	510
1,3,5-Trimethylbenzene	45	89
Benzene	ND	6.4
Ethylbenzene	360	550
Isopropylbenzene	100	110
Naphthalene	33	80
n-Butylbenzene	18	36
n-Propylbenzene	240	320
o-Xylene	190	200
p/m-Xylene	700	990
p-Isopropyltoluene	7.6	9.2
sec-Butylbenzene	19	22
Toluene	65	70
Total	2070	2993

ASR MW-5

COMPOUND	Nov-10	Oct-09
1,2,4-Trimethylbenzene	NA	3300
1,3,5-Trimethylbenzene	NA	820
Ethylbenzene	NA	730
Isopropylbenzene	NA	160
n-Butylbenzene	NA	140
n-Propylbenzene	NA	560
Naphthalene	NA	90
o-Xylene	NA	370
p-Isopropyltoluene	NA	27
p/m-Xylene	NA	2300
Toluene	NA	11
Total	NA	8508

LEGEND:

- PROJECT SITE BOUNDARY
- SB/SG-102 — SOIL BORING AND SOIL VAPOR SAMPLING LOCATION
- SB/SG/MW-101 — SOIL BORING, SOIL VAPOR SAMPLING AND DEEP WELL LOCATION
- SS-101 — SURFACE SOIL SAMPLE
- UST EXCAVATION AND PROPOSED TEST PIT INVESTIGATION AREA
- ASR\ MW-8 — SHALLOW MONITORING WELL INSTALLED BY ADVANCED SITE RESTORATION, LLC (ASR) FROM 2007 TO 2008
- 4,000 GALLON UST (EXISTING)
- SUSPECTED LOCATION OF 7 FORMER 550-GALLON GASOLINE USTs (from Soil Mechanics, 1984)
- 1000 — CONTOUR LINE OF TOTAL VOCS EXCEEDING CLASS GA STANDARDS IN PPB (AKRF Nov 2010 RIR DATA)

Sample ID number

AKRF's Nov 2010 RIR Data

AKRF's Oct 2009 Quarterly Monitoring Data

ASR MW-6

COMPOUND	Nov-10	Oct-09
VOCs	ND	ND

Concentration in parts per billion (ppb) or micrograms per liter(µg/l)

ND	NOT DETECTED
NA	NOT ANALYZED
NE	DID NOT EXCEED CLASS GA STANDARD
11	EXCEEDANCE OF CLASS GA STANDARD

0' 15' 30' 60'

SCALE IN FEET

AKRF Environmental Consultants
440 Park Avenue South, New York, NY 10016

2477 THIRD AVENUE
BRONX, NEW YORK

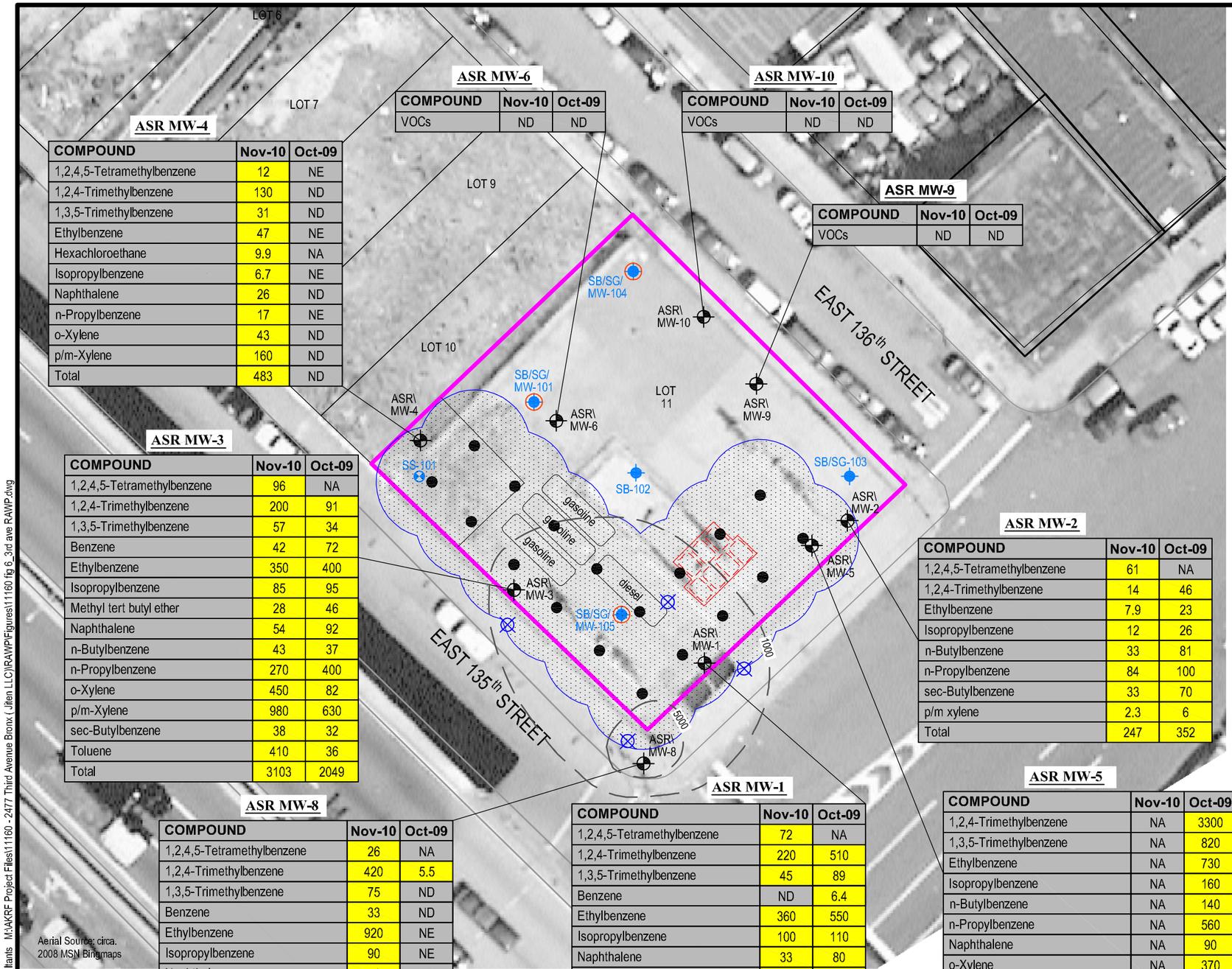
SITE PLAN WITH REMEDIAL STRATEGY

DATE 05.05.11

PROJECT NO. 11160

SCALE as shown

FIGURE 5



ASR MW-4

COMPOUND	Nov-10	Oct-09
1,2,4,5-Tetramethylbenzene	12	NE
1,2,4-Trimethylbenzene	130	ND
1,3,5-Trimethylbenzene	31	ND
Ethylbenzene	47	NE
Hexachloroethane	9.9	NA
Isopropylbenzene	6.7	NE
Naphthalene	26	ND
n-Propylbenzene	17	NE
o-Xylene	43	ND
p/m-Xylene	160	ND
Total	483	ND

ASR MW-6

COMPOUND	Nov-10	Oct-09
VOCs	ND	ND

ASR MW-10

COMPOUND	Nov-10	Oct-09
VOCs	ND	ND

ASR MW-9

COMPOUND	Nov-10	Oct-09
VOCs	ND	ND

ASR MW-3

COMPOUND	Nov-10	Oct-09
1,2,4,5-Tetramethylbenzene	96	NA
1,2,4-Trimethylbenzene	200	91
1,3,5-Trimethylbenzene	57	34
Benzene	42	72
Ethylbenzene	350	400
Isopropylbenzene	85	95
Methyl tert butyl ether	28	46
Naphthalene	54	92
n-Butylbenzene	43	37
n-Propylbenzene	270	400
o-Xylene	450	82
p/m-Xylene	980	630
sec-Butylbenzene	38	32
Toluene	410	36
Total	3103	2049

ASR MW-2

COMPOUND	Nov-10	Oct-09
1,2,4,5-Tetramethylbenzene	61	NA
1,2,4-Trimethylbenzene	14	46
Ethylbenzene	7.9	23
Isopropylbenzene	12	26
n-Butylbenzene	33	81
n-Propylbenzene	84	100
sec-Butylbenzene	33	70
p/m xylene	2.3	6
Total	247	352

ASR MW-8

COMPOUND	Nov-10	Oct-09
1,2,4,5-Tetramethylbenzene	26	NA
1,2,4-Trimethylbenzene	420	5.5
1,3,5-Trimethylbenzene	75	ND
Benzene	33	ND
Ethylbenzene	920	NE
Isopropylbenzene	90	NE
Naphthalene	51	ND
n-Butylbenzene	9.1	ND
n-Propylbenzene	180	NE
o-Xylene	620	ND
p/m-Xylene	1900	NE
sec-Butylbenzene	8.4	NE
Toluene	770	ND
Total	5103	5.5

ASR MW-1

COMPOUND	Nov-10	Oct-09
1,2,4,5-Tetramethylbenzene	72	NA
1,2,4-Trimethylbenzene	220	510
1,3,5-Trimethylbenzene	45	89
Benzene	ND	6.4
Ethylbenzene	360	550
Isopropylbenzene	100	110
Naphthalene	33	80
n-Butylbenzene	18	36
n-Propylbenzene	240	320
o-Xylene	190	200
p/m-Xylene	700	990
p-Isopropyltoluene	7.6	9.2
sec-Butylbenzene	19	22
Toluene	65	70
Total	2070	2993

ASR MW-5

COMPOUND	Nov-10	Oct-09
1,2,4-Trimethylbenzene	NA	3300
1,3,5-Trimethylbenzene	NA	820
Ethylbenzene	NA	730
Isopropylbenzene	NA	160
n-Butylbenzene	NA	140
n-Propylbenzene	NA	560
Naphthalene	NA	90
o-Xylene	NA	370
p-Isopropyltoluene	NA	27
p/m-Xylene	NA	2300
Toluene	NA	11
Total	NA	8508

LEGEND:

- PROJECT SITE BOUNDARY
- SB/SG-102 — SOIL BORING AND SOIL VAPOR SAMPLING LOCATION
- SB/SG/MW-101 — SOIL BORING, SOIL VAPOR SAMPLING AND DEEP WELL LOCATION
- SS-101 — SURFACE SOIL SAMPLE
- AREA OF INFLUENCE OF ORC DISPERSION
- PROPOSED ORC INJECTION BORING LOCATION
- PROPOSED LOCATION OF POST REMEDIATION MONITORING WELL
- ASR\ MW-8 — SHALLOW MONITORING WELL INSTALLED BY ADVANCED SITE RESTORATION, LLC (ASR) FROM 2007 TO 2008
- 4,000 GALLON UST (EXISTING)
- SUSPECTED LOCATION OF 7 FORMER 550-GALLON GASOLINE USTs (from Soil Mechanics, 1984)
- 1000 — CONTOUR LINE OF TOTAL VOCS EXCEEDING CLASS GA STANDARDS IN PPB (AKRF Nov 2010 RIR DATA)

Sample ID number: **ASR MW-6**

COMPOUND	Nov-10	Oct-09
VOCs	ND	ND

AKRF's Nov 2010 RIR Data

AKRF's Oct 2009 Quarterly Monitoring Data

Concentration in parts per billion (ppb) or micrograms per liter(µg/l)

ND	NOT DETECTED
NA	NOT ANALYZED
NE	DID NOT EXCEED CLASS GA STANDARD
11	EXCEEDANCE OF CLASS GA STANDARD

0' 15' 30' 60'

SCALE IN FEET

AKRF Environmental Consultants
440 Park Avenue South, New York, NY 10016

2477 THIRD AVENUE
BRONX, NEW YORK

SITE PLAN WITH ORC INJECTION PLAN

DATE 05.05.11

PROJECT NO. 11160

SCALE as shown

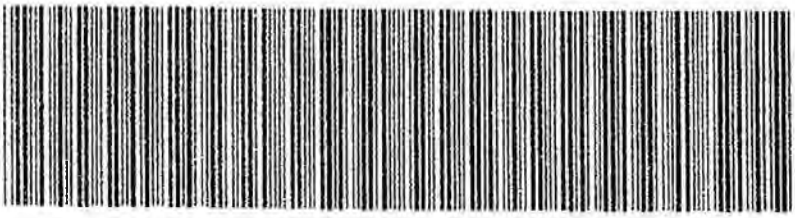
FIGURE 6

APPENDIX A

PROPERTY METES AND BOUNDS

NYC DEPARTMENT OF FINANCE
OFFICE OF THE CITY REGISTER

This page is part of the instrument. The City Register will rely on the information provided by you on this page for purposes of indexing this instrument. The information on this page will control for indexing purposes in the event of any conflict with the rest of the document.



2009011500157001001EC672

RECORDING AND ENDORSEMENT COVER PAGE PAGE 1 OF 6

Document ID: 2009011500157001 Document Date: 01-05-2009 Preparation Date: 01-15-2009
Document Type: DEED
Document Page Count: 4

PRESENTER:
HORIZON LAND SVS - PICK UP USTA
AGENT FOR COMMONWEALTH LAND TITLE
15 WEST 44TH STREET -7TH FLOOR
NEW YORK, NY 10036
212-921-4141
HLS BX 13404 pdrummond@horizonlandservices.com

RETURN TO:
PICK UP USTA
STEVE QUELLER, ESQ.
450 SEVENTH AVENUE - SUITE 2300
NEW YORK, NY 10123

PROPERTY DATA

Borough	Block	Lot		Unit	Address
BRONX	2320	5	Entire Lot		240 EAST 136 STREET
Property Type: OTHER					
Borough	**Block**	**Lot**		**Unit**	**Address**
BRONX	2320	7	Entire Lot		244 EAST 136 STREET
Property Type: OTHER					

x Additional Properties on Continuation Page

CROSS REFERENCE DATA
CRFN____ __ *or* Document ID_____ *or* _____ Year ___ Reel __ Page____ *or* File Number_____

PARTIES

GRANTOR/SELLER:
PACO THIRD AVENUE, LLC
364 MASPETH AVENUE
BROOKLYN, NY 11211

GRANTEE/BUYER:
JITEN LLC
30 BYRD AVENUE
CARLE PLACE, NY 11514

FEES AND TAXES

Mortgage			Filing Fee:	
Mortgage Amount:	$	0.00	$	165.00
Taxable Mortgage Amount:	$	0.00	NYC Real Property Transfer Tax:	
Exemption:			$	118,125.00
TAXES: County (Basic):	$	0.00	NYS Real Estate Transfer Tax:	
City (Additional):	$	0.00	$	18,000.00
Spec (Additional):	$	0.00		
TASF:	$	0.00		
MTA:	$	0.00		
NYCTA:	$	0.00		
Additional MRT:	$	0.00		
TOTAL:	$	0.00		
Recording Fee:	$	72.00		
Affidavit Fee:	$	0.00		

RECORDED OR FILED IN THE OFFICE OF THE CITY REGISTER OF THE CITY OF NEW YORK
Recorded/Filed 02-10-2009 10:57
City Register File No.(CRFN):
2009000038222

City Register Official Signature

NYC DEPARTMENT OF FINANCE
OFFICE OF THE CITY REGISTER

2009011500157001001CC4F2

RECORDING AND ENDORSEMENT COVER PAGE (CONTINUATION) PAGE 2 OF 6

Document ID: 2009011500157001 Document Date: 01-05-2009 Preparation Date: 01-15-2009
Document Type: DEED

PROPERTY DATA

Borough	Block	Lot		Unit	Address
BRONX	2320	8	Entire Lot		246 EAST 136 STREET
Property Type:	OTHER				
Borough	**Block**	**Lot**		**Unit**	**Address**
BRONX	2320	9	Entire Lot		248 EAST 136 STREET
Property Type:	OTHER				
Borough	**Block**	**Lot**		**Unit**	**Address**
BRONX	2320	10	Entire Lot		N/A EAST 136 STREET
Property Type:	OTHER				
Borough	**Block**	**Lot**		**Unit**	**Address**
BRONX	2320	11	Entire Lot		2477 3 AVENUE
Property Type:	OTHER				

— Bargain and Sale Deed, with Covenant against Grantor's Acts — Individual or Corporation (Single Sheet)

NYST $18000.-

CONSULT YOUR LAWYER BEFORE SIGNING THIS INSTRUMENT—THIS INSTRUMENT SHOULD BE USED BY LAWYERS ONLY

THIS INDENTURE, made AS OF the 5TH day of ~~December~~ JANUARY, in the year 2009

BETWEEN PACO THIRD AVENUE, LLC, with an office at 364 Maspeth Avenue, Brooklyn, NY 11211

party of the first part, and JITEN, LLC, with an office at 30 Byrd Avenue, Carle Place, New York 11514

party of the second part,

WITNESSETH, that the party of the first part, in consideration of

Ten ($10.00) dollars

paid by the party of the second part, does hereby grant and release unto the party of the second part, the heirs or successors and assigns of the party of the second part forever.

ALL that certain plot, piece or parcel of land, with the buildings and improvements thereon erected, situate, lying and being in the

See Schedule "A" annexed hereto and made a part hereof.

TOGETHER with all right, title and interest, if any, of the party of the first part in and to any streets and roads abutting the above described premises to the center lines thereof; TOGETHER with the appurtenances and all the estate and rights of the party of the first part in and to said premises; TO HAVE AND TO HOLD the premises herein granted unto the party of the second part, the heirs or successors and assigns of the party of the second part forever.

AND the party of the first part covenants that the party of the first part has not done or suffered anything whereby the said premises have been encumbered in any way whatever, except as aforesaid.
AND the party of the first part, in compliance with Section 13 of the Lien Law, covenants that the party of the first part will receive the consideration for this conveyance and will hold the right to receive such consideration as a trust fund to be applied first for the purpose of paying the cost of the improvement and will apply the same first to the payment of the cost of the improvement before using any part of the total of the same for any other purpose. The word "party" shall be construed as if it read "parties" whenever the sense of this indenture so requires.

IN WITNESS WHEREOF, the party of the first part has duly executed this deed the day and year first above written.

IN PRESENCE OF:

PACO THIRD AVENUE, LLC
BY: PACO REALTY, LLC
By its Manager PORCELLI REALTY MANAGEMENT LLC

By: Norma Porcelli, Manager

ACKNOWLEDGEMENT TAKEN IN NEW YORK STATE

State of New York, County of Kings, ss:

On the 18th day of December in the year 2008, before me, the undersigned, personally appeared Norma Porcelli

, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name(s) is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument

LOUIS FRESOLONE
Notary Public, State of New York
No. 4980420
Qualified in Suffolk County
Commission Expires April 22, 2011

SEAL

ACKNOWLEDGEMENT BY SUBSCRIBING WITNESS TAKEN IN NEW YORK STATE

State of New York, County of , ss:

On the day of in the year , before me, the undersigned, a Notary Public in and for said State, personally appeared , the subscribing witness to the foregoing instrument, with whom I am personally acquainted, who, being by me duly sworn, did depose and say that he/she/they reside(s) in

(if the place of residence is in a city, include the street and street number if any, thereof); that he/she/they know(s)

to be the individual described in and who executed the foregoing instrument; that said subscribing witness was present and saw said

execute the same; and that said witness at the same time subscribed his/her/their name(s) as a witness thereto

ACKNOWLEDGEMENT TAKEN IN NEW YORK STATE

State of New York, County of , ss:

On the day of in the year , before me, the undersigned, personally appeared

, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name(s) is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

ACKNOWLEDGEMENT TAKEN OUTSIDE NEW YORK STATE

*State of , County of , ss:
*(Or insert District of Columbia, Territory, Possession or Foreign County)

On the day of in the year , before me the undersigned personally appeared

Personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name(s) is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), that by his/her/their signature(s) on the instrument, the individual(s) or the person upon behalf of which the individual(s) acted, executed the instrument, and that such individual make such appearance before the undersigned in the

(add the city or political subdivision and the state or country or other place the acknowledgement was taken).

Bargain and Sale Deed With Covenants

Title No. HLS-BX-13404

SECTION:

BLOCK: 2320

LOT: 5, 7, 8, 9, 10 & 11

COUNTY OR TOWN: Bronx

240, 244, 246, 240-248 East 136th Street and 2477 Third Avenue, Bronx, NY

PACO THIRD AVENUE, LLC
TO
JITEN, LLC

DISTRIBUTED BY
YOUR TITLE EXPERTS
The Judicial Title Insurance Agency LLC
800-281-TITLE (8485) FAX: 800-FAX-9396

RETURN BY MAIL TO:

Steve Quelier, Esq.
450 Seventh Avenue, Suite 2300
New York, New York 10123

As to Lot 11

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

BEGINNING at the southwesterly corner of 3rd Avenue and East 136th Street;

RUNNING THENCE westerly along the southerly side of East 136th Street, 100 feet (tax map) (99.92 deed);

THENCE southerly parallel with the westerly side of 3rd Avenue, 93.03 feet;

THENCE easterly parallel with the southerly side of East 136th Street, 100 feet (tax map) (99.92 feet deed) to the westerly side of 3rd Avenue;

THENCE northerly along the westerly side of 3rd Avenue, 93.57 feet to the corner, the point or place of BEGINNING.

As to Lots 7, 8, 9 and 10

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

BEGINNING at a point on the southerly line of East 136th Street (50 feet wide) said point of beginning being 50.00 feet easterly from the intersection of said line of East 136th Street with the easterly line of Rider Avenue (50 feet wide), and running from said point of beginning;

THENCE along the southerly line of East 136th Street, South 74 degrees 23 minutes 10 seconds East, a distance of 100.08 feet to a point;

THENCE along the dividing line between Lot 10 and 11, Block 2320, South 15 degrees 36 minutes 50 seconds West, a distance of 93.03 feet to a point on the northerly line of Major Deegan Expressway (a/k/a Major William F. Deegan Boulevard, Harlem River Terrace and East 135th Street, 169 feet wide);

THENCE along said line of Major Deegan Expressway, North 74 degrees 04

minutes 50 seconds West, a distance of 100.08 feet to a point;

THENCE along the dividing line between Lots 7 and 6 Block 2320, North 15 degrees 36 minutes 50 seconds East, a distance of 92.50 feet to the point or place of BEGINNING.

As to Lot 5

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

BEGINNING at a point where the southerly line of East 136th Street (50 feet wide) is intersected by the easterly line of Rider Avenue (50 feet wide), and running from said point of beginning;

THENCE along said line of East 136th Street, South 74 degrees 23 minutes 10 seconds East, a distance of 25.00 feet to a point;

THENCE along the dividing line between Lots 5 & 7, Block 2320, South 15 degrees 36 minutes 50 seconds West, a distance of 92.37 feet to a point on the northerly line of Major Deegan Expressway (a/k/a Major William F. Deegan Boulevard, Major Deegan Boulevard, Harlem River Terrace and East 135th Street, 169 feet wide);

THENCE along said line of Major Deegan Expressway, North 74 degrees 04 minutes 50 seconds West, a distance of 25.00 feet to a point on the easterly line of Rider Avenue;

THENCE along the easterly line of Rider Avenue, North 15 degrees 36 minutes 50 seconds East, a distance of 92.23 feet to the point or place of BEGINNING.

NYC DEPARTMENT OF FINANCE
OFFICE OF THE CITY REGISTER

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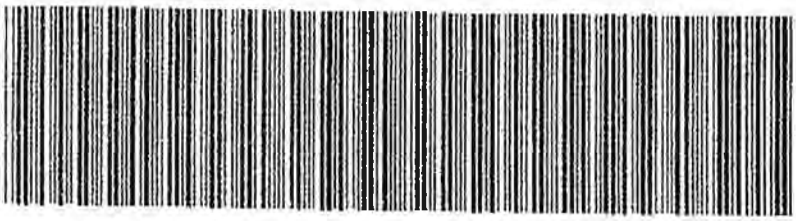

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RECORDING AND ENDORSEMENT COVER PAGE PAGE 1 OF 6

Document ID: 2009011500157001 Document Date: 01-05-2009 Preparation Date: 01-15-2009
Document Type: DEED
Document Page Count: 4

PRESENTER:
HORIZON LAND SVS - PICK UP USTA
AGENT FOR COMMONWEALTH LAND TITLE
15 WEST 44TH STREET -7TH FLOOR
NEW YORK, NY 10036
212-921-4141
IILS BX 13404 pdrummond@horizonlandservices.com

RETURN TO:
PICK UP USTA
STEVE QUELLER, ESQ.
450 SEVENTH AVENUE - SUITE 2300
NEW YORK, NY 10123

PROPERTY DATA

Borough	Block	Lot		Unit	Address
BRONX	2320	5	Entire Lot		240 EAST 136 STREET
Property Type: OTHER					
Borough	**Block**	**Lot**		**Unit**	**Address**
BRONX	2320	7	Entire Lot		244 EAST 136 STREET
Property Type: OTHER					

x Additional Properties on Continuation Page

CROSS REFERENCE DATA

CRFN____ or Document ID_____ or ____ Year____ Reel ____ Page____ or File Number_____

PARTIES

GRANTOR/SELLER:
PACO THIRD AVENUE, LLC
364 MASPETH AVENUE
BROOKLYN, NY 11211

GRANTEE/BUYER:
JITEN LLC
30 BYRD AVENUE
CARLE PLACE, NY 11514

FEES AND TAXES

Mortgage		Filing Fee:	$ 165.00
Mortgage Amount:	$ 0.00		
Taxable Mortgage Amount:	$ 0.00	NYC Real Property Transfer Tax:	$ 118,125.00
Exemption:		NYS Real Estate Transfer Tax:	$ 18,000.00
TAXES: County (Basic):	$ 0.00		
City (Additional):	$ 0.00		
Spec (Additional):	$ 0.00		
TASF:	$ 0.00		
MTA:	$ 0.00		
NYCTA:	$ 0.00		
Additional MRT:	$ 0.00		
TOTAL:	$ 0.00		
Recording Fee:	$ 72.00		
Affidavit Fee:	$ 0.00		

RECORDED OR FILED IN THE OFFICE OF THE CITY REGISTER OF THE CITY OF NEW YORK
Recorded/Filed 02-10-2009 10:57
City Register File No.(CRFN):
2009000038222

City Register Official Signature

NYC DEPARTMENT OF FINANCE
OFFICE OF THE CITY REGISTER

2009011500157001001CC4F2

RECORDING AND ENDORSEMENT COVER PAGE (CONTINUATION) PAGE 2 OF 6

Document ID: 2009011500157001 Document Date: 01-05-2009 Preparation Date: 01-15-2009
Document Type: DEED

PROPERTY DATA

Borough	Block	Lot		Unit	Address
BRONX	2320	8	Entire Lot		246 EAST 136 STREET
Property Type: OTHER					
Borough	**Block**	**Lot**		**Unit**	**Address**
BRONX	2320	9	Entire Lot		248 EAST 136 STREET
Property Type: OTHER					
Borough	**Block**	**Lot**		**Unit**	**Address**
BRONX	2320	10	Entire Lot		N/A EAST 136 STREET
Property Type: OTHER					
Borough	**Block**	**Lot**		**Unit**	**Address**
BRONX	2320	11	Entire Lot		2477 3 AVENUE
Property Type: OTHER					

— Bargain and Sale Deed, with Covenant against Grantor's Acts — Individual or Corporation (Single Sheet)

NYSTT $18000.-

CONSULT YOUR LAWYER BEFORE SIGNING THIS INSTRUMENT—THIS INSTRUMENT SHOULD BE USED BY LAWYERS ONLY.

THIS INDENTURE, made as of the 5TH day of ~~December~~ JANUARY in the year 2009

BETWEEN PACO THIRD AVENUE, LLC, with an office at 364 Maspeth Avenue, Brooklyn, NY 11211

party of the first part, and JITEN, LLC, with an office at 30 Byrd Avenue, Carle Place, New York 11514

party of the second part.

WITNESSETH, that the party of the first part, in consideration of

Ten ($10.00) dollars

paid by the party of the second part, does hereby grant and release unto the party of the second part, the heirs or successors and assigns of the party of the second part forever.

ALL that certain plot, piece or parcel of land, with the buildings and improvements thereon erected, situate, lying and being in the

See Schedule "A" annexed hereto and made a part hereof.

TOGETHER with all right, title and interest, if any, of the party of the first part in and to any streets and roads abutting the above described premises to the center lines thereof; TOGETHER with the appurtenances and all the estate and rights of the party of the first part in and to said premises; TO HAVE AND TO HOLD the premises herein granted unto the party of the second part, the heirs or successors and assigns of the party of the second part forever.

AND the party of the first part covenants that the party of the first part has not done or suffered anything whereby the said premises have been encumbered in any way whatever, except as aforesaid.
AND the party of the first part, in compliance with Section 13 of the Lien Law, covenants that the party of the first part will receive the consideration for this conveyance and will hold the right to receive such consideration as a trust fund to be applied first for the purpose of paying the cost of the improvement and will apply the same first to the payment of the cost of the improvement before using any part of the total of the same for any other purpose. The word "party" shall be construed as if it read "parties" whenever the sense of this indenture so requires.

IN WITNESS WHEREOF, the party of the first part has duly executed this deed the day and year first above written.

IN PRESENCE OF:

PACO THIRD AVENUE, LLC
BY: PACO REALTY, LLC
By its Manager PORCELLI REALTY MANAGEMENT LLC

By: Norma Porcelli, Manager

ACKNOWLEDGEMENT TAKEN IN NEW YORK STATE

State of New York, County of Kings, ss:

On the 18th day of December in the year 2008, before me, the undersigned, personally appeared Norma Porcelli

, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name(s) is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument

LOUIS FRESOLONE
Notary Public, State of New York
No. 4980420
Qualified in Suffolk County
Commission Expires April 22, 2011

SEAL

ACKNOWLEDGEMENT BY SUBSCRIBING WITNESS TAKEN IN NEW YORK STATE

State of New York, County of , ss:

On the day of in the year , before me, the undersigned, a Notary Public in and for said State, personally appeared , the subscribing witness to the foregoing instrument, with whom I am personally acquainted, who, being by me duly sworn, did depose and say that he/she/they reside(s) in

(if the place of residence is in a city, include the street and street number if any, thereof), that he/she/they know(s)

to be the individual described in and who executed the foregoing instrument; that said subscribing witness was present and saw said

execute the same; and that said witness at the same time subscribed his/her/their name(s) as a witness thereto

ACKNOWLEDGEMENT TAKEN IN NEW YORK STATE

State of New York, County of , ss:

On the day of in the year , before me, the undersigned, personally appeared

, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name(s) is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

ACKNOWLEDGEMENT TAKEN OUTSIDE NEW YORK STATE

*State of , County of , ss:
*(Or insert District of Columbia, Territory, Possession or Foreign County)

On the day of in the year , before me the undersigned personally appeared

Personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name(s) is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), that by his/her/their signature(s) on the instrument, the individual(s) or the person upon behalf of which the individual(s) acted, executed the instrument, and that such individual make such appearance before the undersigned in the

(add the city or political subdivision and the state or country or other place the acknowledgement was taken).

Bargain and Sale Deed With Covenants

Title No. HLS-BX-13404

PACO THIRD AVENUE, LLC
TO
JITEN, LLC

SECTION:

BLOCK: 2320

LOT: 5, 7, 8, 9, 10 & 11

COUNTY OR TOWN: Bronx

240, 244, 246, 248 East 136th Street and 2477 Third Avenue, Bronx, NY

DISTRIBUTED BY
YOUR TITLE EXPERTS
The Judicial Title Insurance Agency LLC
800-281-TITLE (8485) FAX: 800-FAX-9396

RETURN BY MAIL TO:

Steve Queller, Esq.
450 Seventh Avenue, Suite 2300
New York, New York 10123

As to Lot 11

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

BEGINNING at the southwesterly corner of 3rd Avenue and East 136th Street;

RUNNING THENCE westerly along the southerly side of East 136th Street, 100 feet (tax map) (99.92 deed);

THENCE southerly parallel with the westerly side of 3rd Avenue, 93.03 feet;

THENCE easterly parallel with the southerly side of East 136th Street, 100 feet (tax map) (99.92 feet deed) to the westerly side of 3rd Avenue;

THENCE northerly along the westerly side of 3rd Avenue, 93.57 feet to the corner, the point or place of BEGINNING.

As to Lots 7, 8, 9 and 10

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

BEGINNING at a point on the southerly line of East 136th Street (50 feet wide) said point of beginning being 50.00 feet easterly from the intersection of said line of East 136th Street with the easterly line of Rider Avenue (50 feet wide), and running from said point of beginning;

THENCE along the southerly line of East 136th Street, South 74 degrees 23 minutes 10 seconds East, a distance of 100.08 feet to a point;

THENCE along the dividing line between Lot 10 and 11, Block 2320, South 15 degrees 36 minutes 50 seconds West, a distance of 93.03 feet to a point on the northerly line of Major Deegan Expressway (a/k/a Major William F. Deegan Boulevard, Harlem River Terrace and East 135th Street, 169 feet wide);

THENCE along said line of Major Deegan Expressway, North 74 degrees 04

minutes 50 seconds West, a distance of 100.08 feet to a point;

THENCE along the dividing line between Lots 7 and 6 Block 2320, North 15 degrees 36 minutes 50 seconds East, a distance of 92.50 feet to the point or place of BEGINNING.

As to Lot 5

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

BEGINNING at a point where the southerly line of East 136th Street (50 feet wide) is intersected by the easterly line of Rider Avenue (50 feet wide), and running from said point of beginning;

THENCE along said line of East 136th Street, South 74 degrees 23 minutes 10 seconds East, a distance of 25.00 feet to a point;

THENCE along the dividing line between Lots 5 & 7, Block 2320, South 15 degrees 36 minutes 50 seconds West, a distance of 92.37 feet to a point on the northerly line of Major Deegan Expressway (a/k/a Major William F. Deegan Boulevard, Major Deegan Boulevard, Harlem River Terrace and East 135th Street, 169 feet wide);

THENCE along said line of Major Deegan Expressway, North 74 degrees 04 minutes 50 seconds West, a distance of 25.00 feet to a point on the easterly line of Rider Avenue;

THENCE along the easterly line of Rider Avenue, North 15 degrees 36 minutes 50 seconds East, a distance of 92.23 feet to the point or place of BEGINNING.

APPENDIX B

ARCHITECTURAL PLANS OF PROPOSED PROJECT

No.	DATE	DESCRIPTION

EAST 136TH STREET (50' WIDE)

EAST 135TH STREET (WIDE)

2477 THIRD AVENUE (93'-7" WIDE)

ACCESSORY PARKING
(O.G.-S2) (U.G.-5B)
AREA 15,084 SF
/300 SF PER PARKING
50 PARKINGS PERMITTED
22 PARKINGS PROPOSED

NOTE: THIS IS A SCHEMATIC DESIGN & SHALL SUBJECT TO REVIEW & INTERPRETATION BY NYC DEPT. OF BLDGS ON ZONING AND BUILDING CODES.

N.Y.C. D.O.B. NO. :
220041684

PROJECT:
COMFORT INN & SUITE
2477 THIRD AVENUE
BRONX, NY

DRAWING TITLE:
1ST FLOOR PLAN
SCALE : 1/8" = 1'-0"

SEAL & SIGNATURE:

RAYMOND CHAN ARCHITECT P.C.
ARCHITECTS • PLANNERS
136-40 39TH AVENUE FLUSHING, NEW YORK 11354
Tel: (718) 445-2345 Fax: (718) 359-8809
Email: Info@raymondchanarchitect.com
Web: www.raymondchanarchitect.com

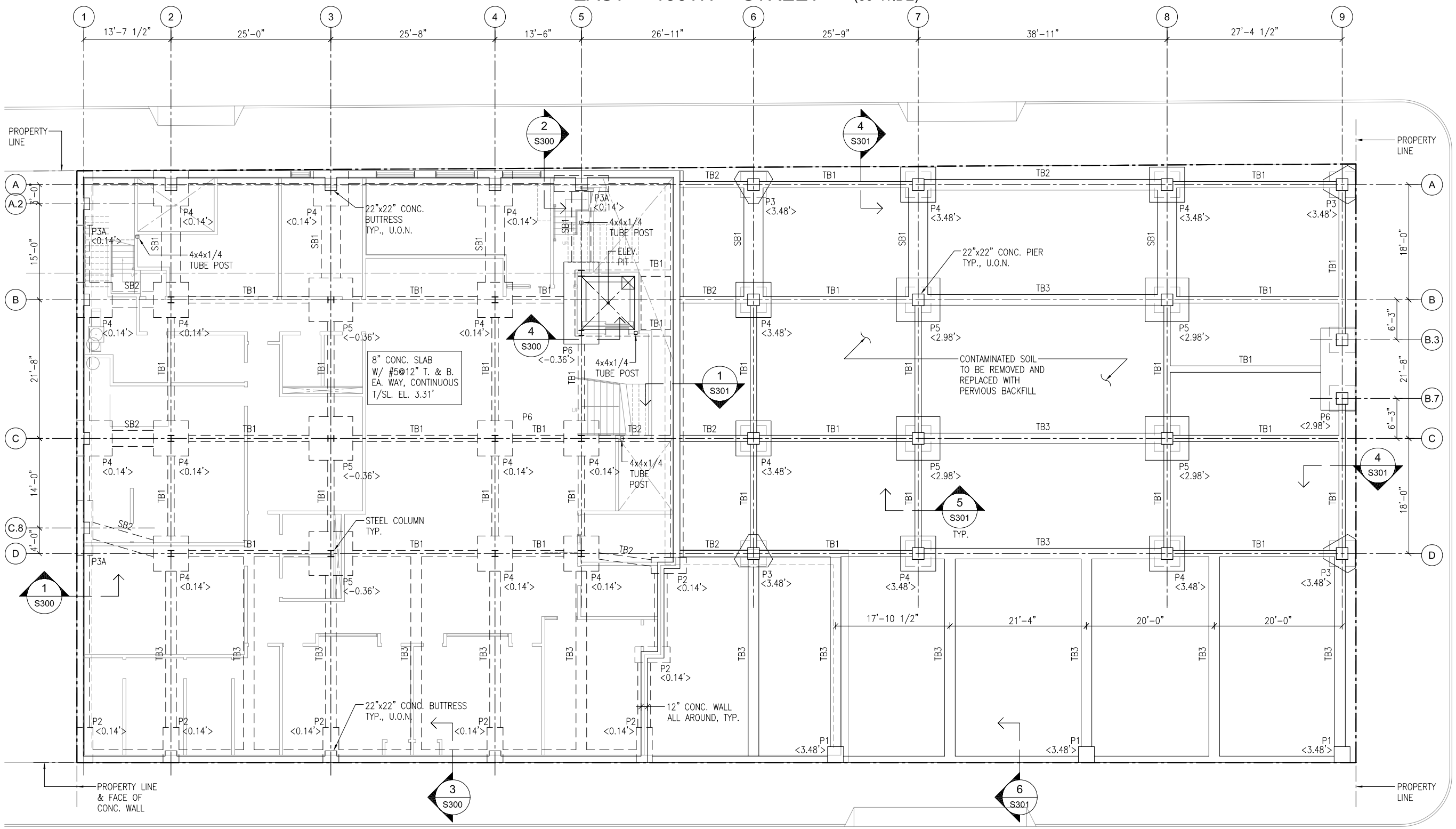
DATE:	07/22/2010
PROJECT No.:	2846
PROJECT MANAGER:	RCA
DRAWN BY:	
CADD FILE NO.:	2477 THIRD AVENUE (2846)

DWG. No.:
A-102.00
09-OF-23
DOB USE ONLY

No.	DATE	DESCRIPTION
PROGRESS SET, NOT FOR CONSTRUCTION		JUL. 23, 2010

EAST 136TH STREET (50' WIDE)

THIRD AVENUE (WIDE)



EAST 135TH STREET (WIDE)

CELLAR PLAN

SCALE: 1/8" = 1'-0"

NOTES:

1. ALL PILES SHALL BE 10" ROUND STEEL PIPES (GRADE A36) OF 60-TON CAPACITY (MIN.) FILL ALL PIPES WITH 4000 PSI CONCRETE AND PROVIDE 1-#11 x 20'-0" REBAR @ TOP OF PILE, TYP.
2. ALL CONCRETE SHALL BE NORMAL WEIGHT (WITH TYPE II CEMENT) HAVING A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI @28 DAYS REBARS FOR PILE CAPS, GRADE BEAMS, AND DOWELS SHALL BE GRADE 60, EPOXY COATED REBARS CONFORMING TO ASTM-A775.
3. FOR GENERAL NOTES AND TYPICAL DETAILS, SEE DWG. S200 TO S204.
4. FOR PILE CAPS DETAILS, SEE DWG. S201.
5. FOR PILING INFORMATION, CONSULT WITH GEOTECHNICAL ENGINEER AND SEE GENERAL NOTES ON DWG. S200.

PROJECT NOTES:

1. CONTRACTOR MUST SUBMIT THE FOLLOWING SHOP DWGS. TO ENGINEER OF RECORD FOR REVIEW AND APPROVAL. THE ENGINEER OF RECORD WILL NOT BE HELD RESPONSIBLE FOR THE STRUCTURAL INTEGRITY AND STABILITY OF THE BUILDING IF THE OWNER/CONTRACTOR CHOOSES TO PLACE REBARS, POUR CONCRETE AND ERECT STRUCTURAL STEEL PRIOR TO SHOP DWGS. APPROVAL.
   A. FOUNDATION REBARS DWGS.
   B. STRUCTURAL STEEL (INCLUDING JOB STANDRARDS).
   C. STEEL DECK.
   D. CONCRETE MIXES.
2. EXCAVATION SHORING SHALL BE CONTRACTOR'S SOLE RESPONSIBILITIES. CONTRACTOR SHALL HIRE A NYS LICENSED ENGINEER TO DESIGN THE SHORING SYSTEM AND PREPARE NECESSARY DWGS. ALL FOUNDATION LOADS, SOIL PRESSURES - STATIC AND SEISMIC, ADJACENT BUILDING LOADS AND SURCHARGES SHALL BE CONSIDERED WHEN DESIGNING THE SHORING SYSTEM.
3. PRIOR TO START OF CONSTRUCTION WORK, THE OWNER/ CONTRACTORS SHALL FULLY COORDINATE WITH ALL TRADES, ARCHITECTURAL, STRUCTURAL, MEP AND ELEVATOR. ANY DISCREPANCIES FOUND SHALL BE BROUGHT TO ATTENTION OF THE DESIGN TEAM IMMEDIATELY.

WAI-LEUNG NG, P.E.
Structural Engineer
858 52nd Street, Brooklyn, NY 11220
Tel: (917) 518-3236 Fax: (718) 854-0016

N.Y.C. D.O.B. NO. :

220041684

PROJECT:
COMFORT INN & SUITE
2477 THIRD AVENUE
BRONX, NY

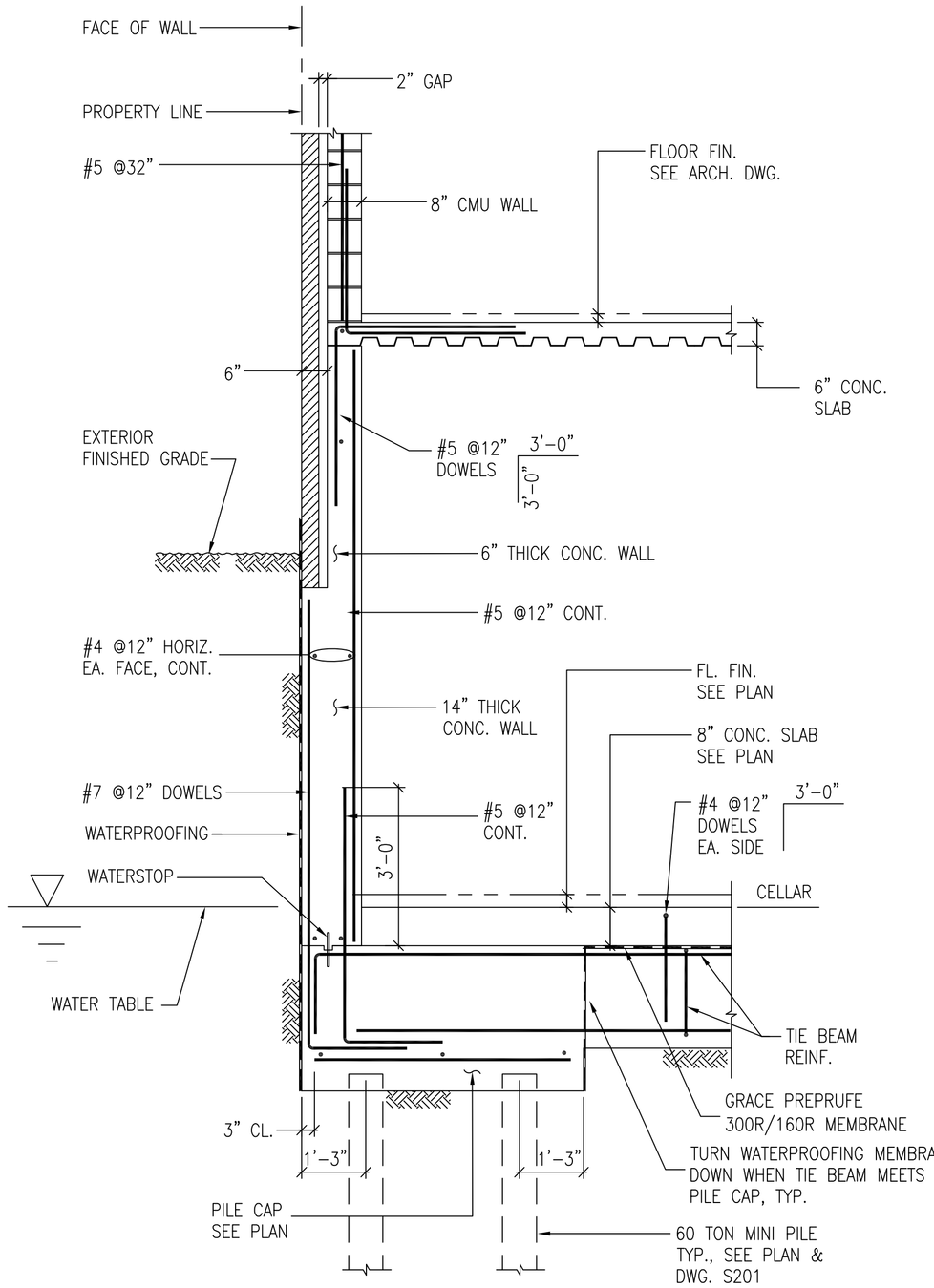
DRAWING TITLE:
CELLAR PLAN

SEAL & SIGNATURE:

RAYMOND CHAN ARCHITECT P.C.
ARCHITECTS • PLANNERS
136-40 39TH AVENUE FLUSHING, NEW YORK 11354
Tel: (718) 445-2345 Fax: (718) 359-8809
Email: Info@raymondchanarchitect.com
Web: www.raymondchanarchitect.com

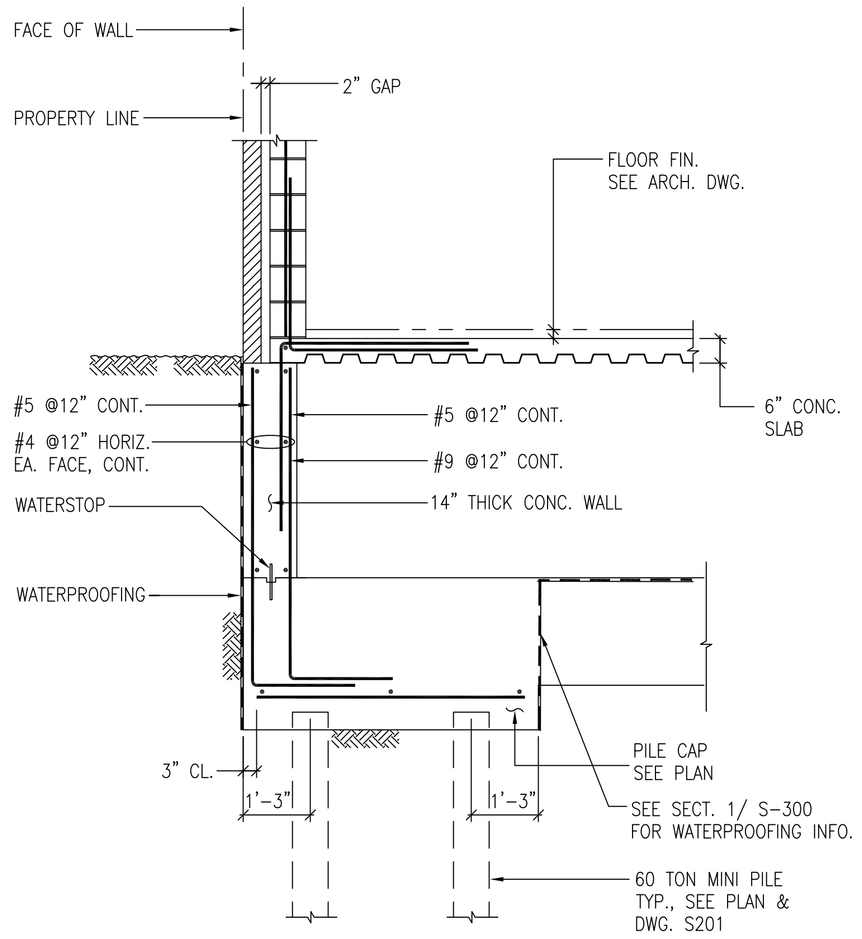
DATE: 05/28/2010 DWG. No.:
PROJECT No.: 2846
PROJECT MANAGER: RN
DRAWN BY:
CADD FILE NO.: 2477 THIRD AVENUE (2846)

S-101.00

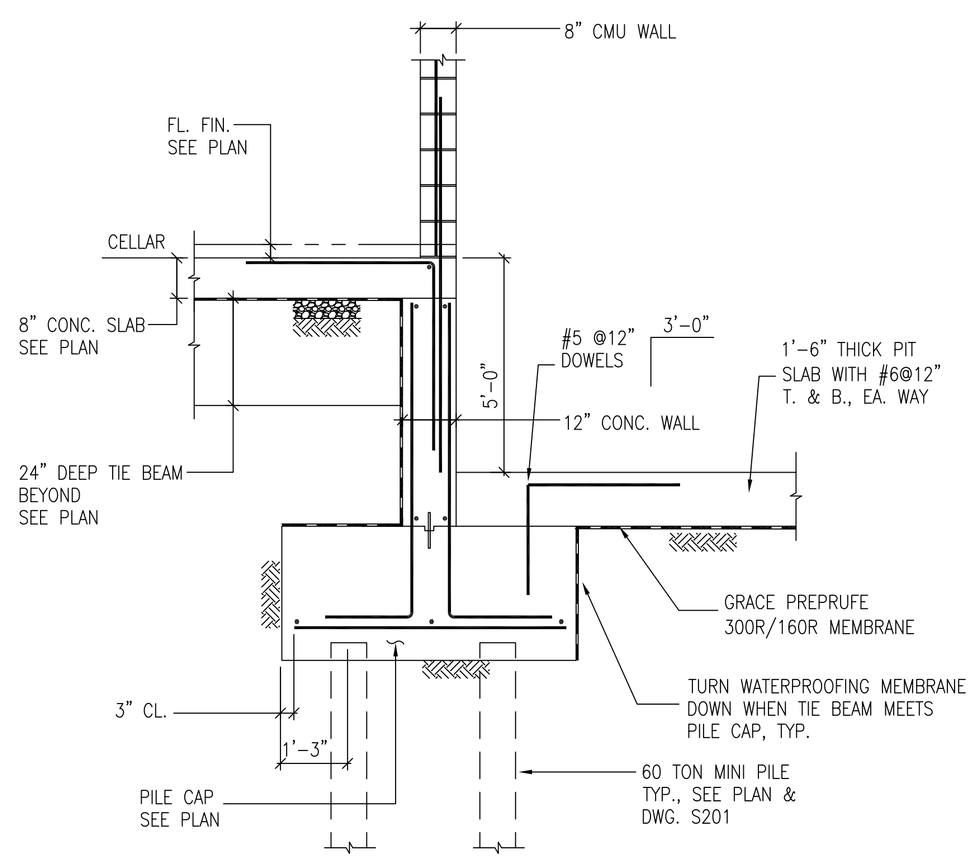


SECTION 1 / S300
SCALE: 1/2" = 1'-0"

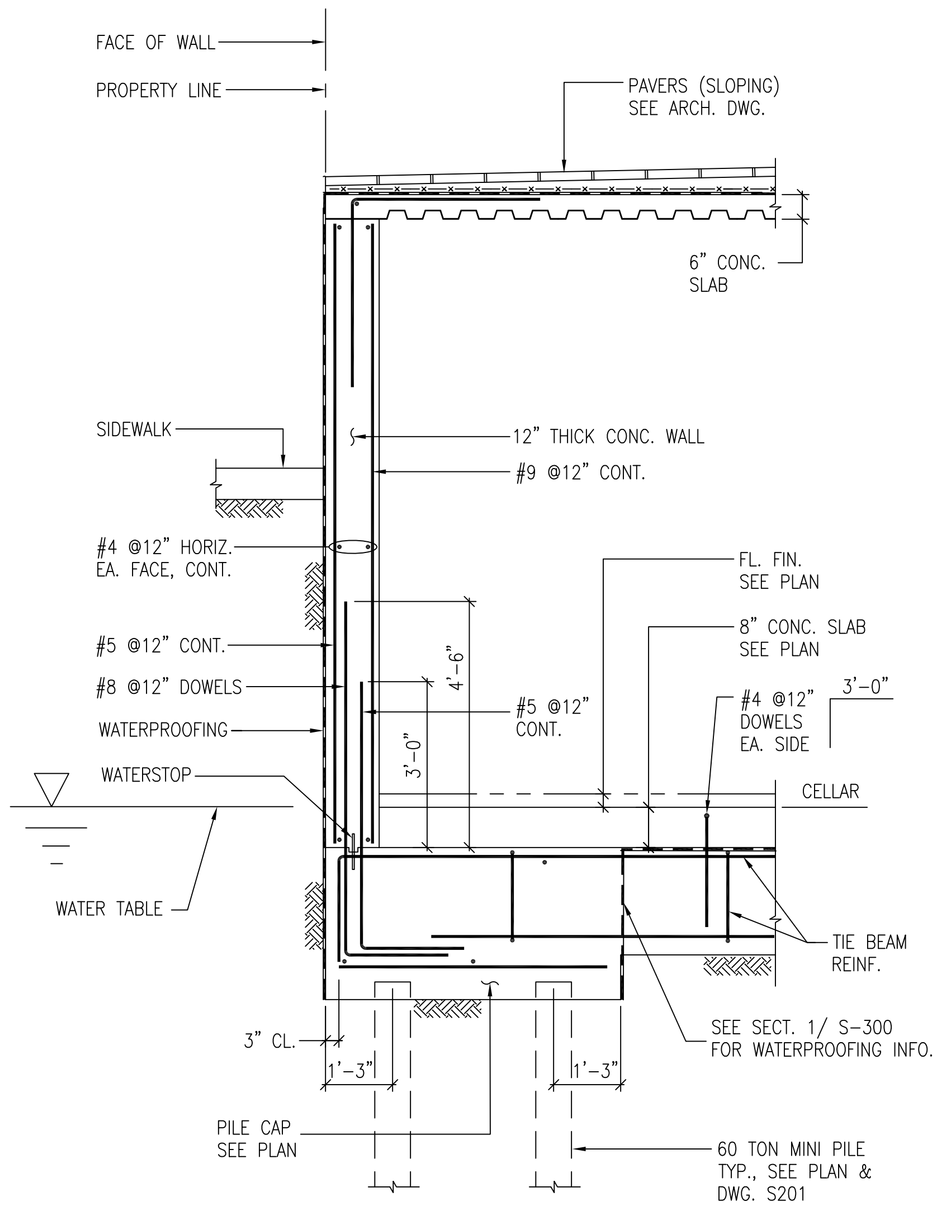
NOTE : WATERPROOFING IS NOT ALLOWED BETWEEN BOTTOM OF CELLAR CONC. SLAB AND TOP OF PILE CAPS/TIE BEAMS.



SECTION 2 / S300
SCALE: 1/2" = 1'-0"



SECTION 4 / S300
SCALE: 1/2" = 1'-0"



SECTION 3 / S300
SCALE: 1/2" = 1'-0"

No.	DATE	DESCRIPTION
PROGRESS SET, CONSTRUCTION		NOT FOR JUL. 23, 2010

WAI-LEUNG NG, P.E.
Structural Engineer
858 52nd Street, Brooklyn, NY 11220
Tel: (917) 518-3236 Fax: (718) 854-0016

N.Y.C. D.O.B. NO. :

220041684

PROJECT:
COMFORT INN & SUITE
2477 THIRD AVENUE
BRONX, NY

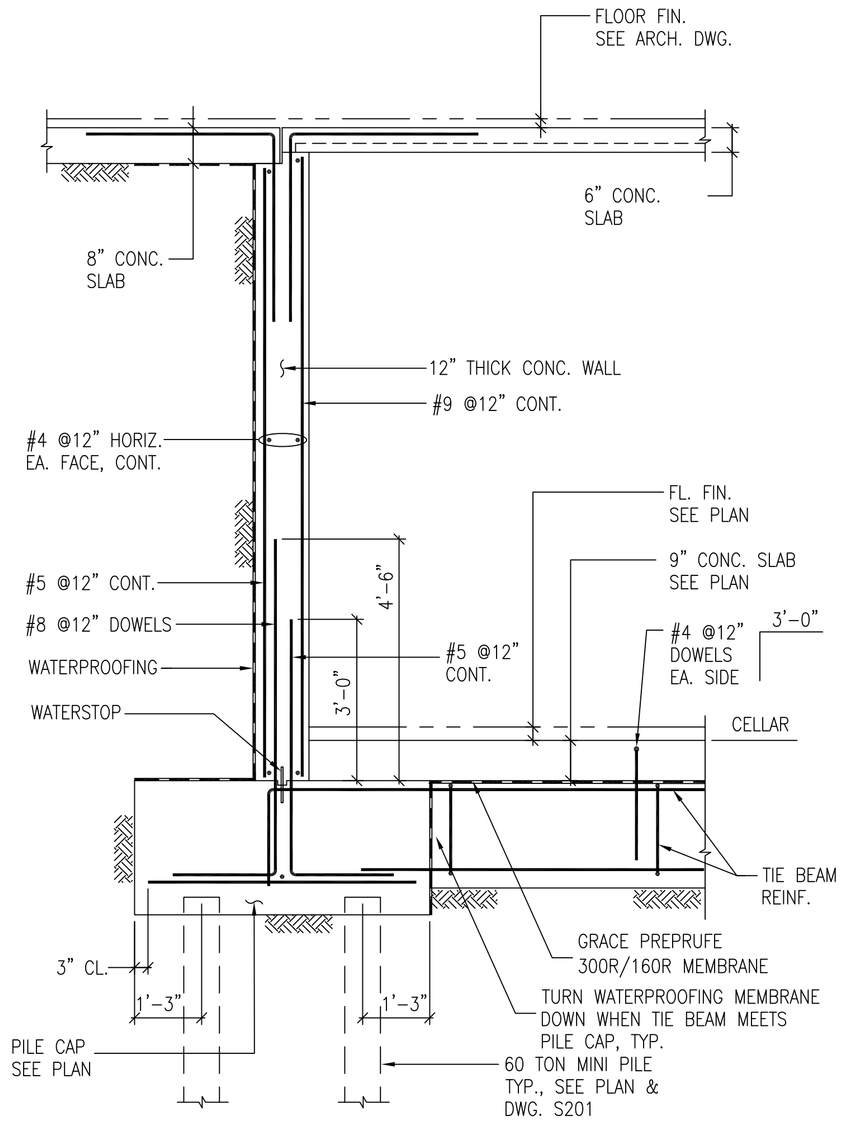
DRAWING TITLE:
FOUNDATION SECTIONS I

SEAL & SIGNATURE:

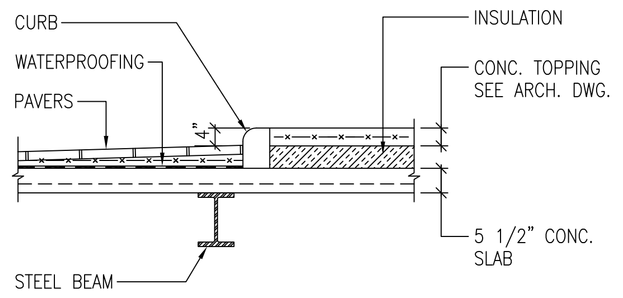
RAYMOND CHAN ARCHITECT P.C.
ARCHITECTS • PLANNERS
136-40 39TH AVENUE FLUSHING, NEW YORK 11354
Tel: (718) 445-2345 Fax: (718) 359-8809
Email: info@raymondchanarchitect.com
Web: www.raymondchanarchitect.com

DATE: 05/28/2010
PROJECT No.: 2646
PROJECT MANAGER: RN
DRAWN BY:
CADD FILE NO.: 2477 THIRD AVENUE (2846)

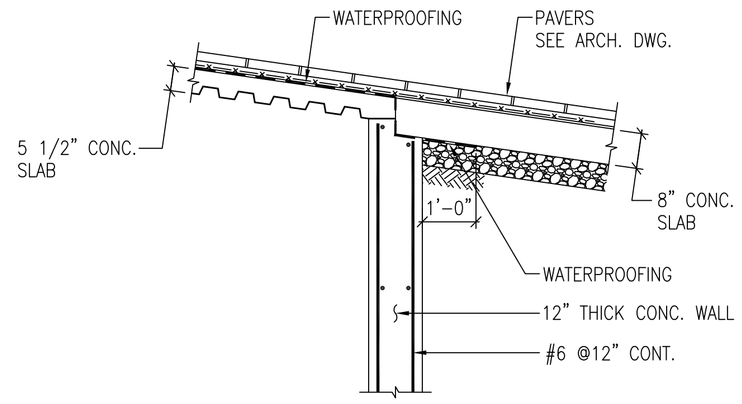
DWG. No.: S-300.00



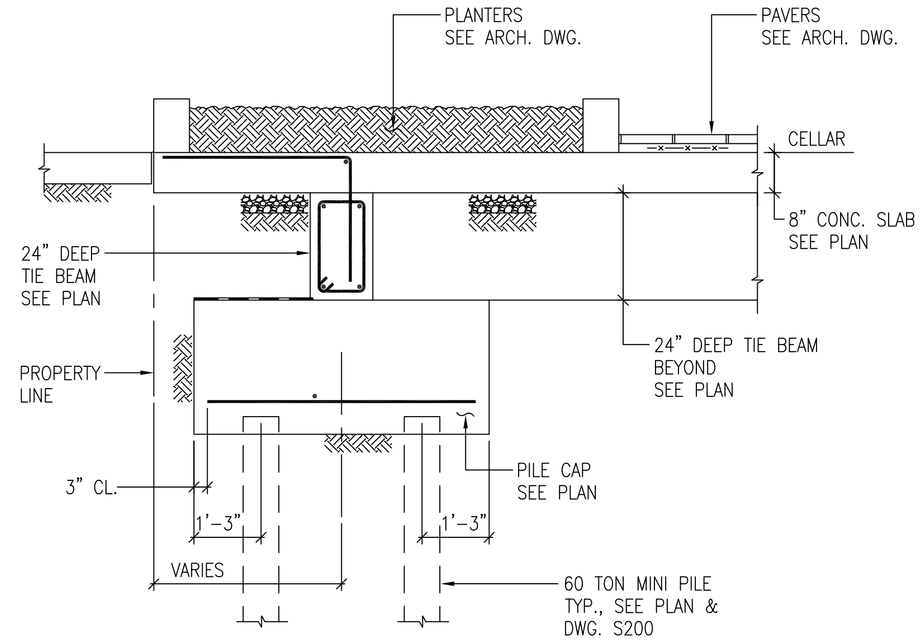
SECTION 1
SCALE: 1/2" = 1'-0" — S301



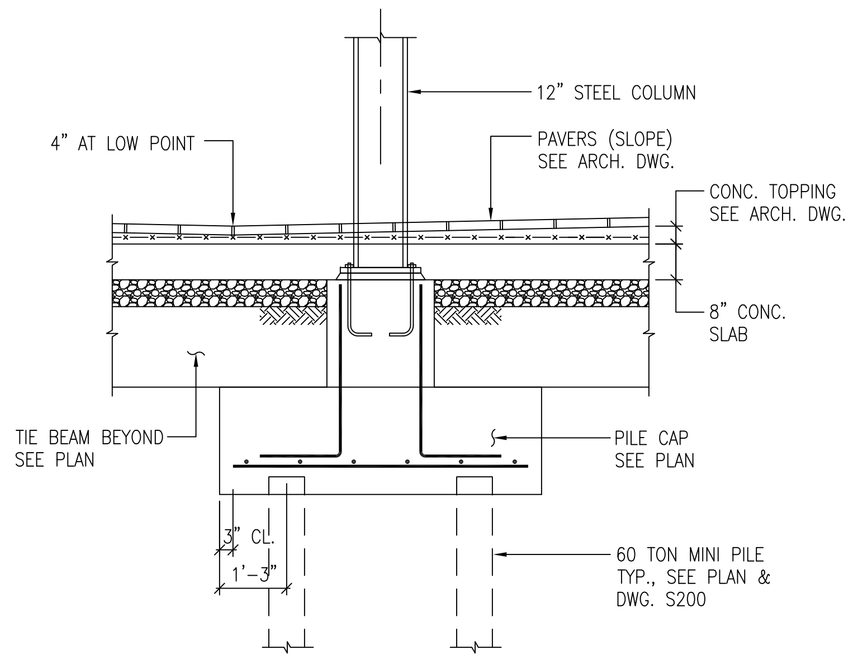
SECTION 2
SCALE: 1/2" = 1'-0" — S301



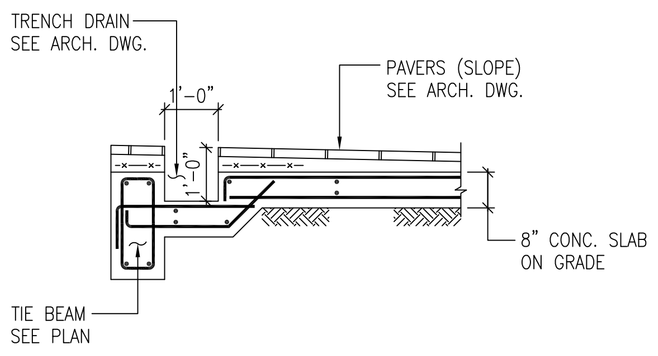
SECTION 3
SCALE: 1/2" = 1'-0" — S301



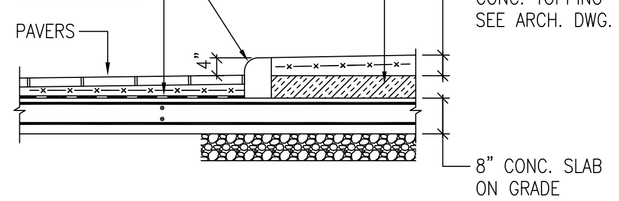
SECTION 4
SCALE: 1/2" = 1'-0" — S301



SECTION 5
SCALE: 1/2" = 1'-0" — S301



SECTION 6
SCALE: 1/2" = 1'-0" — S301



SECTION 7
SCALE: 1/2" = 1'-0" — S301

No.	DATE	DESCRIPTION
PROGRESS SET, NOT FOR CONSTRUCTION	JUL. 23, 2010	

WAI-LEUNG NG, P.E.
Structural Engineer
858 52nd Street, Brooklyn, NY 11220
Tel: (917) 518-3236 Fax: (718) 854-0016

N.Y.C. D.O.B. NO. :

220041684

PROJECT:
COMFORT INN & SUITE
2477 THIRD AVENUE
BRONX, NY

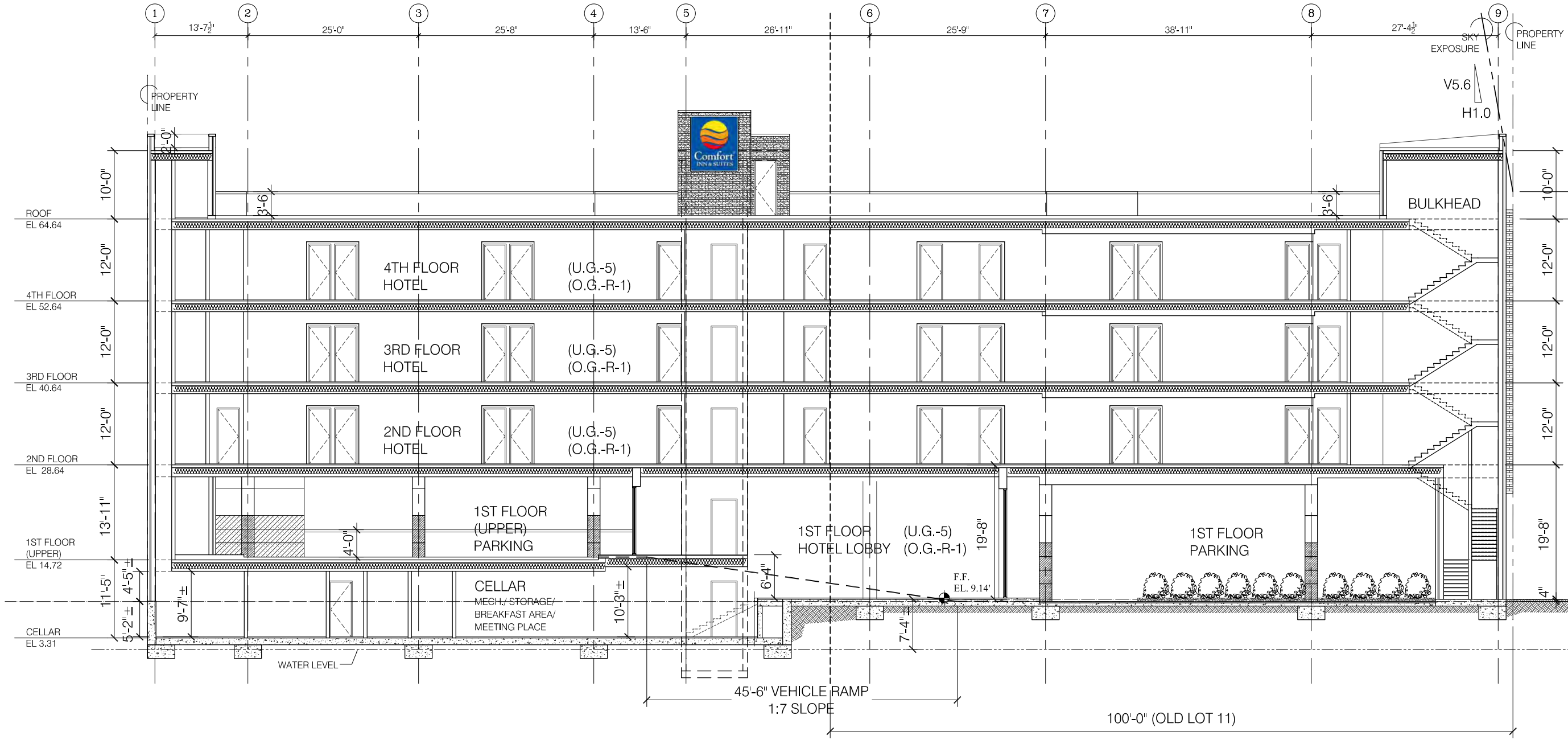
DRAWING TITLE:
FOUNDFATION SECTIONS II

SEAL & SIGNATURE:

RAYMOND CHAN ARCHITECT P.C.
ARCHITECTS • PLANNERS
136-40 39TH AVENUE FLUSHING, NEW YORK 11354
Tel: (718) 445-2345 Fax: (718) 359-8809
Email: info@raymondchanarchitect.com
Web: www.raymondchanarchitect.com

DATE: 05/28/2010
PROJECT No.: 2846
PROJECT MANAGER: RN
DRAWN BY:
CADD FILE NO.: 2477 THIRD AVENUE (2846)

DWG. No.:
S-301.00



No.	DATE	DESCRIPTION

MEAN CURB LEVEL CALCULATION

- MEAN CURB LEVEL AT EAST 135TH STREET
  8.08 + 8.22 / 2 = 8.15
- MEAN CURB LEVEL AT 3RD AVENUE
  8.49 + 9.74 / 2 = 9.12
- MEAN CURB LEVEL AT EAST 136TH STREET
  9.98 + 7.83 / 2 = 8.91

$$\frac{[A+B/2 \times a] + [B+C/2 \times b] + [C+D/2 \times c]}{a + b + c} = \frac{[8.15 \times 200] + [9.12 \times 93.57] + [8.91 \times 200]}{200 + 93.57 + 200}$$

$$\frac{1630+853.36+1782}{493.57} = 8.64'$$

NOTE: THIS IS A SCHEMATIC DESIGN & SHALL SUBJECT TO REVIEW & INTERPRETATION BY NYC DEPT. OF BLDGS ON ZONING AND BUILDING CODES.

M.E.P. ENGINEER:
VICTOR CESPEDES
Tel: (908) 789-0859 Fax: (908) 789-0859

STRUCTURAL ENGINEER:
WAI-LEUNG NG, P.E.
Tel: (917) 518-3236 Fax: (718) 854-0016

N.Y.C. D.O.B. NO. :

220041684

PROJECT:
COMFORT INN & SUITE
2477 THIRD AVENUE
BRONX, NY

DRAWING TITLE:
BUILDING SECTION
SCALE : 1/8" - 1'-0"

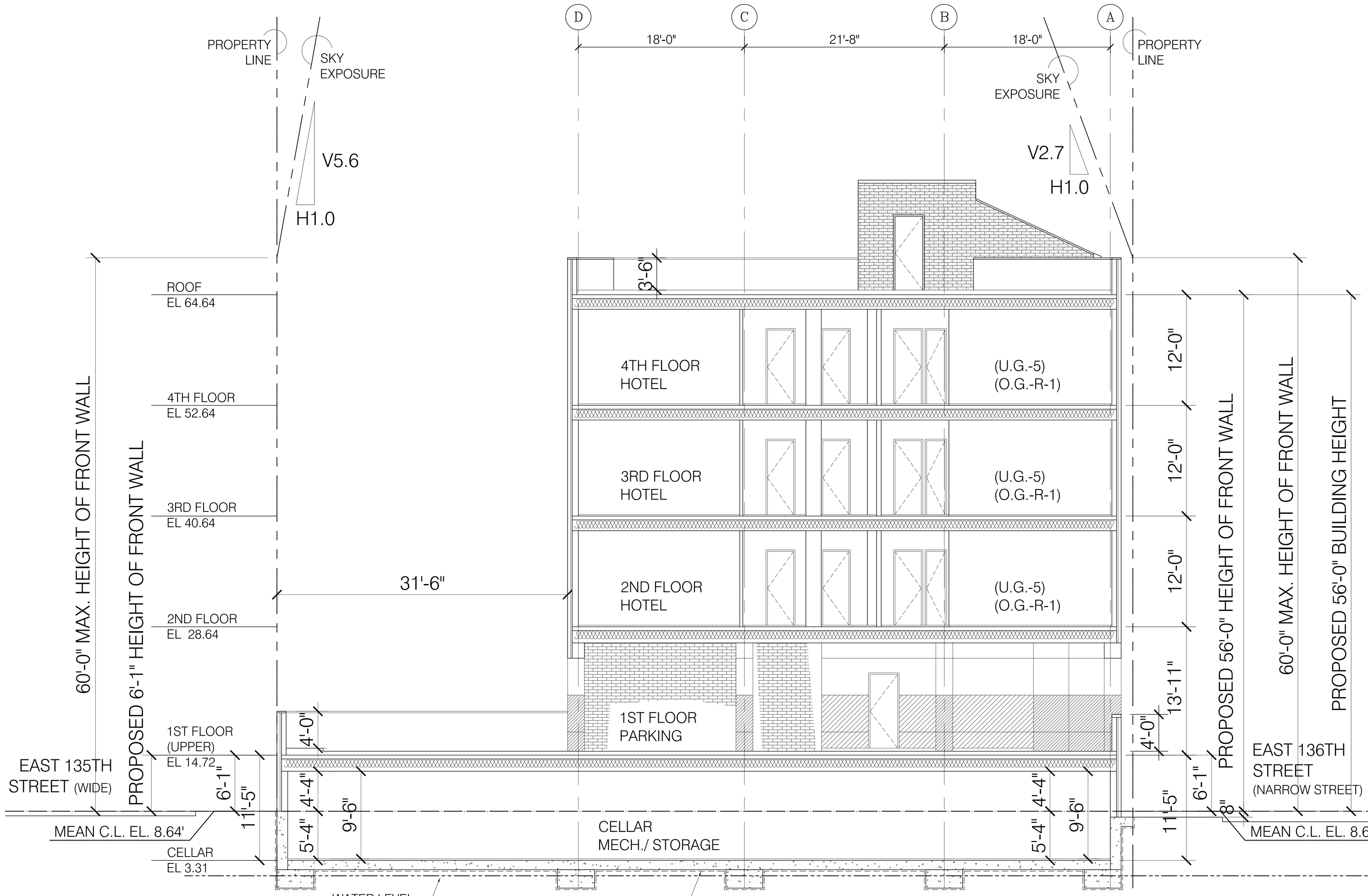
SEAL & SIGNATURE:

RAYMOND CHAN ARCHITECT P.C.
ARCHITECTS • PLANNERS
136-40 39TH AVENUE FLUSHING, NEW YORK 11354
Tel: (718) 445-2345 Fax: (718) 359-8809
Email: Info@raymondchanarchitect.com
Web: www.raymondchanarchitect.com

DATE: 09/07/2010
PROJECT No.: 2846
PROJECT MANAGER: RCA
DRAWN BY:
CADD FILE NO.: 2477 THIRD AVENUE (2846)

DWG. No.:
A-601.00
17 -OF-31
DOB USE ONLY

No.	DATE	DESCRIPTION



WATER LEVEL

PROVIDE BELOW GRADE WATER PROOFING SYSTEM
BELOW ENTIRE FOUNDATION AND SUBGRADE WALLS
(BY GRACE- PREPRUFE 300R FOR FOUNDATION
& PREPRUFE 160R FOR SUBGRADE WALLS.)
SEE FOUNDATION PLAN FOR DETAILS

NOTE: THIS IS A SCHEMATIC DESIGN
& SHALL SUBJECT TO REVIEW
& INTERPRETATION BY
NYC DEPT. OF BLDGS ON
ZONING AND BUILDING CODES.

M.E.P. ENGINEER:
VICTOR CESPEDES
Tel: (908) 789-0859 Fax: (908) 789-0859

STRUCTURAL ENGINEER:
WAI-LEUNG NG, P.E.
Tel: (917) 518-3236 Fax: (718) 854-0016

N.Y.C. D.O.B. NO. :

220041684

PROJECT:
COMFORT INN & SUITE
2477 THIRD AVENUE
BRONX, NY

DRAWING TITLE:
BUILDING SECTION
SCALE : 3/16" - 1'-0"

SEAL & SIGNATURE:

RAYMOND CHAN ARCHITECT PC
ARCHITECTS • PLANNERS
136-40 39TH AVENUE FLUSHING, NEW YORK 11354
Tel: (718) 445-2345 Fax: (718) 359-8809
Email: info@raymondchanarchitect.com
Web: www.raymondchanarchitect.com

DATE: 01/07/2011
PROJECT No.: 2846
PROJECT MANAGER: RCA
DRAWN BY:
CADD FILE NO.: 2477 THIRD AVENUE (2846)

DWG. No.:
A-602.00

DOB USE ONLY

APPENDIX C
REMEDIAL COST ESTIMATES

Appendix C
Alternative 2
2477 Third Avenue, Bronx, New York

Description	Quantity	Units	Unit Price	Cost	# Years	Total O&M Cost (NPV)	Contingency (20%)	Total
Soil Removal								
Capital Costs								
Mobilization	1	LS	$25,000	$25,000			$5,000	**$30,000**
Utility Relocation/Repair/Protection	1	LS	$50,000	$50,000			$10,000	**$60,000**
UST Removals and Regulatory Reporting	1	LS	$40,000	$40,000			$8,000	**$48,000**
Shoring & Excavation	1	LS	$300,000	$300,000			$60,000	**$360,000**
Backfill & Compaction	1500	tons	$36	$54,000			$10,800	**$64,800**
Waste Characterization Testing	2500	tons	$2	$5,000			$1,000	**$6,000**
Soil Transportation & Disposal	2500	tons	$60	$150,000			$30,000	**$180,000**
Subtotal				**$624,000**			**$124,800**	**$748,800**
Engineering & Expenses								
Geotechnical/Structural Design	1	LS	$30,000	$30,000			$6,000	**$36,000**
Remedial Design, Coordination & Reporting	1	LS	$50,000	$50,000			$10,000	**$60,000**
Air Monitoring Equipment	4	months	$2,500	$10,000			$2,000	**$12,000**
Field Oversight	4	months	$24,000	$96,000			$19,200	**$115,200**
Subtotal				**$186,000**			**$31,200**	**$223,200**
					Subtotal - Soil Removal			**$972,000**
Groundwater In-Situ Treatment								
Capital Costs								
Mobilization	1	LS	$5,000	$5,000			$1,000	**$6,000**
Well Installation (Post-Construction Monitoring)	5	wells	$2,000	$10,000			$2,000	**$12,000**
ORC injection	1	event	$20,000	$20,000			$4,000	**$24,000**
Subtotal				**$35,000**			**$7,000**	**$42,000**
Engineering & Expenses								
Design, Coordination & Reporting	1	LS	$15,000	$15,000			$3,000	**$18,000**
Field Oversight & Start-up	10	days	$1,200	$12,000			$2,400	**$14,400**
Subtotal				**$27,000**			**$5,400**	**$32,400**
Annual O&M Costs								
Quarterly Groundwater Monitoring	1	Per Year	$15,000	$15,000	2	$28,300	$5,660	**$33,960**
Reporting	1	Per Year	$25,000	$25,000	2	$47,200	$9,440	**$56,640**
Subtotal				**$40,000**		**$75,500**	**$15,100**	**$90,600**
					Subtotal - Groundwater In-Situ Treatment			**$165,000**
Vapor Barrier								
Capital Costs								
Vapor Barrier	9000	SF	$11	$99,000			$19,800	**$118,800**
Installation	1	LS	$20,000	$20,000			$4,000	**$24,000**
					Subtotal - Vapor Barrier			**$142,800**

ALTERNATIVE 2 TOTAL	**$1,279,800**

Appendix C
Alternative 3
2477 Third Avenue, Bronx, New York

Description	Quantity	Units	Unit Price	Cost	# Years	Total O&M Cost (NPV)	Contingency (20%)	Total
Soil Removal								
Capital Costs								
Mobilization	1	LS	$25,000	$25,000			$5,000	**$30,000**
Utility Relocation/Repair/Protection	1	LS	$50,000	$50,000			$10,000	**$60,000**
UST Removals and Regulatory Reporting	1	LS	$40,000	$40,000			$8,000	**$48,000**
Shoring & Excavation	1	LS	$400,000	$400,000			$80,000	**$480,000**
Backfill & Compaction	5100	tons	$36	$183,600			$36,720	**$220,320**
Waste Characterization Testing	6100	tons	$2	$12,200			$2,440	**$14,640**
Soil Transportation & Disposal	6100	tons	$65	$396,500			$79,300	**$475,800**
Subtotal				**$1,107,300**			**$221,460**	**$1,328,760**
Engineering & Expenses								
Geotechnical/Structural Design	1	LS	$30,000	$30,000			$6,000	**$36,000**
Remedial Design, Coordination & Reporting	1	LS	$50,000	$50,000			$10,000	**$60,000**
Air Monitoring Equipment	4	months	$2,500	$10,000			$2,000	**$12,000**
Field Oversight	4	months	$24,000	$96,000			$19,200	**$115,200**
Subtotal				**$186,000**			**$31,200**	**$223,200**
					Subtotal - Soil Removal			**$1,551,960**
Groundwater Pump and Treat System								
Capital Costs								
Mobilization and Equipment	1	LS	$100,000	$100,000			$20,000	**$120,000**
System Installation (trenching, wiring, etc.)	1	LS	$20,000	$20,000			$4,000	**$24,000**
Well Installation (system and monitoring)	11	wells	$2,000	$22,000			$4,400	**$26,400**
Subtotal				**$142,000**			**$28,400**	**$170,400**
Engineering & Expenses								
Design, Coordination & Reporting	1	LS	$20,000	$20,000			$4,000	**$24,000**
Field Oversight & Start-up	10	days	$1,200	$12,000			$2,400	**$14,400**
Subtotal				**$32,000**			**$6,400**	**$38,400**
First Week O&M Costs (daily monitoring)								
System Influent Monitoring	5	samples	$1,800	$9,000			$1,800	**$10,800**
Discharge Permit Monitoring	5	samples	$240	$1,200			$240	**$1,440**
Air Discharge Monitoring	5	samples	$300	$1,500			$300	**$1,800**
Labor	5	days	$1,200	$6,000			$1,200	**$7,200**
Subtotal				**$17,700**			**$3,540**	**$21,240**

Annual O&M Costs									
Quarterly Groundwater Monitoring		4	quarter	$5,000	$20,000	2	$40,000	$8,000	**$48,000**
System Influent Monitoring		12	samples	$1,800	$21,600	2	$43,200	$12,960	**$34,560**
Discharge Permit Monitoring		12	samples	$240	$2,880	2	$5,760	$1,728	**$4,608**
Air Discharge Monitoring		12	samples	$300	$3,600	2	$7,200	$2,160	**$5,760**
Labor		12	days	$1,200	$14,400	2	$28,800	$8,640	**$23,040**
Carbon Changeout		6	changes	$4,000	$24,000	2	$48,000	$14,400	**$38,400**
Reporting		1	per year	$30,000	$30,000	2	$60,000	$12,000	**$72,000**
	Subtotal				**$116,480**		**$232,960**	**$59,888**	**$226,368**
						Subtotal - Groundwater Puomp and Treat System			**$456,408**

ALTERNATIVE 3 TOTAL	**$2,008,368**

APPENDIX D

HEALTH AND SAFETY PLAN (HASP)

2477 Third Avenue Site

BRONX, NEW YORK

Health and Safety Plan

BCP Site No. C203047

AKRF Project Number: 11160

Prepared for:

Jiten, LLC
30 Byrd Avenue
Carle Place, NY 11514

Prepared by:

AKRF, Inc.
440 Park Avenue South, 7th Floor
New York, New York 10016
212-696-0670

MAY 2011

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FIGURE

APPENDICES

1.0 INTRODUCTION

The 2477 Third Avenue site (the Site) is identified legally as Tax Block 2320, Lot 11 in the Bronx, New York. Previous investigations of the site include: a Baseline Acquisition Assessment Report (Delta Environmental Consultants, Inc., October 2002); two Phase I Environmental Site Assessments (AKRF, Inc., October 2007 and January 2009); two soil and groundwater investigations (Advanced Site Restoration, LLC, Inc., December 2007 and September 2008); a Limited Subsurface (Phase II) Investigation (AKRF, Inc., February 2009); and A Remedial Investigation (AKRF, Inc., August 2010). These investigations were designed to identify potential on-site and off-site sources of contamination and delineate soil, soil vapor, and groundwater contamination at the Site.

The field observations and analytical data from the previous investigations indicated that hydrocarbon contamination exists in soil, soil vapor and groundwater at the Site. Volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides and metals were detected in soil and groundwater samples at concentrations that exceed the applicable New York State Department of Environmental Conservation (NYSDEC) Recommended Soil Cleanup Objectives (RSCOs). Gasoline-related hydrocarbons [including benzene, toluene, ethylbenzene and xylene (BTEX) and methyl tert butyl ether (MTBE)] were detected in soil and groundwater. A plume consisting of gasoline-related hydrocarbons was identified migrating southeast from the former gasoline station. Regulatory records identified three 4,000-gallon gasoline underground storage tanks, one 4,000-gallon diesel underground storage tank (UST) and three 12,000-gallon gasoline underground storage tanks (USTs) at the Site. These tanks were registered as closed and removed; however, current field observations indicate that the 4,000-gallon tanks remain in place. An active gasoline spill (NYSDEC Spill #02-30034) exists for site.

Remedial work at the Site is being managed under the oversight of the NYSDEC and New York State Department of Health (NYSDOH) under Site No. C203047. This Health and Safety Plan (HASP) addresses the health and safety practices that will be employed by workers participating in investigation and remediation activities at the Site by AKRF, Inc. (AKRF), construction personnel, and any other personnel authorized to be on-site. The HASP takes into account the specific hazards inherent to the Site, and presents procedures to be followed by AKRF, construction personnel, subcontractors, and all Site visitors in order to avoid and, if necessary, protect against health and/or safety hazards. Activities performed under this HASP will comply with applicable parts of OSHA Regulations, primarily 29 CFR Parts 1910 and 1926. A copy this HASP will be maintained on-site for the duration of remedial work.

All workers who may participate in activities at the Site that are under the direction of AKRF are required to comply with the provisions specified in this HASP. All site visitors who enter designated work zones must also comply with this HASP. Refusal or failure to comply with the HASP or violation of any safety procedures by field personnel and/or subcontractors performing work covered by this HASP may result in immediate removal from the Site following consultation with the NYSDEC and/or NYSDOH.

2.0 HEALTH AND SAFETY GUIDELINES AND PROCEDURES

2.1 Hazard Evaluation

2.1.1 Hazards of Concern

Check all that apply		
(X) Organic Chemicals	(X) Inorganic Chemicals	( ) Radiological
( ) Biological	(X) Explosive/Flammable	( ) Oxygen Deficient Atm.
(X) Heat Stress	(X) Cold Stress	( ) Carbon Monoxide
Comments: No personnel are permitted to enter permit confined spaces.		

2.1.2 Physical Characteristics

Check all that apply		
(X) Liquid	(X) Solid	( ) Sludge
(X) Vapors	( ) Unknown	( ) Other
Comments:		

2.1.3 Hazardous Materials

Check all that apply					
Chemicals	**Solids**	**Sludges**	**Solvents**	**Oils**	**Other**
( ) Acids	( ) Ash	( ) Paints	( ) Halogens	( ) Transformer	( ) Lab
( ) Caustics	( )Asbestos	( ) Metals	(X) Petroleum	( ) Other DF	( ) Pharm
(X) Pesticides	( ) Tailings	( ) POTW	( ) Other Organic Solvents	(X) Motor or Hydraulic Oil	( ) Hospital
(X)Petroleum	(X) Other	( ) Other		(X) Gasoline	( ) Rad
( ) Inks	Fill material			(X) Fuel Oil	( ) MGP
(X) PCBs					( ) Mold
(X) Metals					( ) Cyanide
(X)Other: SVOCs					

1.1.1 Chemicals of Concern

Chemicals	REL/PEL/STEL (ppm)	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.
Chloroform	REL = 2 ppm [60-minute] PEL = 50 ppm	Irritation eyes, skin; dizziness, mental dullness, nausea, confusion; headache, lassitude (weakness, exhaustion); anesthesia; enlarged liver; potential carcinogen.
Heptachlor (pesticide)	REL = 0.5 mg/m^3 PEL = 0.5 mg/m^3 [skin]	There is no reliable information on health effects in humans. Liver damage, excitability, and decreases in fertility have been observed in animals ingesting heptachlor. The effects are worse when the exposure levels were high or when exposure lasted many weeks.
Ethylbenzene	REL = 100 ppm PEL = 100 ppm	Irritation eyes, skin, mucous membrane; headache; dermatitis; narcosis, coma.
Fuel Oil	REL = 350 mg/m^3 PEL = 400 ppm	Nausea, irritation – eyes, hypertension, headache, light-headedness, loss of appetite, poor coordination; long-term exposure – kidney damage, blood clotting problems; potential carcinogen.
Methyl Tert Butyl Ether (MTBE)	REL = 40 ppm	Headaches, nausea, dizziness, mental confusion, gastrointestinal irritation, liver and kidney damage, and nervous system effects.
Polycyclic Aromatic Hydrocarbons (PAHs)	PEL = 5 mg/m^3	Harmful effects to skin, bodily fluids, and ability to fight disease, reproductive problems; potential carcinogen.
Polychlorinated biphenyls (PCBs)	REL = 0.001 mg/m^3 PEL = 0.5 mg/m^3 [skin]	Irritation eyes; chloracne; liver damage; reproductive effects; 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.
Xylenes	REL = 100 ppm PEL = 100 ppm	Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, poor coordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis.
Comments: REL = National Institute for Occupational Safety and Health ("NIOSH") Recommended Exposure Limit PEL = OSHA Permissible Exposure Limit STEL = OSHA Short Term Exposure Limit		

2.1.4 Designated Personnel

AKRF will appoint one of its on-site personnel as the Site Safety Coordinator (SSC). This individual will be responsible for the implementation of the HASP. The SSO will have a 4-year college degree in occupational safety or a related science/engineering field, and experience in implementation of air monitoring and hazardous materials sampling programs. Health and safety training required for the SSC and all field personnel subject to this HASP.

2.2 Training

All personnel who enter the work area while intrusive activities are being performed will have completed a 40-hour training course that meets OSHA requirements of 29 CFR Part 1910,

Occupational Safety and Health Standards. In addition, all personnel will have up-to-date 8-hour refresher training. The training will allow personnel to recognize and understand the potential hazards to health and safety. All field personnel must attend a training program, whose purpose is to:

- Make them aware of the potential hazards they may encounter;
- Provide the knowledge and skills necessary for them to perform the work with minimal risk to health and safety; make them aware of the purpose and limitations of safety equipment; and
- Ensure that they can safely avoid or escape from emergencies.

Each member of the field crew will be instructed in these objectives before he/she goes onto the site. A site safety meeting will be conducted at the start of the project. Additional meetings will be conducted, as necessary, for new personnel working at the site.

2.3 Medical Surveillance Program

All AKRF and subcontractor personnel performing field work involving subsurface disturbance at the site 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 SSC 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.

2.4 Site Work Zones

During any activities involving subsurface disturbance, 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. 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. A summary of these areas is provided below. These zones may changed by SSC, depending on that day's activities. All field personnel will be informed of the location of these zones before work begins.

Site Work Zones			
Task	**Exclusion Zone**	**CRZ**	**Support Zone**
Soil Excavation and Test Pits	10 ft from Excavator	15 ft from Excavator	As Needed
In-Site Groundwater Remediation and Well Installation	10 ft from Drill Rig	15 ft from Drill Rig	As Needed

2.5 Air Monitoring

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

2.5.1 Work Zone Air Monitoring

An air monitoring program will be implemented during soil/fill excavation/disturbing activities during all excavation/soil disturbance activities. The monitoring is consistent with the types of contaminants identified at the Site and the proposed development plans. The air monitoring is intended to avoid or minimize exposure of the field personnel and the public to potential environmental hazards in the soil during excavation of such soil. Results of this air monitoring times will be used to determine the appropriate response action, if needed. A photoionization detector (PID) will be used to perform the air monitoring and will be calibrated with isobutylene in accordance with the manufacturer's recommendations.

A Dust Trak® dust monitor or equivalent will be used to measure concentration of total particulate matter during excavation activities if subsurface contamination is encountered.

Measurements for particulate and volatile organic compounds will be taken prior to commencement of the work and for at least 1 minute every 60 minutes during the work. The action levels developed for the site are based upon 15-minute averages of the monitoring data. The measurements will be made as close to the workers as practicable and at the breathing height of the workers. The SSC will 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 following table. As indicated, work will be stopped if the PID reads 20 parts per million (ppm) or more. The SSC will inspect the area to determine the source and use appropriate means to abate the vapors. Once PID readings are below 20 ppm, work will resume.

Air Monitoring Action Levels and Required Responses

Instrument	Action Level*	Response Action
Particulate Monitoring	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 less than 2.5 mg/m^3, resume work using Level D. Otherwise, upgrade Level C.
	Above 125 mg/m^3	**Stop work.** Apply additional dust suppression measures. Resume work when less than 125 mg/m^3 and maintain Level C.
Volatile Organic Compound Monitoring with PID	Less than 10 ppm in breathing zone.	**Level D or D-Modified** (Requires coveralls and steel toe boots) (As applicable: Chemical resistant gloves, chemical resistant boot covers, Hard hat, safety glasses, face shield, or escape mask)
	Between 10 and 20 ppm	**Level C**. (Requires Full Face or half face respirator, Hooded chemical resistant two piece Tyvek suite or overalls, Chemical resistant inner and outer gloves, Chemical resistant boot covers, Steel toe and shank boots) (As applicable: Hard hat, face shield, or escape mask)
	More than 20 ppm	**Stop work.** Resume work when source of vapors is abated and readings are less than 20 ppm above background
Notes: * 15-minute time-weighted average, parts per million (ppm), milligrams per cubic meter (mg/m^3)		

2.5.2 Community Air Monitoring Plan

Community air monitoring will be conducted during all intrusive site activities in compliance with the New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan (CAMP). Real-time air monitoring for volatile compounds at the perimeter of the exclusion zone will be performed as described below.

VOC Monitoring

Continuous monitoring for VOCs will be conducted during all soil disturbance/excavation. Upwind concentrations will be measured at the start of each workday and periodically thereafter to establish background concentrations. VOCs will be monitored continuously at the downwind perimeter of the exclusion zone. Monitoring will be conducted with a photoionization detector (PID) equipped with a 10.6 eV lamp capable of calculating 15-minute running average concentrations. The following actions will be taken based on organic vapor levels measured:

- If total organic vapor levels exceed 5 ppm above background for the 15-minute average at the exclusion zone perimeter, work activities will be temporarily halted and monitoring continued. If levels readily decrease (per instantaneous readings)

below 5 ppm above background, work activities will resume with continued monitoring.

- If total organic vapor levels at the downwind perimeter of the exclusion zone persist at levels in excess of 5 ppm above background but less than 25 ppm, work activities will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities will resume provided that the total organic vapor level 200 feet downwind of the hot zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less – but in no case less than 20 feet – is below 5 ppm above background for the 15-minute average.
- If the total organic vapor level is above 25 ppm at the perimeter of the exclusion zone, activities will be shut down.

More frequent intervals of monitoring will be conducted if required as determined by the SSC. All 15-minute readings will be recorded and available for NYSDEC and NYSDOH personnel to review. Instantaneous readings, if any, will also be recorded.

Dust/Particulate Monitoring

A Dust Trak® dust monitor or equivalent will be used to measure concentration of total particulate matter during field activities. Continuous monitoring will be conducted during all soil excavation/disturbance. Upwind concentrations will be measured at the start of each workday and periodically thereafter to establish background concentrations. VOCs will be monitored continuously at the downwind perimeter of the exclusion zone.

The action levels developed for the site are based upon 15-minute averages of the monitoring data. The measurements will be made as close to the workers as practicable and at the breathing height of the workers. 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 work zone action levels and required responses are listed in the following table:

Work Zone Action Levels and Required Responses

Action Level	Response Action
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 less than 2.5 mg/m^3, resume work using Level D. Otherwise, upgrade Level C.
Above 125 mg/m^3	**Stop work.** Apply additional dust suppression measures. Resume work when less than 125 mg/m^3 and maintain Level C.

If, after implementation of dust suppression techniques, downwind particulate levels are greater than 125 mg/m^3 above the background (upwind level), work shall be reevaluated and changes initiated to reduce particulate levels and to prevent visible dust migration, including work stoppage if necessary.

In addition, fugitive dust migration to the nearby community should be visually assessed during all work activities as follows:

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

The action levels and required responses for protection of the nearby community are summarized in the following table:

Action Levels and Required Responses for Protection of the Nearby Community

Action Level	Response Action
Between 100 mg/m^3 and 100 mg/m^3 greater than background	Apply dust suppression measures. If less than 100 mg/m^3 above background, resume work using Level D. Otherwise, upgrade Level C.
Great than 150 mg/m^3 above background levels	**Stop work.** Apply additional dust suppression measures. Resume work when less than 150 mg/m^3 above background levels.

Major Vapor Emission Response Plan

Although not anticipated, if any organic levels greater than 5 ppm over background are identified 200 feet downwind from the work site, or half the distance to the nearest residential or commercial property, whichever is less, all work activities must be halted or vapor controls must be implemented.

If, following the cessation of the work activities, or as the result of an emergency, organic levels persist above 5 ppm above background 200 feet downwind or half the distance to the nearest residential or commercial property from the exclusion zone, then the air quality must be monitored within 20 feet of the perimeter of the nearest residential or commercial structure (20 Foot Zone).

If either of the following criteria is exceeded in the 20-Foot Zone, then the Major Vapor Emission Response Plan shall automatically be implemented.

- Sustained organic vapor levels approaching 1 ppm above background for a period of more than 30 minutes, or
- Organic vapor levels greater than 5 ppm above background for any time period.

Upon activation, the following activities shall be undertaken as part of the Major Vapor Emission Response Plan:

- The NYSDEC, NYSDOH, and local police authorities will be immediately contacted by the SSC and advised of the situation;

- Frequent air monitoring will be conducted at 30-minute intervals within the 20-Foot Zone. If two successive readings below action levels are measured, air monitoring may be halted or modified by the Site Health and Safety Officer; and
- All Emergency contacts will go into effect as appropriate.

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

2.5.3 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."

AKRF field personnel and other site personnel shall wear, at a minimum, Level D personal protective equipment. The protection will be based on the air monitoring described in this section.

Personal Protection Equipment Requirements

Level of Protection and PPE		All Tasks
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) Nitrile Gloves (X) Tyvek for drill operator if NAPL present	Yes
Level C *(in addition to Level D)* (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 (breathing zone)
Comments: Cartridges to be changed out at least once per shift unless warranted beforehand (e.g., more difficult to breath or any odors detected).		

2.6 General Work Practices

To protect the health and safety of the field personnel, field personnel will adhere to the guidelines listed below during activities involving subsurface disturbance:

- Eating, drinking, chewing gum or tobacco, and smoking are prohibited, except in designated areas on the site. These areas will be designated by the SSC.
- Workers must wash their hands thoroughly on leaving the work area and before eating, drinking, or any other such activity.

- The workers should shower as soon as possible after leaving the site. Contact with contaminated or suspected surfaces should be avoided.
- The buddy system should always be used; each buddy should watch for signs of fatigue, exposure, and heat/cold stress.

3.0 EMERGENCY PROCEDURES AND EMERGENCY RESPONSE PLAN

The field crew will be equipped with emergency equipment, such as a first aid kit and disposable eye washes. In the case of a medical emergency, the SSC will determine the nature of the emergency and he/she will have someone call for an ambulance, if needed. If the nature of the injury is not serious, i.e., the person can be moved without expert emergency medical personnel, he/she should be driven to the Lincoln Medical and Mental Health Center by on-site personnel. Directions to the hospital are provided below, and a hospital route map is attached.

3.1 Hospital Directions

Hospital Name	Lincoln Medical and Mental Health Center
Phone Number	718-579-5000
Address/Location	234 East 149th Street – Bronx, New York (East 149th Street between Morris Avenue and Park Avenue)
Directions	Go EAST (RIGHT) on East 136th Street LEFT onto Lincoln Avenue Lincoln Avenue merges with Morris Avenue LEFT onto East 149th Street The hospital will be on the left

3.2 Emergency Contacts

Company	Individual Name	Title	Contact Number
AKRF	Michelle Lapin	Project Director and Remediation Engineer	646-388-9520 (office)
	Axel Schwendt	Project Manager	646-388-9529 (office) 917-596-8992 (cell)
	Steve Grens	SSC	914-922-2371 (office) 917-613-6022 (cell)
Jiten LLC	Daniele Cervino	Client Project Manager	973-703-6578 (cell)
New York State Department of Environmental Conservation (NYSDEC)	Ralph Keating	BCP Project Manager	518-402-9774 (office)
New York State Department of Health (NYSDOH)	Thomas Panzone	NYSDOH Project Manager	718-482-4953 (office)
Ambulance, Fire Department & Police Department	-	-	911
NYSDEC Spill Hotline	-	-	800-457-7362

4.0 APPROVAL & ACKNOWLEDGMENTS OF HASP

APPROVAL

Signed: _____ Date: _____

AKRF Project Manager

Signed: _____ Date: _____

AKRF Health and 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 SSO.

AFFIDAVIT

I,_____(name), of_____(company name), have read the Health and Safety Plan (HASP) for the 2477 Third Avenue site in the Bronx, New York. 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: _____ Company: _____ Date: _____
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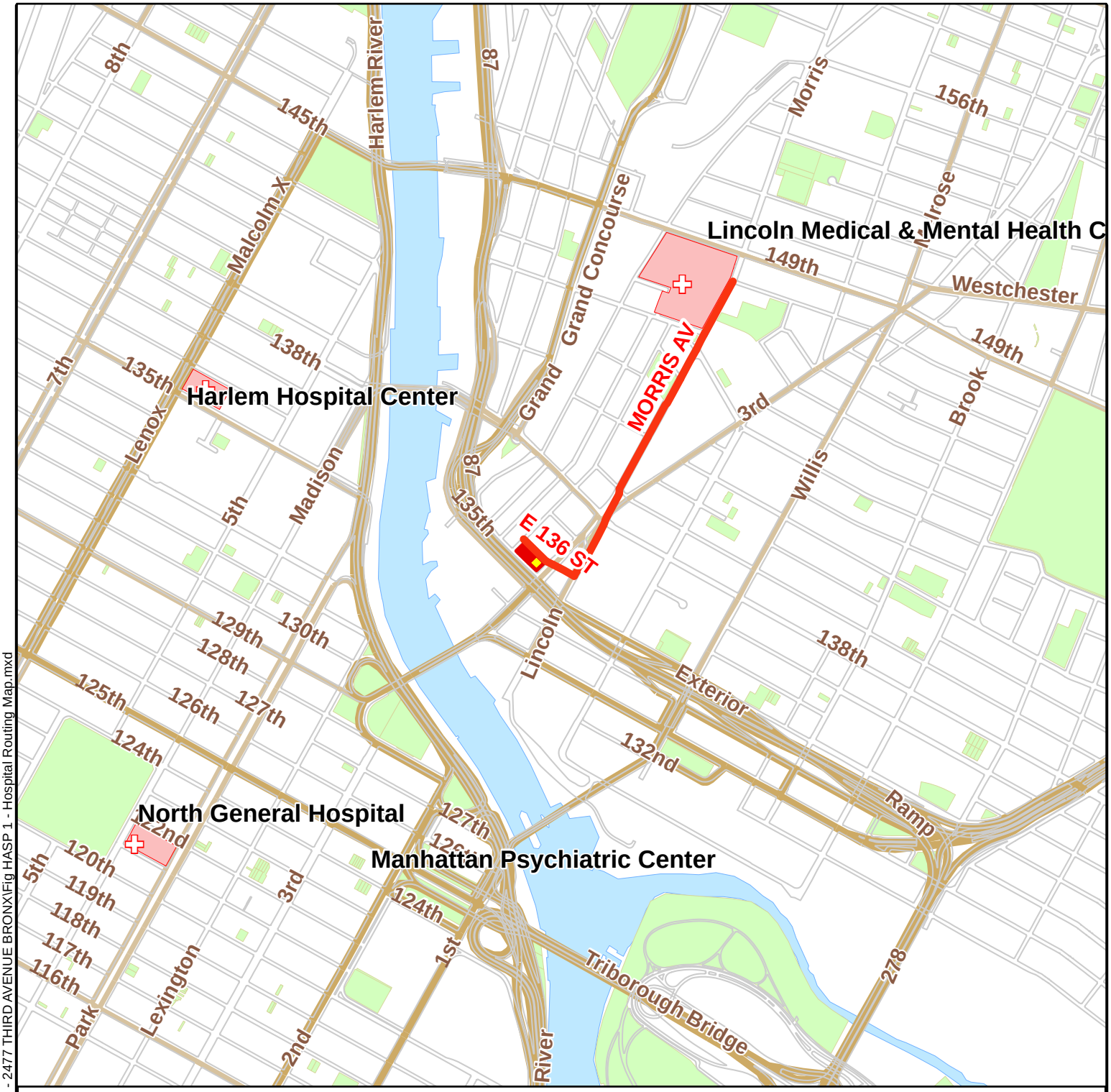
FIGURES



Lincoln Medical and Mental Health Center
234 East 149th Street
Bronx, New York 10451
Tel. (718) 579-5000

0 0.5 Miles

2477 THIRD AVENUE
BRONX, NEW YORK

HOSPITAL LOCATION MAP

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

DATE
3.03.09

PROJECT No.
11160-005

FIGURE
HASP - 1

ATTACHMENT A

POTENTIAL HEALTH EFFECTS FROM ON-SITE CONTAMINANTS

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

BENZENE
CAS # 71-43-2

Agency for Toxic Substances and Disease Registry ToxFAQs September 1997

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.

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

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.

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.

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FUEL OILS

CAS # 8008-20-6, 70892-10-3, 68476-30-2, 68476-34-6, 68476-31-3

This fact sheet answers the most frequently asked health questions (FAQs) about fuel oils. 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: Fuel oils are liquid mixtures produced from petroleum, and their use mostly involves burning them as fuels. Drinking or breathing fuel oils may cause nausea or nervous system effects. However, exposure under normal use conditions is not likely to be harmful. Fuel oils have been found in at least 26 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What are fuel oils?

(Pronounced fyo͞o′əl oilz)

Fuel oils are a variety of yellowish to light brown liquid mixtures that come from crude petroleum. Some chemicals found in fuel oils may evaporate easily, while others may more easily dissolve in water.

Fuel oils are produced by different petroleum refining processes, depending on their intended uses. Fuel oils may be used as fuel for engines, lamps, heaters, furnaces, and stoves, or as solvents.

Some commonly found fuel oils include kerosene, diesel fuel, jet fuel, range oil, and home heating oil. These fuel oils differ from one another by their hydrocarbon compositions, boiling point ranges, chemical additives, and uses.

What happens to fuel oils when they enter the environment?

- Some chemicals found in fuel oils may evaporate into the air from open containers or contaminated soil or water.
- Some chemicals found in fuel oils may dissolve in water after spills to surface waters or leaks from underground storage tanks.
- Some chemicals found in fuel oils may stick to particles in water, which will eventually cause them to settle to the bottom sediment.
- Some of the chemicals found in fuel oils may be broken down slowly in air, water, and soil by sunlight or small organisms.
- Some of the chemicals found in fuel oils may build up significantly in plants and animals.

How might I be exposed to fuel oils?

- Using a home kerosene heater or stove, or using fuel oils at work.
- Breathing air in home or building basements that has been contaminated with fuel oil vapors entering from the soil.
- Drinking or swimming in water that has been contaminated with fuel oils from a spill or a leaking underground storage tank.
- Touching soil contaminated with fuel oils.
- Using fuel oils to wash paint or grease from skin or equipment.

How can fuel oils affect my health?

Little information is available about the health effects that may be caused by fuel oils. People who use kerosene

stoves for cooking do not seem to have any health problems related to their exposure.

Breathing some fuel oils for short periods may cause nausea, eye irritation, increased blood pressure, headache, lightheadedness, loss of appetite, poor coordination, and difficulty concentrating. Breathing diesel fuel vapors for long periods may cause kidney damage and lower your blood's ability to clot.

Drinking small amounts of kerosene may cause vomiting, diarrhea, coughing, stomach swelling and cramps, drowsiness, restlessness, painful breathing, irritability, and unconsciousness. Drinking large amounts of kerosene may cause convulsions, coma, or death. Skin contact with kerosene for short periods may cause itchy, red, sore, or peeling skin.

How likely are fuel oils to cause cancer?

The International Agency for Research on Cancer (IARC) has determined that some fuel oils (heavy) may possibly cause cancer in humans, but for other fuel oils (light) there is not enough information to make a determination. IARC has also determined that occupational exposures to fuel oils during petroleum refining are probably carcinogenic in humans.

Some studies with mice have suggested that repeated contact with fuel oils may cause liver or skin cancer. However, other mouse studies have found this not to be the case. No studies are available in other animals or in people on the carcinogenic effects of fuel oils.

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

There is no medical test that shows if you have been exposed to fuel oils. Tests are available to determine if some of the chemicals commonly found in fuel oils are in your blood. However, the presence of these chemicals in blood may not necessarily mean that you have been exposed to fuel oils.

Has the federal government made recommendations to protect human health?

The Occupational Safety and Health Administration (OSHA) and the Air Force Office of Safety and Health (AFOSH) have set a permissible exposure level (PEL) of 400 parts of petroleum distillates per million parts of air (400 ppm) for an 8-hour workday, 40-hour workweek.

The National Institute for Occupational Safety and Health (NIOSH) recommends that average workplace air levels not exceed 350 milligrams of petroleum distillates per cubic meter of air (350 mg/m^3) for a 40-hour workweek.

The Department of Transportation (DOT) lists fuel oils as hazardous materials and, therefore, regulates their transportation.

Glossary

Carcinogenic: Able to cause cancer.

CAS: Chemical Abstracts Service.

Evaporate: To change into a vapor or a gas.

Hydrocarbon: Any compound made up of hydrogen and carbon.

Milligram (mg): One thousandth of a gram.

ppm: Parts per million.

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 fuel oils. 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 E-29, Atlanta, GA 30333. Phone:1-888-422-8737, FAX: 404-498-0093. 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

HEPTACHLOR and HEPTACHLOR EPOXIDE

CAS # 76-44-8 and 1024-57-3

Division of Toxicology and Environmental Medicine ToxFAQs™ August 2007

This fact sheet answers the most frequently asked health questions (FAQs) about heptachlor and heptachlor epoxide. For more information, call the ATSDR Information Center at 1-800-232-4636. 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 these substances 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: The primary exposure to heptachlor and heptachlor epoxide is from contaminated foods and milk. Little is known about their health effects in humans. At high levels, they may cause damage to your liver and nervous system. Exposure of animals during gestation and infancy can result in damage to the nervous system and the immune systems. Heptachlor and heptachlor epoxide have been found in at least 210 and 200, respectively, of the 1,684 National Priority List sites identified by the Environmental Protection Agency (EPA).

What are heptachlor and heptachlor epoxide?

Heptachlor is a manufactured chemical and doesn't occur naturally. Pure heptachlor is a white powder that smells like camphor (mothballs). The less pure grade is tan. Trade names include Heptagran®, Basaklor®, Drinox®, Soleptax®, Termide®, Gold Crest H-60®, and Velsicol 104®.

Heptachlor was used extensively in the past for killing insects in homes, buildings, and on food crops. These uses stopped in 1988. Currently it can only be used for fire ant control in underground power transformers.

Heptachlor epoxide is also a white powder. Bacteria and animals break down heptachlor to form heptachlor epoxide. The epoxide is more likely to be found in the environment than heptachlor.

What happens to heptachlor and heptachlor epoxide when they enter the environment?

- ❑ Heptachlor doesn't dissolve easily in water; heptachlor epoxide dissolves more easily
- ❑ They stick strongly to soil particles and evaporate slowly to air.
- ❑ Heptachlor epoxide can stay in the soil and water for many years.
- ❑ Plants can take up heptachlor from the soil. Levels of heptachlor and heptachlor epoxide can build up in the tissues of fish and cattle.

How might I be exposed to heptachlor or heptachlor epoxide?

- ❑ Eating fish, dairy products, and fatty meats from animals exposed to heptachlor in their food.
- ❑ Breast milk from mothers who had high exposures can expose breastfed infants.
- ❑ Drinking water, breathing air, or touching soil at waste sites that contain these substances.

How can heptachlor and heptachlor epoxide affect my health?

There is no reliable information on health effects in humans. Liver damage, excitability, and decreases in fertility have been observed in animals ingesting heptachlor. The effects are worse when the exposure levels were high or when exposure lasted many weeks.

Although there is very little information on heptachlor epoxide, it is likely that similar effects would also occur after exposure to this compound.

HEPTACHLOR and HEPTACHLOR EPOXIDE
CAS # 76-44-8 and 1024-57-3

How likely are heptachlor and heptachlor epoxide to cause cancer?

Lifetime exposure to heptachlor resulted in liver tumors in animals. The International Agency for Research on Cancer (IARC) and the EPA have classified heptachlor as a possible human carcinogen. EPA also considers heptachlor epoxide as a possible human carcinogen.

How can heptachlor and heptachlor epoxide affect children?

Animals exposed to heptachlor during gestation and infancy may be very sensitive to heptachlor and heptachlor epoxide. Changes in nervous system and immune function were found in these animals. Exposure to higher doses of heptachlor in animals can also result in decreases in body weight and death in newborn animals.

How can families reduce the risks of exposure to heptachlor and heptachlor epoxide?

❑ People who live in homes where heptachlor was used for termite control or on farms where heptachlor was used on crops may have a higher risk of exposure through contaminated crops, soil, water, and air. To avoid exposure from contaminated soil, you should discourage your children from eating dirt. Make sure they wash their hands frequently and before eating. Discourage children from putting their hands in their mouths or other hand-to-mouth activities.

❑ Heptachlor and heptachlor epoxide are also persistent in food and milk. Eating fish from contaminated water can increase exposure to heptachlor. Do not fish or eat fish from contaminated water. Local fishing advisories can tell you if the water is contaminated.

Is there a medical test to determine whether I've been exposed to heptachlor or heptachlor epoxide?

Laboratory tests can detect heptachlor and heptachlor epoxide in blood, fat, breast milk, and body tissues after exposure to high levels of these chemicals. These tests are not commonly available at your doctor's office. Most often, the test for heptachlor epoxide is used because heptachlor is quickly changed into heptachlor epoxide in your body. Blood samples are used most often because they are easy to collect. These tests are specific for heptachlor and heptachlor epoxide.

Methods for measuring heptachlor and heptachlor epoxide in body fat are more precise and can detect lower levels than tests that measure levels in blood. If heptachlor or heptachlor epoxide is found in your blood or fat, it is not possible to tell when you were exposed to these chemicals or if harmful health effects will occur.

Has the federal government made recommendations to protect human health?

The EPA requires that drinking water should not contain more than 0.0004 milligrams heptachlor per liter of water (0.0004 mg/L) and 0.0002 mg heptachlor epoxide per liter of water (0.0002 mg/L).

The FDA controls the amount of heptachlor and heptachlor epoxide on raw food crops and on edible seafood. The limit on food crops is 0.01 parts heptachlor per million parts food (0.01 ppm). The limit in milk is 0.1 parts per million of milk fat. The limit on edible seafood is 0.3 ppm.

The Occupational Safety and Health Administration (OSHA) has set a limit of 0.5 milligrams heptachlor per cubic meter of workplace air (0.5 mg/m^3) for 8 hour shifts and 40 hour work weeks.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2007. Toxicological Profile for Heptachlor and Heptachlor Epoxide (Update). 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.

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

METHYL *TERT*-BUTYL ETHER (MTBE) CAS # 1634-04-4

Agency for Toxic Substances and Disease Registry ToxFAQs **September 1997**

This fact sheet answers the most frequently asked health questions (FAQs) about methyl *tert*-butyl ether (MTBE). 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: Methyl *tert*-butyl ether (MTBE) is a flammable liquid which is used as an additive in unleaded gasoline. Drinking or breathing MTBE may cause nausea, nose and throat irritation, and nervous system effects. MTBE has been found in at least 11 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is methyl *tert*-butyl ether?

(Pronounced měth′əl tûr′shē-ĕr′ē byo͞ot′l ē′thər)

Methyl *tert*-butyl ether (MTBE) is a flammable liquid with a distinctive, disagreeable odor. It is made from blending chemicals such as isobutylene and methanol, and has been used since the 1980s as an additive for unleaded gasolines to achieve more efficient burning.

MTBE is also used to dissolve gallstones. Patients treated in this way have MTBE delivered directly to their gall bladders through special tubes that are surgically inserted.

What happens to MTBE when it enters the environment?

- MTBE quickly evaporates from open containers and surface water, so it is commonly found as a vapor in the air.
- Small amounts of MTBE may dissolve in water and get into underground water.
- It remains in underground water for a long time.
- MTBE may stick to particles in water, which will cause it to eventually settle to the bottom sediment.
- MTBE may be broken down quickly in the air by sunlight.
- MTBE does not build up significantly in plants and animals.

How might I be exposed to MTBE?

- Touching the skin or breathing contaminated air while pumping gasoline.
- Breathing exhaust fumes while driving a car.
- Breathing air near highways or in cities.
- Drinking, swimming, or showering in water that has been contaminated with MTBE.
- Receiving MTBE treatment for gallstones.

How can MTBE affect my health?

Breathing small amounts of MTBE for short periods may cause nose and throat irritation. Some people exposed to MTBE while pumping gasoline, driving their cars, or working

in gas stations have reported having headaches, nausea, dizziness, and mental confusion. However, the actual levels of exposure in these cases are unknown. In addition, these symptoms may have been caused by exposure to other chemicals.

There are no data on the effects in people of drinking MTBE. Studies with rats and mice suggest that drinking MTBE may cause gastrointestinal irritation, liver and kidney damage, and nervous system effects.

How likely is MTBE to cause cancer?

There is no evidence that MTBE causes cancer in humans. One study with rats found that breathing high levels of MTBE for long periods may cause kidney cancer. Another study with mice found that breathing high levels of MTBE for long periods may cause liver cancer.

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

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

MTBE and its breakdown product, butyl alcohol, can be detected in your breath, blood, or urine for up to 1 or 2 days after exposure. These tests aren't available at most doctors' offices, but can be done at special laboratories that have the right equipment. There is no other test specific to determining MTBE exposure.

Has the federal government made recommendations to protect human health?

The EPA has issued guidelines recommending that, to protect children, drinking water levels of MTBE not exceed 4 milligrams per liter of water (4 mg/L) for an exposure of 1-10 days, and 3 mg/L for longer-term exposures.

The American Conference of Governmental Industrial Hygienists (ACGIH) has recommended an exposure limit of 40 parts of MTBE per million parts of air (40 ppm) for an 8-hour workday, 40-hour workweek.

Glossary

Carcinogenicity: Ability to cause cancer.

CAS: Chemical Abstracts Service.

Evaporate: To change into a vapor or gas.

Milligram (mg): One thousandth of a gram.

ppm: Parts per million.

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

References

This ToxFAQs information is taken from the 1996 Toxicological Profile for Methyl *tert*-Butyl Ether 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.

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NAPHTHALENE
CAS # 91-20-3

1-METHYLNAPHTHALENE
CAS # 90-12-0

2-METHYLNAPHTHALENE
CAS # 91-57-6

Division of Toxicology ToxFAQs™ August 2005

This fact sheet answers the most frequently asked health questions (FAQs) about naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene. 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 these substances 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 naphthalene, 1-methylnaphthalene, or 2-methylnaphthalene happens mostly from breathing air contaminated from the burning of wood, tobacco, or fossil fuels, industrial discharges, or moth repellents. Exposure to large amounts of naphthalene may damage or destroy some of your red blood cells. Naphthalene has caused cancer in animals. Naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene have been found in at least 687, 36, and 412, respectively, of the 1,662 National Priority List sites identified by the Environmental Protection Agency (EPA).

What are naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene?

Naphthalene is a white solid that evaporates easily. Fuels such as petroleum and coal contain naphthalene. It is also called white tar, and tar camphor, and has been used in mothballs and moth flakes. Burning tobacco or wood produces naphthalene. It has a strong, but not unpleasant smell. The major commercial use of naphthalene is in the manufacture of polyvinyl chloride (PVC) plastics. Its major consumer use is in moth repellents and toilet deodorant blocks.

1-Methylnaphthalene and 2-methylnaphthalene are naphthalene-related compounds. 1-Methylnaphthalene is a clear liquid and 2-methylnaphthalene is a solid; both can be smelled in air and in water at very low concentrations.

1-Methylnaphthalene and 2-methylnaphthalene are used to make other chemicals such as dyes and resins. 2-Methylnaphthalene is also used to make vitamin K.

What happens to naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene when they enter the environment?

- Naphthalene enters the environment from industrial and domestic sources, and from accidental spills.
- Naphthalene can dissolve in water to a limited degree and may be present in drinking water from wells close to hazardous waste sites and landfills.
- Naphthalene can become weakly attached to soil or pass through soil into underground water.
- In air, moisture and sunlight break it down within 1 day. In water, bacteria break it down or it evaporates into the air.
- Naphthalene does not accumulate in the flesh of animals or fish that you might eat.
- 1-Methylnaphthalene and 2-methylnaphthalene are expected to act like naphthalene in air, water, or soil because they have similar chemical and physical properties.

How might I be exposed to naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene?

- Breathing low levels in outdoor air.
- Breathing air contaminated from industrial discharges or smoke from burning wood, tobacco, or fossil fuels.
- Using or making moth repellents, coal tar products, dyes or inks could expose you to these chemicals in the air.
- Drinking water from contaminated wells.
- Touching fabrics that are treated with moth repellents containing naphthalene.
- Exposure to naphthalene, 1-methylnaphthalene and 2-methylnaphthalene from eating foods or drinking beverages is unlikely.

How can naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene 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. This condition is called hemolytic anemia. Some symptoms of hemolytic anemia 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 high amounts of naphthalene. It is not clear whether this also develops in people. Rats and mice that breathed naphthalene vapors daily for a lifetime developed irritation and inflammation of their nose and lungs. It is unclear if naphthalene

causes reproductive effects in animals; most evidence says it does not.

There are no studies of humans exposed to 1-methylnaphthalene or 2-methylnaphthalene.

Mice fed food containing 1-methylnaphthalene and 2-methylnaphthalene for most of their lives had part of their lungs filled with an abnormal material.

How likely are naphthalene, 1-methylnaphthalene, or 2-methylnaphthalene to cause cancer?

There is no direct evidence in humans that naphthalene, 1-methylnaphthalene, or 2-methylnaphthalene cause cancer. However, cancer from naphthalene exposure has been seen in animal studies. Some female mice that breathed naphthalene vapors daily for a lifetime developed lung tumors. Some male and female rats exposed to naphthalene in a similar manner also developed nose tumors.

Based on the results from animal studies, the Department of Health and Humans Services (DHHS) concluded that naphthalene is reasonably anticipated to be a human carcinogen. The International Agency for Research on Cancer (IARC) concluded that naphthalene is possibly carcinogenic to humans. The EPA determined that naphthalene is a possible human carcinogen (Group C) and that the data are inadequate to assess the human carcinogenic potential of 2-methylnaphthalene.

How can naphthalene, 1-methylnaphthalene, or 2-methylnaphthalene affect children?

Hospitals have reported many cases of hemolytic anemia in children, including newborns and infants, who either ate naphthalene mothballs or deodorants cakes or who were in close contact with clothing or blankets stored in naphthalene mothballs. Naphthalene can move from a pregnant woman's blood to the unborn baby's blood. Naphthalene has been detected in some samples of breast milk from the general U.S. population, but not at levels that are expected to be of concern.

There is no information on whether naphthalene has affected development in humans. No developmental abnormalities were observed in the offspring from rats, mice, and rabbits fed naphthalene during pregnancy.

We do not have any information on possible health effects of 1-methylnaphthalene or 2-methylnaphthalene on children.

How can families reduce the risks of exposure to naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene?

❑ Families can reduce the risks of exposure to naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene by avoiding smoking tobacco, generating smoke during cooking, or using fireplaces or heating appliances in the their homes.

❑ If families use naphthalene-containing moth repellents, the material should be enclosed in containers that prevent vapors from escaping, and kept out of the reach from children.

❑ Blankets and clothing stored with naphthalene moth repellents should be aired outdoors to remove naphthalene odors and washed before they are used.

❑ Families should inform themselves of the contents of air deodorizers that are used in their homes and refrain from using deodorizers with naphthalene.

Is there a medical test to determine whether I've been exposed to naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene?

Tests are available that measure levels of these chemicals and their breakdown products in samples of urine, feces, blood, maternal milk, or body fat. These tests are not routinely available in a doctor's office because they require special equipment, but samples can be sent to special testing laboratories. These tests cannot determine exactly how much naphthalene, 1-methylnaphthalene, or 2-methylnaphthalene you were exposed to or predict whether harmful effects will occur. If the samples are collected within a day or two of exposure, then the tests can show if you were exposed to a large or small amount of naphthalene, 1-methylnaphthalene, or 2-methylnaphthalene.

Has the federal government made recommendations to protect human health?

The EPA recommends that children not drink water with over 0.5 parts per million (0.5 ppm) naphthalene for more than 10 days or over 0.4 ppm for any 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 (70 years), the EPA suggests that it contain no more than 0.1 ppm naphthalene.

The Occupational Safety and Health Administration (OSHA) set a limit of 10 ppm for the level of naphthalene in workplace air during an 8-hour workday, 40-hour workweek. The National Institute for Occupational Safety and Health (NIOSH) considers more than 500 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 impair a worker's ability to leave a contaminate area and therefore, results in permanent health problems or death.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2005. Toxicological Profile for Naphthalene, 1-Methylnaphthalene, and 2-Methylnaphthalene (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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POLYCHLORINATED BIPHENYLS

Division of Toxicology ToxFAQs™ February 2001

This fact sheet answers the most frequently asked health questions (FAQs) about polychlorinated biphenyls. 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: Polychlorinated biphenyls (PCBs) are a mixture of individual chemicals which are no longer produced in the United States, but are still found in the environment. Health effects that have been associated with exposure to PCBs include acne-like skin conditions in adults and neurobehavioral and immunological changes in children. PCBs are known to cause cancer in animals. PCBs have been found in at least 500 of the 1,598 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What are polychlorinated biphenyls?

Polychlorinated biphenyls are mixtures of up to 209 individual chlorinated compounds (known as congeners). There are no known natural sources of PCBs. PCBs are either oily liquids or solids that are colorless to light yellow. Some PCBs can exist as a vapor in air. PCBs have no known smell or taste. Many commercial PCB mixtures are known in the U.S. by the trade name Aroclor.

PCBs have been used as coolants and lubricants in transformers, capacitors, and other electrical equipment because they don't burn easily and are good insulators. The manufacture of PCBs was stopped in the U.S. in 1977 because of evidence they build up in the environment and can cause harmful health effects. Products made before 1977 that may contain PCBs include old fluorescent lighting fixtures and electrical devices containing PCB capacitors, and old microscope and hydraulic oils.

What happens to PCBs when they enter the environment?

❑ PCBs entered the air, water, and soil during their manufacture, use, and disposal; from accidental spills and leaks during their transport; and from leaks or fires in products containing PCBs.

❑ PCBs can still be released to the environment from hazardous waste sites; illegal or improper disposal of industrial wastes and consumer products; leaks from old electrical transformers containing PCBs; and burning of some wastes in incinerators.

❑ PCBs do not readily break down in the environment and thus may remain there for very long periods of time. PCBs can travel long distances in the air and be deposited in areas far away from where they were released. In water, a small amount of PCBs may remain dissolved, but most stick to organic particles and bottom sediments. PCBs also bind strongly to soil.

❑ PCBs are taken up by small organisms and fish in water. They are also taken up by other animals that eat these aquatic animals as food. PCBs accumulate in fish and marine mammals, reaching levels that may be many thousands of times higher than in water.

How might I be exposed to PCBs?

❑ Using old fluorescent lighting fixtures and electrical devices and appliances, such as television sets and refrigerators, that were made 30 or more years ago. These items may leak small amounts of PCBs into the air when they get hot during operation, and could be a source of skin exposure.

❑ Eating contaminated food. The main dietary sources of PCBs are fish (especially sportfish caught in contaminated lakes or rivers), meat, and dairy products.

❑ Breathing air near hazardous waste sites and drinking contaminated well water.

❑ In the workplace during repair and maintenance of PCB transformers; accidents, fires or spills involving transformers, fluorescent lights, and other old electrical devices; and disposal of PCB materials.

How can PCBs affect my health?

The most commonly observed health effects in people exposed to large amounts of PCBs are skin conditions such as acne and rashes. Studies in exposed workers have shown changes in blood and urine that may indicate liver damage. PCB exposures in the general population are not likely to result in skin and liver effects. Most of the studies of health effects of PCBs in the general population examined children of mothers who were exposed to PCBs.

Animals that ate food containing large amounts of PCBs for short periods of time had mild liver damage and some died. Animals that ate smaller amounts of PCBs in food over several weeks or months developed various kinds of health effects, including anemia; acne-like skin conditions; and liver, stomach, and thyroid gland injuries. Other effects

of PCBs in animals include changes in the immune system, behavioral alterations, and impaired reproduction. PCBs are not known to cause birth defects.

How likely are PCBs to cause cancer?

Few studies of workers indicate that PCBs were associated with certain kinds of cancer in humans, such as cancer of the liver and biliary tract. Rats that ate food containing high levels of PCBs for two years developed liver cancer. The Department of Health and Human Services (DHHS) has concluded that PCBs may reasonably be anticipated to be carcinogens. The EPA and the International Agency for Research on Cancer (IARC) have determined that PCBs are probably carcinogenic to humans.

How can PCBs affect children?

Women who were exposed to relatively high levels of PCBs in the workplace or ate large amounts of fish contaminated with PCBs had babies that weighed slightly less than babies from women who did not have these exposures. Babies born to women who ate PCB-contaminated fish also showed abnormal responses in tests of infant behavior. Some of these behaviors, such as problems with motor skills and a decrease in short-term memory, lasted for several years. Other studies suggest that the immune system was affected in children born to and nursed by mothers exposed to increased levels of PCBs. There are no reports of structural birth defects caused by exposure to PCBs or of health effects of PCBs in older children. The most likely way infants will be exposed to PCBs is from breast milk. Transplacental transfers of PCBs were also reported In most cases, the benefits of breast-feeding outweigh any risks from exposure to PCBs in mother's milk.

How can families reduce the risk of exposure to PCBs?

❑ You and your children may be exposed to PCBs by eating fish or wildlife caught from contaminated locations. Certain states, Native American tribes, and U.S. territories have issued advisories to warn people about PCB-contaminated fish and fish-eating wildlife. You can reduce your family's exposure to PCBs by obeying these advisories.

❑ Children should be told not play with old appliances, electrical equipment, or transformers, since they may contain PCBs.

❑ Children should be discouraged from playing in the dirt near hazardous waste sites and in areas where there was a transformer fire. Children should also be discouraged from eating dirt and putting dirty hands, toys or other objects in their mouths, and should wash hands frequently.

❑ If you are exposed to PCBs in the workplace it is possible to carry them home on your clothes, body, or tools. If this is the case, you should shower and change clothing before leaving work, and your work clothes should be kept separate from other clothes and laundered separately.

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

Tests exist to measure levels of PCBs in your blood, body fat, and breast milk, but these are not routinely conducted. Most people normally have low levels of PCBs in their body because nearly everyone has been environmentally exposed to PCBs. The tests can show if your PCB levels are elevated, which would indicate past exposure to above-normal levels of PCBs, but cannot determine when or how long you were exposed or whether you will develop health effects.

Has the federal government made recommendations to protect human health?

The EPA has set a limit of 0.0005 milligrams of PCBs per liter of drinking water (0.0005 mg/L). Discharges, spills or accidental releases of 1 pound or more of PCBs into the environment must be reported to the EPA. The Food and Drug Administration (FDA) requires that infant foods, eggs, milk and other dairy products, fish and shellfish, poultry and red meat contain no more than 0.2-3 parts of PCBs per million parts (0.2-3 ppm) of food. Many states have established fish and wildlife consumption advisories for PCBs.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2000. Toxicological profile for polychlorinated biphenyls (PCBs). 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 E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-498-0093. 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.

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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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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.

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TRICHLOROETHYLENE

CAS # 79-01-6

Division of Toxicology ToxFAQs™ July 2003

This fact sheet answers the most frequently asked health questions (FAQs) about trichloroethylene. 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: Trichloroethylene is a colorless liquid which is used as a solvent for cleaning metal parts. Drinking or breathing high levels of trichloroethylene may cause nervous system effects, liver and lung damage, abnormal heartbeat, coma, and possibly death. Trichloroethylene has been found in at least 852 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is trichloroethylene?

Trichloroethylene (TCE) is a nonflammable, colorless liquid with a somewhat sweet odor and a sweet, burning taste. It is used mainly as a solvent to remove grease from metal parts, but it is also an ingredient in adhesives, paint removers, typewriter correction fluids, and spot removers.

Trichloroethylene is not thought to occur naturally in the environment. However, it has been found in underground water sources and many surface waters as a result of the manufacture, use, and disposal of the chemical.

What happens to trichloroethylene when it enters the environment?

- Trichloroethylene dissolves a little in water, but it can remain in ground water for a long time.
- Trichloroethylene quickly evaporates from surface water, so it is commonly found as a vapor in the air.
- Trichloroethylene evaporates less easily from the soil than from surface water. It may stick to particles and remain for a long time.
- Trichloroethylene may stick to particles in water, which will cause it to eventually settle to the bottom sediment.
- Trichloroethylene does not build up significantly in plants and animals.

How might I be exposed to trichloroethylene?

- Breathing air in and around the home which has been contaminated with trichloroethylene vapors from shower water or household products such as spot removers and typewriter correction fluid.
- Drinking, swimming, or showering in water that has been contaminated with trichloroethylene.
- Contact with soil contaminated with trichloroethylene, such as near a hazardous waste site.
- Contact with the skin or breathing contaminated air while manufacturing trichloroethylene or using it at work to wash paint or grease from skin or equipment.

How can trichloroethylene affect my health?

Breathing small amounts may cause headaches, lung irritation, dizziness, poor coordination, and difficulty concentrating.

Breathing large amounts of trichloroethylene may cause impaired heart function, unconsciousness, and death. Breathing it for long periods may cause nerve, kidney, and liver damage.

Drinking large amounts of trichloroethylene may cause nausea, liver damage, unconsciousness, impaired heart function, or death.

Drinking small amounts of trichloroethylene for long periods may cause liver and kidney damage, impaired immune system function, and impaired fetal development in pregnant women, although the extent of some of these effects is not yet clear.

Skin contact with trichloroethylene for short periods may cause skin rashes.

How likely is trichloroethylene to cause cancer?

Some studies with mice and rats have suggested that high levels of trichloroethylene may cause liver, kidney, or lung cancer. Some studies of people exposed over long periods to high levels of trichloroethylene in drinking water or in workplace air have found evidence of increased cancer. Although, there are some concerns about the studies of people who were exposed to trichloroethylene, some of the effects found in people were similar to effects in animals.

In its 9th Report on Carcinogens, the National Toxicology Program (NTP) determined that trichloroethylene is "reasonably anticipated to be a human carcinogen." The International Agency for Research on Cancer (IARC) has determined that trichloroethylene is "probably carcinogenic to humans."

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

If you have recently been exposed to trichloroethylene, it can be detected in your breath, blood, or urine. The breath test, if it is performed soon after exposure, can tell if you have been exposed to even a small amount of trichloroethylene.

Exposure to larger amounts is assessed by blood and urine tests, which can detect trichloroethylene and many of its breakdown products for up to a week after exposure. However, exposure to other similar chemicals can produce the same breakdown products, so their detection is not absolute proof of exposure to trichloroethylene. This test isn't available at most doctors' offices, but can be done at special laboratories that have the right equipment.

Has the federal government made recommendations to protect human health?

The EPA has set a maximum contaminant level for trichloroethylene in drinking water at 0.005 milligrams per liter (0.005 mg/L) or 5 parts of TCE per billion parts water.

The EPA has also developed regulations for the handling and disposal of trichloroethylene.

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

Glossary

Carcinogenicity: The ability of a substance to cause cancer.
CAS: Chemical Abstracts Service.
Evaporate: To change into a vapor or gas.
Milligram (mg): One thousandth of a gram.
Nonflammable: Will not burn.
ppm: Parts per million.
Sediment: Mud and debris that have settled to the bottom of a body of water.
Solvent: A chemical that dissolves other substances.

References

This ToxFAQs information is taken from the 1997 Toxicological Profile for Trichloroethylene (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 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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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.

ATTACHMENT B

WEST NILE VIRUS/ST. LOUIS ENCEPHALITIS PREVENTION

WEST NILE VIRUS/ST. LOUIS ENCEPHALITIS PREVENTION

The following section is based upon information provided by the CDC Division of Vector-Borne Infectious Diseases. Symptoms of West Nile Virus include fever, headache, and body aches, occasionally with skin rash and swollen lymph glands, with most infections being mild. More severe infection may be marked by headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, paralysis, and, rarely, death. Most infections of St. Louis encephalitis are mild without apparent symptoms other than fever with headache. More severe infection is marked by headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, occasional convulsions (especially infants) and spastic (but rarely flaccid) paralysis. The only way to avoid infection of West Nile Virus and St. Louis encephalitis is to avoid mosquito bites. 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 (N, N-diethyl-meta-toluamide), since mosquitoes may bite through thin clothing.
- Apply insect repellent sparingly to exposed skin. An effective repellent will contain 35% DEET. DEET in high concentrations (greater than 35%) provides no additional protection.
- Repellents may irritate the eyes and mouth.
- 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.

ATTACHMENT C

REPORT FORMS

WEEKLY SAFETY REPORT FORM

Week Ending: _____ Project Name/Number: _____

Report Date: _____ Project Manager Name: _____

Summary of any violations of procedures occurring that week:

_____

_____

_____

Summary of any job related injuries, illnesses, or near misses that week:

_____

_____

_____

_____

Summary of air monitoring data that week (include and sample analyses, action levels exceeded, and actions taken):

_____

_____

_____

Comments:

_____

_____

_____

Name: _____ Company: _____

Signature: _____ Title: _____

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:	_____	Address:	_____
Phone No.:	_____	Phone No.:	_____
Name:	_____	Company:	_____
Address:	_____	Address:	_____
Phone No.:	_____	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:

SSO Name Printed | SSO 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 D

EMERGENCY HAND SIGNALS

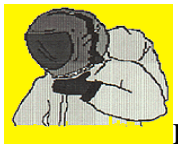
EMERGENCY SIGNALS

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 E

RESUMES OF KEY PERSONNEL

MICHELLE LAPIN, P.E.

SENIOR VICE PRESIDENT

Michelle Lapin is a Senior Vice President with more than 20 years of experience in the assessment and remediation of hazardous waste issues. She leads the firm's Hazardous Materials group and offers extensive experience providing strategic planning and management for clients. Ms. Lapin has been responsible for the administration of technical solutions to contaminated soil, groundwater, air and geotechnical problems. Her other duties have included technical and report review, proposal writing, scheduling, budgeting, and acting as liaison between clients and regulatory agencies, and project coordination with federal, state, and local authorities.

Ms. Lapin's hydrogeologic experience includes groundwater investigations, and formulation and administration of groundwater monitoring programs in New York, New Jersey, Connecticut, New Hampshire, Massachusetts, Rhode Island, Virginia, and Maryland. Her experience with groundwater contamination includes Level B hazardous waste site investigations; leaking underground storage tank studies, including hazardous soil removal and disposal and associated soil and water issues; soil gas/vapor intrusion surveys; and wetlands issues. Ms. Lapin is experienced in coordinating and monitoring field programs concerning hazardous waste cell closures. She has directed numerous Phase I, Phase II, and Phase III investigations, many of them in conjunction with developers, law firms, lending institutions, and national retail chains. She is also experienced in the cleanup of contaminated properties under Brownfield Cleanup Program (BCP) regulations.

BACKGROUND

Education

M.S., Civil Engineering, Syracuse University, 1985

B.S., Civil Engineering, Clarkson University, 1983

Professional Licenses/Certifications

New York State P.E.

State of Connecticut P.E.

Professional Memberships

Member, American Society of Professional Engineers (ASPE), National and CT Chapters

Member, American Society of Civil Engineers (ASCE), National and CT Chapters

Member, Connecticut Business & Industry Association (CBIA), CBIA Environmental Policies Council

Years of Experience

Year started in company: 1994

Year started in industry: 1986

RELEVANT EXPERIENCE

West 61st Street Rezoning/Residential Development, New York, NY

Ms. Lapin is directing the firm's hazardous materials work for this mixed-use development in Manhattan. AKRF was retained by the Algin Management Co. to prepare an EIS for the proposed rezoning of the western portion of the block between West 60th and 61st Streets, between Amsterdam and West End Avenues. The proposed action

rezoned the western half of the block, thus facilitating the development of two 30-story residential towers with accessory parking spaces, and landscaped open space. The EIS examined a "worst case" condition for rezoning the block, which allowed Algin to build a residential building of approximately 375,000 square feet at their site. The building now contains 475 apartments, 200 accessory parking spaces, a health club, and community facility space. This site, with the services of AKRF, entered into New York State's Brownfield Cleanup Program (BCP). On-site issues included underground storage tanks remaining from previous on-site buildings, petroleum contamination from these tanks and possibly from off-site sources, and other soil contaminants (metals, semi-volatile organic compounds, etc.) from fill materials and previous on-site buildings. AKRF oversaw the adherence to the Construction Health and Safety Plan (HASP), which was submitted to and approved by the NYSDEC, and monitoring the waste streams, to ensure that the different types of waste are being disposed of at the correct receiving facilities. This oversight also included confirmation and characteristic soil sampling for the receiving facilities and NYSDEC. A "Track 1" Clean up of the majority of the property (the portion including the buildings) was completed and the final Engineering Report was approved by the NYSDEC. AKRF is currently completing a smaller portion of the property which includes a tennis court and landscaped areas.

68, 76 and 78 Forest Street and 96-98 Grove Street, Stamford, CT

Ms. Lapin led this project, for which AKRF was retained to complete a Phase I Environmental Site Assessment (ESA) of five residential properties, and asbestos surveys and XRF paint surveys of the five multi-family residential structures prior to a real estate transaction. The investigations were completed to clear the way for demolition of the residential structures and prepare the properties for development into the Highgrove high rise condominium complex. AKRF represented the purchaser and site developer during the due diligence process, identified areas of environmental concern, and completed underground storage tank closure activities prior to initiating site development. In addition, AKRF conducted a Phase I ESA of a property on Summer Street that was being used by the developer as a "temporary" office building and a parking area utilized as a sales center and apartment model for the Highgrove residential development.

Shelton Storage Deluxe, Shelton, CT

AKRF completed Phase I, Phase II and Tank Removal/Remediation services for a proposed storage facility in Shelton, Connecticut. Based on this information from the Phase I ESA, AKRF conducted a Phase II study that revealed groundwater impact (gasoline), possibly from an off-site source. Additional testing was then conducted to determine the source of the gasoline contamination. Testing of a wood block floor revealed concentrations of volatile and semivolatile organic compounds and total petroleum hydrocarbons; therefore, disposal of this material had to be as a petroleum-contaminated waste. The additional testing included upstream and downstream surface water samples, and on-site detention pond water and sediment samples. Subsequent to the Phase II testing, a 4,000-gallon on-site underground storage tank was removed. Upon removal, contaminated soil and groundwater were observed and a spill was called into the CTDEP. Following completion of remedial activities and submission of a closure report, the spill was closed by the CTDEP. Ms. Lapin directed the firm's efforts to complete this project.

Hudson River Park, New York, NY

Ms. Lapin is directing AKRF's hazardous materials work during construction of Hudson River Park, a 5-mile linear park along Manhattan's West Side. As the Hudson River Park Trust's (HRPT's) environmental consultant, AKRF is overseeing preparation and implementation of additional soil and groundwater investigations (working with both NYSDEC and NYCDEP), all health and safety activities, removal of both known underground storage tanks and those encountered during construction. Previously, the firm performed hazardous materials assessments as part of the Environmental Impact Statement (EIS) process, including extensive database and historical research, as well as soil and groundwater investigations. Ms. Lapin has been the senior consultant for the soil and groundwater investigations and remediation, and the asbestos investigations and abatement oversight.

Fiterman Hall Deconstruction and Decontamination Project, New York, NY

The 15-story Fiterman Hall building, located at 30 West Broadway between Barclay and Murray Streets, originally constructed as an office building in the 1950s, had served as an extension of the City University of New York (CUNY) Borough of Manhattan Community College (BMCC) since 1993. The building was severely damaged during the September 11, 2001, attack on the World Trade Center (WTC) when 7 WTC collapsed and struck the south façade of the building, resulting in the partial collapse of the southwest corner of the structure. The building was subsequently stabilized, with breaches closed and major debris removed, however extensive mold and WTC dust contaminants remain within the building, which must be taken down. The project requires the preparation of two EASs for the redevelopment of Fiterman Hall—one for the deconstruction and decontamination of the building and one for the construction of a replacement building on the site. AKRF is currently preparing the EAS for the Deconstruction and Decontamination project, which includes the decontamination of the interior and exterior of the building, the removal and disposal of all building contents, and the deconstruction of the existing, approximately 377,000-gross-square-foot partially collapsed structure. Ms. Lapin was the reviewer for the deconstruction and decontamination plans for the EAS. The cleanup plan is due to be submitted shortly to the U.S. Environmental Protection Agency; once approved, remediation work will begin, followed by the deconstruction and rebuilding of Fiterman.

Brooklyn Bridge Park, Brooklyn, NY

AKRF is preparing an Environmental Impact Statement (EIS) and providing technical and planning support services for Brooklyn Bridge Park, which will revitalize the 1.3-mile stretch of the East River waterfront between Jay Street on the north and Atlantic Avenue on the south. The new park, to be completed by 2010, would allow public access to the water's edge, allowing people to enjoy the spectacular views of the Manhattan skyline and New York Harbor. It would also provide an array of passive and active recreational opportunities, including lawns, pavilions, and a marina. As with many waterfront sites around New York City, the lands along the Brooklyn waterfront have a long history of industrial activities. Some of these industries used dangerous chemicals and generated toxic by-products that could have entered the soil and groundwater. In addition, landfilling activities along the shoreline also made use of ash and other waste materials from industrial processes. Based on site inspections and historical maps, government records, and other sources, AKRF is in the process of investigating the potential for the presence for hazardous materials in the park. This information will be compiled into a Phase 1 Environmental Site Assessment report. AKRF will also provide support to the design team related to designing the project to minimize costs related to remediating hazardous materials where possible. Ms. Lapin is serving as senior manager for the hazardous materials investigations, including procuring a Beneficial Use Determination (BUD) from the New York State Department of Environmental Conservation (NYSDEC) for the acceptance of fill materials to the site.

Columbia University Manhattanville Academic Mixed-Use Development, New York, NY

Ms. Lapin is serving as Hazardous Materials Task Leader on this Environmental Impact Statement (EIS) for approximately 4 million square feet of new academic, research and neighborhood uses to be constructed north of Columbia University's existing Morningside campus. The work has included Phase I Environmental Site Assessments for the properties within the site boundaries and estimates for upcoming investigation and remediation.

To date, the firm's Hazardous Materials group has performed 30 Phase I Environmental Site Assessments for properties within the development area. In addition, a Preliminary Environmental Site Assessment (PESA) was completed in conjunction with the Environmental Impact Statement (EIS). Based on the Phase I studies, AKRF conducted a subsurface (Phase II) investigation in accordance with an NYCDEP-approved investigative work plan and health and safety plan. The objective of the subsurface investigation was to characterize the subsurface conditions on the property and determine whether past or present on-site and/or off-site potential sources of contamination have adversely affected the study site, and to use the analytical data collected during AKRF's subsurface investigation, to evaluate any potential environmental risks and/or the need for remedial action at the site prior to future development. Subsurface activities included the advancement of soil borings, groundwater

monitor wells, and the collection of soil and groundwater samples for laboratory analysis. This study was used to estimate remediation costs of contaminated soil, groundwater and hazardous building materials, including lead-based paint and asbestos-containing materials.

Albert Einstein College of Medicine Center for Genetic and Translational Medicine, Bronx, NY

Ms. Lapin directed the firm's hazardous materials work in connection with the construction a new Center for Genetics and Translational Medicine (CGTM) building on the Bronx campus of the Albert Einstein College of Medicine of Yeshiva University. AKRF prepared an Environmental Assessment Statement (EAS) that examined such issues as land use, zoning, air quality, urban design and visual resources, hazardous materials, traffic, noise, and air quality. Ms. Lapin's work included analysis of the existing conditions and potential impacts that the construction could cause to the environment and human health.

Yonkers Waterfront Redevelopment Project, Yonkers, NY

For this redevelopment along Yonkers Hudson River waterfront, Ms. Lapin headed the remedial investigation and remediation work that included Phase I assessments of 12 parcels, investigations of underground storage tank removals and associated soil remediation, remedial alternatives reports, and remedial work plans for multiple parcels. Several of the city-owned parcels were remediated under a Voluntary Cleanup Agreement; others were administered with state Brownfields grants. Hazardous waste remediation was completed on both brownfield and voluntary clean-up parcels, which enabled construction for mixed-use retail, residential development, and parking.

Davids Island Site Investigations, New Rochelle, NY

Ms. Lapin managed the hazardous materials investigation of Davids Island, the largest undeveloped island on the Long Island Sound in Westchester County. The 80-acre island features pre- and post-Civil War military buildings and parade grounds, and is viewed as a major heritage, tourism, and recreational amenity. The island, formerly known as Fort Slocum, was used by the U.S. military, beginning in the 19th century, as an Army base, hospital, and training center. The island was planned for county park purposes. The investigation included a Phase I site assessment, with historical research going back to the 17th century, a Phase II subsurface investigation, underground storage tank investigations, and asbestos surveys of all remaining structures. Cost estimates were submitted to Westchester County for soil remediation, asbestos abatement, and building demolition.

Site Selection and Installation of 11 Turbine Generators, New York and Long Island, NY

AKRF was retained by the New York Power Authority (NYPA) to assist in the State Environmental Quality Review Act (SEQRA) review of the proposed siting, construction, and operation of 11 single-cycle gas turbine generators in the New York metropolitan area. Ms. Lapin managed the hazardous materials investigation of the sites. The work has included Phase I site assessments, subsurface investigations, and construction health and safety plans.

Cross Westchester (I-287) Expressway Phases V and VI, Westchester County, NY

For the New York State Department of Transportation (NYSDOT), Ms. Lapin served as Project Manager and was responsible for directing the contaminated materials aspect of the final design effort for the reconstruction of Westchester County's major east-west artery. As part of her duties, Ms. Lapin was responsible for managing the asbestos investigations at eight bridges and wetland delineation along the entire corridor, as well as writing the scope of work and general management of the project.

Supermarket Redevelopment, New Fairfield, CT

AKRF provided consulting services to the developer and owner of a 9-acre site included conducting a remedial investigation and remediation of a site contaminated from former dry cleaning operations and off-site gasoline spills. The investigation included the installation of monitoring wells in three distinct aquifers, geophysical logging, pump tests, and associated data analysis. Ms. Lapin presented the environmental issues and planned remediation to

local and state officials during the early stages of the planning process to incorporate their comments into the final remedial design. A remedial action work plan (RAWP) was completed and approved by the Connecticut Department of Environmental Protection within a year to enable redevelopment work for a new supermarket and shopping center. The RAWP included the remediation of soil within the source area and a multi-well pump and treat system for the recovery of non-aqueous and dissolved phase contamination in groundwater. The design of the recovery well system included extensive groundwater modeling to ensure capture of the contaminant plume and the appropriate quantity and spacing of the wells. Ms. Lapin directed the soil removal remedial activities and monitoring for additional potential contamination during construction. In addition, AKRF performed comprehensive pre-demolition asbestos and lead-based paint surveys of the former site structures, and provided environmental consulting support for the development of the site. The groundwater remediation system was installed during site development and began operation once development was complete.

Target Stamford, Stamford, CT

AKRF originally completed a Phase I Environmental Site Assessment (ESA) for a developer of this property, located at southeastern corner of Broad Street and Washington Boulevard in downtown Stamford, Connecticut, for a proposed residential development. Four years later, an update of this Phase I ESA was conducted for a proposed Target retail development. The study area included the current Target site and the west-adjacent site currently under construction as a residential building. Following the Phase I report, a subsurface (Phase II) investigation was conducted, which included 21 soil borings, groundwater monitor wells, soil and groundwater sample collection and analysis. The results of the Phase II investigation were used to develop a remediation strategy. An additional Phase I/Phase II investigation was conducted of the adjacent former transmission repair facility, which included a site inspection, review of local and state records, an underground storage tank markout survey, advancement of 12 soil borings, and collection of soil samples for laboratory analysis. AKRF also conducted asbestos surveys prior to abatement and demolition of the former Broad Street and Washington Boulevard buildings.

East 75th/East 76th Street Site, New York, NY

Ms. Lapin served as Senior Manager for this project that encompassed coordination and direct remediation efforts of this former dry cleaning facility and parking garage prior to the sale of the property and its ultimate redevelopment for use as a private school. A preliminary site investigation identified 20 current and former petroleum and solvent tanks on the property. A soil and groundwater testing program was designed and implemented to identify the presence and extent of contamination resulting from potential tank spills. This investigation confirmed the presence of subsurface petroleum contamination in the soil and solvent contamination from former dry cleaning activities in the bedrock. AKRF completed oversight of the remediation under the State's Voluntary Cleanup Program. Remediation, consisting of tank removals and excavation of contaminated soil and the removal of solvent-contaminated bedrock down to 30 feet below grade, has been completed. AKRF completed oversight of the pre-treatment of groundwater prior to discharge to the municipal sewer system and is currently completing an off-site study to determine impacts to groundwater in downgradient locations.

Former Macy's Site, White Plains, NY

Ms. Lapin managed the pre-demolition work for Tishman Speyer. Work included a Phase I site assessment; subsurface investigation (Phase II), including the analysis of soil and groundwater samples for contamination; a comprehensive asbestos, lead paint, and PCB investigation; radon analysis; and coordination and oversight of the removal of hazardous materials left within the building from previous tenants. Work also included asbestos abatement specifications and specifications for the removal of two 10,000-gallon vaulted fuel-oil underground storage tanks.

Storage Deluxe, Various Locations, NY

Ms. Lapin manages the firm's ongoing work with Storage Deluxe, which includes Phase I and Phase II subsurface investigations, underground storage tank removals and associated remediation, asbestos surveys and abatement oversight, and contaminated soil removal and remediation for multiple sites in Connecticut, the Bronx, Brooklyn, Manhattan, Westchester County, and Long Island.

Home Depot, Various Locations, NY

Ms. Lapin, serving as either Project Manager or Senior Manager, has managed the investigations and remediation at multiple Home Depot sites in the five boroughs, Long Island, and Connecticut. The investigations have included Phase I and II site assessments, asbestos and lead paint surveys, abatement specifications and oversight, and soil and groundwater remediation.

Avalon on the Sound, New Rochelle, NY

For Avalon Bay Communities, Ms. Lapin is managing the investigations and remediation of two phases of this residential development, including two luxury residential towers and an associated parking garage. Remediation of the first phase of development (the first residential tower and the parking garage) included gasoline contamination from a former taxi facility, fuel oil contamination from multiple residential underground storage tanks, and chemical contamination from former on-site manufacturing facilities. The remediation and closure of the tank spills was coordinated with the New York State Department of Environmental Conservation (NYSDEC). The initial investigation of the Phase II development—an additional high-rise luxury residential building—detected petroleum contamination. A second investigation was conducted to delineate the extent of the contamination and estimate the costs for remediation. AKRF oversaw the remediation and conducted the Health and Safety Monitoring. The remediation was completed with closure and approvals of the NYSDEC.

Mill Basin, Gerritsen Inlet, and Paerdegat Basin Bridges, Final Design, Shore Parkway, Brooklyn, NY

Following the preparation of the Generic Environmental Impact Statement (GEIS) for the Belt Parkway Bridges Project, the firm was retained for supplemental work during the final design phase of the project. This included NEPA and SEQRA documentation for three of the bridges—Mill Basin, Gerritsen Inlet, and Paerdegat Basin—which will be federally funded. Ms. Lapin managed the contaminated materials investigation that included a detailed subsurface contaminated materials assessment, both subaqueous and along the upland approaches.

NYSDOT Transportation Management Center (TMC), Hawthorne, NY

AKRF conducted environmental studies for the NYSDOT at the current troopers' headquarters in Hawthorne, NY. The property is the proposed site of a new Transportation Management Center. AKRF completed a comprehensive asbestos survey of the on-site building and prepared asbestos abatement specifications; performed a Phase I site assessment; conducted an eletromagnetic (EM) survey that located two fuel oil underground storage tanks, and developed removal specifications for the two underground storage tanks and an aboveground storage tank.

Metro-North Railroad Poughkeepsie Intermodal Station/Parking Improvement Project, Poughkeepsie, NY

Ms. Lapin served as Project Manager of the hazardous materials investigation in connection with AKRF's provision of planning and environmental services for parking improvement projects at this station along the Hudson Line. The project included an approximately 600-space garage, additional surface parking, and an intermodal station to facilitate bus, taxi, and kiss-and-ride movements. Ms. Lapin conducted Phase I and II contaminated materials assessments and worked with the archaeologists to locate an historical roundhouse/turntable.

Metro-North Railroad Golden's Bridge Station Parking Project, Westchester County, New York

For Metro-North Railroad, Ms. Lapin managed a Phase I Environmental Site Assessment of a property that has since become the new parking area, used by the existing Golden's Bridge train station. Ms. Lapin also conducted a subsurface (Phase II) investigation of the original parking area, track area, and existing platform for the potential impact of moving tracks in the siding area to extend the existing parking area and adding an access from a proposed overhead walkway (connecting the train station to the new parking area). The study also included an assessment for lead-based paint and asbestos on the platform structures.

East River Science Park, New York, NY

Originally, New York University School of Medicine (NYUSOM) retained the firm to prepare a full Environmental Impact Statement (EIS) for its proposed East River Science Park (ERSP). The proposed complex was to occupy an underutilized portion of the Bellevue Hospital campus between East 30th Street and approximately East 28th Street, immediately south of NYU's campus. Phase I was to consist of 618,000 square feet of development, including a clinical practice and research building, a biotech center, 220 housing units for post-doctorate staff, a child care center, and a conference center. This phase would include reuse of the former Bellevue Psychiatric Building, an historic structure on 30th Street east of First Avenue. Phase II would see development of a second biotech building with a library to serve NYU and Bellevue at the eastern end of the block between 29th and 30th Streets. Phase III would follow with a third biotech building and parking.

The EIS for the project considered a full range of issues, including land use, socioeconomics, shadows, historic resources, open space, traffic and transportation, air quality, noise, and construction. The firm also prepared all of the traffic and transportation studies for the urban design and master planning efforts. Ms. Lapin managed the Phase I Environmental Site Assessment and other hazardous materials-related issues. Events relating to September 11, 2001 put a hold on the project for a number of years. When it resurfaced, a new developer stepped in and the scope of the project decreased. Ms. Lapin updated the hazardous materials issues for the new developer and consulted with them regarding remediation strategies and involvement of regulatory agencies. For the actual remediation/development, the city requested oversight by AKRF to represent their own interests (the city is retaining ownership of the land). Ms. Lapin is currently directing the remediation oversight on behalf of the City of New York for the remediation of this former psychiatric hospital building, laundry building and parking areas associated with Bellevue Hospital. The new development includes a biotechnology center (Commercial Life Science Research and Office Park) comprising two buildings (combined 550,000 square feet), street level retail, and an elevated plaza.

Roosevelt Union Free School District – District-wide Improvement Program, Roosevelt, NY

Ms. Lapin managed the hazardous materials investigation for the Draft and Final Environmental Impact Statements for the improvement program, which included the demolition of three existing elementary schools and portions of the junior-senior high school, and the reconstruction of three replacement elementary schools, a separate replacement middle school, and renovations to the high school. Following the EIS, additional hazardous materials investigations were completed, including comprehensive asbestos and lead surveys; Phase I and Phase II Environmental Site Assessments; preparing asbestos, lead, hazardous materials and demolition specifications; and obtaining site-specific variances from the New York State Department of Labor (NYSDOL). AKRF continues to provide asbestos and lead project monitoring and air monitoring, and environmental remediation oversight. The middle school remediation was conducted through coordination with the NYSDEC, NYSDOH, the New York State Education Department and the local school district. The project was approved and construction/renovation for the new middle school is complete. The school will be open for the Fall 2008 semester as planned. AKRF continues to provide oversight for ongoing abatement at a number of the schools, and overall environmental consulting to the school district. AKRF continues to provide asbestos and lead project monitoring and air monitoring, and environmental remediation oversight during the program's demolition and construction phases.

AXEL E. SCHWENDT, P.G.

PROFESSIONAL GEOLOGIST

Mr. Schwendt is a senior professional geologist for AKRF and has 11 years of experience in the environmental consulting field. Mr. Schwendt has extensive experience in Phase II activities involving subsurface soil and groundwater investigations, and has been involved in all aspects of soil and groundwater remediation, including those related to manufactured gas plants (MGP). He has managed and implemented large-scale site investigations and remedial measures for various properties under different regulatory programs including the New York State Department of Environmental Conservation's (NYSDEC) Voluntary Cleanup Program, New Jersey's Industrial Site Recovery Act (ISRA), and Pennsylvania's Land Recycling program. Mr. Schwendt also conducts and manages Phase I Environmental Site Assessments for various clients from a variety of industries.

In addition, Mr. Schwendt has extensive experience in underground and aboveground storage tank (UST) management, including UST removals, installations, and upgrades. He has designed and implemented remedial investigations surrounding UST releases and overseen the installation and maintenance of pump-and-treat remedial systems. He has performed storage tank compliance audits and maintenance inspections all across the country and prepared Spill Prevention, Control, and Countermeasures Plans (SPCC Plans) for over 90 individual facilities, including personnel training programs.

Mr. Schwendt worked with several other firms prior to joining AKRF, which provided him with a variety of skills. He has expertise with Environmental Emergency Response Plans, Integrated Contingency Plans, Phase I Environmental Site Assessments, and multi-phase compliance audits, including some international projects. He has also performed various types of hydrogeologic testing, including pilot tests, slug tests, pump tests and groundwater modeling, and has been responsible for data review and management.

BACKGROUND

Education

B.A., Earth Science and Environmental Studies, Tulane University, 1991

M.S., Geology, University of Delaware, 2002

Years of Experience

Year started in company: 2002

Year started in industry: 1995

RELEVANT EXPERIENCE

Lincoln Center Development Project, New York, NY

On behalf of the Lincoln Center Development Project, Inc., Mr. Schwendt conducted a Subsurface (Phase II) Investigation in the area of an underground storage tank (UST) farm located beneath the lower garage level of the West 62nd Street parking garage at Lincoln Center. The Phase II study was prompted by a request from the New York State Department of Environmental Conservation (NYSDEC) to properly close out the tanks. The tank farm includes seventeen (17) 550-gallon gasoline USTs and one (1) 550-gallon waste oil UST. The purpose of this Phase II investigation was to determine whether historic leaks from the tanks had affected the subsurface and to assist with future tank closure activities. The Phase II report was submitted to the NYSDEC for review and included a request to close the tanks in-place instead of removing them due to the structural constraints of the tank farm location.

Rose Plaza on the River, Brooklyn, NY

Mr. Schwendt conducted a Subsurface (Phase II) Investigation at the 470 Kent Avenue property located in Brooklyn, New York. The objective of the subsurface investigation was to characterize the subsurface soil and groundwater conditions and determine whether past or present on-site and/or off-site potential sources of contamination have adversely affected the site. Results of the Phase II study were also intended to be used to evaluate any potential environmental risks and/or the need for remedial action at the site prior to future development. The proposed development of the site includes the construction of approximately 665 market rate dwelling units and approximately 33,750 square feet of commercial uses. The scope of the Phase II study was based on a Phase I Environmental Site Assessment (January 2004) performed by AKRF, which identified recognized environmental conditions for the site, including the potential for soil and groundwater contamination from a historical on-site manufactured gas plant, and potential underground storage tanks. Phase II activities were conducted in accordance with AKRF's Sampling Protocol and site-specific Health and Safety Plan (HASP), which was reviewed and approved by the New York City Department of Environmental Protection (NYCDEP).

Albert Einstein College of Medicine Environmental Investigation, Bronx, NY

Mr. Schwendt managed a Subsurface (Phase II) Investigation at an approximately eight-acre portion of the Jacobi Medical Center fronting on Eastchester Road in the Bronx, New York. The site, owned by New York City, contained an old boiler house, a storage warehouse, a laundry facility, and several paved parking areas. The objective of the subsurface investigation was to characterize the subsurface conditions on the property and determine whether past or present on-site and/or off-site potential sources of contamination have adversely affected the study site.

Storage Deluxe, Various Locations, NY

Mr. Schwendt is currently the project manager for assisting Storage Deluxe with the ongoing expansion of their self-storage facilities primarily in the five boroughs of New York City and Westchester County. He conducts and manages environmental due diligence needs related to their property transactions including conducting Phase I ESAs, Phase II investigations, and geophysical surveys, as well as consulting on petroleum bulk storage tank management. He assists Storage deluxe in making decisions with respect to environmental risk issues.

270 Greenwich Street, New York NY

Mr. Schwendt conducted a subsurface (Phase II) investigation that included the advancement of soil borings and the collection of soil and groundwater samples from the 270 Greenwich Street property in the Tribeca neighborhood of New York City. The site will be developed with approximately 402 dwelling units (172 rental units and 230 for sale condominiums), approximately 224,084 gross square feet of destination and local retail space, and below-grade public parking. The purpose of this Phase II subsurface investigation was to ascertain subsurface soil and groundwater quality beneath the study site and determine whether past on- or off-site operations have affected the subject property. The subsurface investigation was also intended to determine whether there are any special handling or disposal requirements for pumped groundwater, should dewatering be necessary during site development. The Phase II study included soil and groundwater sampling as well as a geophysical investigation to determine whether unknown underground storage tanks were present at the site. Field activities were performed in accordance with Mr. Schwendt's Sampling Protocol and Health and Safety Plan (HASP), which were approved by the New York City Department of Environmental Protection (NYCDEP).

Columbia University Manhattanville Rezoning and Academic Mixed-Use Development, New York, NY

Mr. Schwendt is managing the hazardous materials task on the EIS for approximately 4 million square feet of new academic, research and neighborhood uses to be constructed north of Columbia University's existing Morningside campus. The work has included more than 25 Phase I Environmental Site Assessments for the properties within

the site boundaries and estimates for upcoming investigation and remediation. In addition, a Preliminary Environmental Site Assessment (PESA) was completed for the whole project area. Recognized environmental concerns in the area included: current and historical underground storage tanks; current and historical auto-related use such as repair shops and gasoline stations; two historical manufactured gas holders; and a Consolidated Edison cooling plant located on West 132nd Street. Mr. Schwendt conducted a subsurface investigation at the site to characterize the subsurface conditions on the property and determine whether past or present on-site and/or off-site potential sources of contamination have adversely affected the study site, and to use the analytical data to evaluate any potential environmental risks and/or the need for remedial action at the site prior to future development.

Hudson River Park, New York, NY

Mr. Schwendt serves as an on-call consultant for the ongoing development of the Hudson River Park, the approximately 5 to 6 mile section of waterfront property from Battery Place to 59th Street along the western edge of Manhattan. He conducts subsurface investigations, provides guidance on construction and environmental health and safety issues, interfaces with regulatory agencies as necessary, and manages the mitigation of environmental conditions encountered during site development activities.

Brooklyn Bridge Park, Brooklyn, NY

AKRF is providing environmental planning and review services for the development of a new 70-acre park that will revitalize 1.5 miles of the East River waterfront between Jay Street and Atlantic Avenue. When completed, the park would provide open space and recreational facilities as well as a hotel, restaurants, retail, and historic and educational venues. Mr. Schwendt conducted a Phase I ESA and Phase II Subsurface Investigation for the proposed Brooklyn Bridge Park area and is involved with the completion of the Environmental Impact Statement.

Titan Property Management, Rego Park, NY

Mr. Schwendt is currently involved with an extensive site investigation for a property involved in the New York State Voluntary Cleanup Program. The property is resting on a plume of PCE contamination. The goal of the investigation is to determine whether the property is the source of the contamination and to collect data to provide information for the design and implementation of a site remedial system. The investigation involves extensive soil, soil gas, and groundwater investigation, and includes the investigation of surrounding properties.

ABCO Refrigeration Company, Long Island, NY

Mr. Schwendt is managing a tank closure and dry well assessment and remediation project for the ABCO Refrigeration Company. Historic contamination was found seeping from the ground in the location of an old underground storage tank, which is believed to be a source of adverse impact. An adjacent drywell has been impacted by the tank as well as from past dumping activities of a former typewriter ribbon ink manufacturing company. A site-wide investigation of the ten drywells was also implemented at the request of the Nassau County Department of Health. Mr. Schwendt undertook soil remedial activities that led to the property receiving closure with respect to the underground storage tank. Drywell remedial activities were successful and the site received approval from the EPA to continue use of on-site drywells.

Levin Management Corporation Property—Site Investigation, Pelham Manor, NY

Mr. Schwendt has been involved in the on-going site investigation of a former manufactured gas plant (MGP) and petroleum off-loading and storage until the late 1950s. Soils have also been observed to have been affected by non-aqueous phase liquid (NAPL) consisting of oil- and tar-like material. Floating or light NAPL (LNAPL) has also been detected in one on-site groundwater. The objectives of the site investigation are to collect additional data to further determine the extent of NAPL-affected soil both above and below the water table throughout the site; collect additional data to further delineate groundwater contamination throughout the site; and confirm the on-

site groundwater flow direction and that NAPL has not migrated to the downgradient perimeter of the site, including Eastchester Creek. Mr. Schwendt was brought on board for this project for his expertise in soil and groundwater MGP contaminant delineation.

NYCDEP Bureau of Environmental Engineering 26th Ward Wastewater Treatment Plant—Site Investigation, Brooklyn, New York

Mr. Schwendt managed and conducted environmental sampling and testing at the 26th Ward Wastewater Treatment Plant property located in Brooklyn, New York. This investigation was performed to determine the presence or absence of contamination in the soil and groundwater that would affect the proposed construction of a new raw sewage pump station. Mr. Schwendt provided the 26th Ward with the protocol necessary for the special handling and disposal of the excavated soil as well as for the groundwater that would be pumped during dewatering operations.

Olnick Organization, New York, NY

AKRF was retained by the Olnick Organization to prepare and implement an SPCC Plan for their aboveground storage tank system for an office building in Manhattan. Mr. Schwendt performed the site inspections and provided the Olnick Organization with a list of recommendations for upgrades to their fuel transfer piping system that would bring the facility into compliance with SPCC regulations. He also provided Olnick with a plan for implementing the required SPCC training program for their facility personnel.

Site investigations of former MGP Facilities/Properties for Consolidated Edison, New York City, NY & Westchester County, NY

While with another firm, Mr. Schwendt worked on this project, which included a service station in New York City and an electrical substation in Westchester County, New York. Mr. Schwendt performed the site characterizations, including subsurface soil and groundwater impact delineation and aquifer testing. The findings from these characterizations are being used by Consolidated Edison to make appropriate changes to the design specifications and to plan for appropriate handling of impacted materials and health and safety protocols during future construction activities.

UST Site Investigation and Remediation for Consolidated Edison Service Center, Queens, NY

While with another firm, Mr. Schwendt worked on this project, which included due diligence site reviews, soil boring installation, monitoring well installation, hydrogeologic testing, and water quality sampling. Risk-based closures incorporating natural attenuation and groundwater monitoring activities have been proposed. Remedial work plans are under development for other facilities where more aggressive remedial actions are required. Performed subsurface investigations and site characterizations for several other Consolidated Edison facilities including soil-gas surveys and radiological scoping survey.

Petroleum Bulk Storage Management Program for Bell Atlantic-New York (now Verizon), Manhattan, Brooklyn, Queens, Bronx, Staten Island, and Long Island, NY

While with another firm, Mr. Schwendt personally designed and conducted subsurface investigations for UST remediations including characterization of releases, soil and ground water investigations, pilot tests, slug tests, pump tests, groundwater modeling, horizontal and vertical impact delineation, and preparation of compliance documentation for regulatory agencies. He performed oversight of the installation of 'pump and treat' remedial systems and performed maintenance activities. He also supervised UST installations, upgrades and closures; implemented tank tightness testing programs; addressed on-site health and safety issues and other regulatory requirements; prepared closure reports; and managed soil disposal.

Hertz Rent-A-Car Corporate Headquarters, Park Ridge, NJ

Mr. Schwendt served as an in-house consultant/project manager for the environmental department at Hertz's corporate office in Park Ridge, New Jersey. He managed Phase I and Phase II investigations for real estate purchases, leases and acquisitions throughout the United States and Canada. He coordinated Hertz's subcontractors and environmental consulting firms, reviewed reports, and made recommendations to the legal and real estate departments with respect to environmental risk issues.

Temple University, Philadelphia, PA

Mr. Schwendt was a lead auditor for a multi-phase compliance audit of the five campuses of Temple University. The audit included an assessment of all of the Temple University Hospitals, the School of Medicine, the College of Science and Technology, the Tyler School of Art, the College of Engineering, Ambler College (Community and Regional Planning, Horticulture, Landscape Architecture), the Physical Plant Department, and all university facilities and maintenance departments. Regulatory programs targeted as part of the audit included, but were not limited to, federal and state air and water programs, hazardous waste management, hazardous chemicals and substances, FIFRA (pesticides), emergency response, Community Right-to-Know, TSCA (toxic substances), and petroleum bulk storage regulations. Following completion of the audit, Mr. Schwendt prepared and implemented an environmental management system that conformed to the needs and culture of the Temple University organization.

University of Pennsylvania, Philadelphia, PA

Mr. Schwendt was the lead auditor for an environmental compliance audit of the University of Pennsylvania's Department of Environmental Health and Radiation Safety. The audit included an assessment for the preparation and implementation of the university's Spill Prevention, Control, and Countermeasures Plans (SPCC Plans). Mr. Schwendt prepared and implemented the university's environmental management program and provided training for the facility personnel.

Wistar Institute, Philadelphia, PA

Mr. Schwendt was the lead auditor for an environmental compliance audit of the Wistar Institute, an independent non-profit biomedical research institute in West Philadelphia, Pennsylvania. The multi-phase audit comprised an assessment of the entire facility for compliance with federal, state and local environmental regulations and included the development of an environmental management system.

Seton Hall University, South Orange, NJ

Mr. Schwendt was a lead auditor for a multi-phase compliance audit of the Seton Hall University campus. The audit comprised an assessment of the entire facility for compliance with federal and state air and water programs, hazardous waste management programs, hazardous chemicals and substances programs, FIFRA (pesticides), emergency response and Community Right-to-Know regulations, TSCA (toxic substances), and petroleum bulk storage regulations. The audit included the development and implementation of an environmental management system for the Seton Hall University faculty and staff.

South Bronx Overall Economic Development Corporation (SoBRO) Port Morris Brownfield Opportunity Areas (BOA), Bronx, NY

Mr. Schwendt is assisting SoBRO with the in-depth and thorough analysis of existing conditions, opportunitires, and reuse potential for properties located in the proposed Port Morris Brownfield Opportunity Area with an emphasis on the identification and reuse potential of strategic brownfield sites that may be catalysts for revitalization. His work so far has included the preparation of Phase I Environmental Site Assessments for the catalyst sites and advertising on the suitability of enacting zoning changes to permit various property uses.

STEPHEN R. GRENS, JR.

ENVIRONMENTAL SPECIALIST

Stephen Grens, Jr. is an Environmental Specialist with expertise in Phase I and II site assessments and comprehensive asbestos surveys. He has completed assessments in New York, New Jersey, Connecticut, Pennsylvania, North Carolina, South Carolina, and Georgia. Mr. Grens is also actively involved in data interpretation and report preparation.

BACKGROUND

Education

B.S., Environmental Sciences, State University of New York (SUNY), Purchase, Expected Graduation Date: May 2010

Licenses/Certifications

New York State Certified Asbestos Inspector, Asbestos Project Monitor, and Air Sampling Technician

LIRR Roadway Worker

OSHA HAZWOPER Site Safety Supervisor

NYC Department of Buildings (DOB) Expediter

Years of Experience

Year started in company: 1996

Year started in industry: 1996

RELEVANT EXPERIENCE

Former Domino Sugar Refinery

Mr. Grens performed environmental oversight for the installation of numerous groundwater monitor wells, soil borings and soil and groundwater sampling. Soil and groundwater sampling and monitoring are being performed in accordance with the NYCDEP approved workplan.

Triangle Parcel

Mr. Grens performed environmental oversight for the installation of numerous groundwater monitor wells, soil borings and soil and groundwater sampling. Soil and groundwater sampling and monitoring are being performed in accordance with the NYSDEC approved workplan.

Gedney Way Landfill, White Plains, NY

Mr. Grens performed environmental oversight for the installation of numerous groundwater monitor wells, soil gas vapor extraction points, test pits, soil removal and soil and groundwater sampling. Remedial activities at the landfill are being performed for landfill closure in accordance with the NYSDEC approved workplan.

Flushing Industrial Park, Flushing, NY

Mr. Grens performed environmental and remediation oversight including the implantation of the site specific health and safety plan (HASP) during excavation activities at the Flushing Industrial Park site. Approximately 22,762 tons of PCB contaminated soil and 55,629 tons of non-hazardous soil were remediated and disposed of at the appropriate receiving facilities. The environmental clean-up activities at the Flushing Industrial site were done in accordance with the U.S. Environmental Protection Agency (EPA) and the New York State Department of Environmental Conservation (NYSDEC) under the Brownfields Clean-Up Program. Mr. Grens is currently overseeing the construction related remedial oversight activities at the Flushing Industrial Park site and will continue through 2008/2009.

Queens West Development Project, Long Island City, NY

For over 20 years, AKRF has played a key role in advancing the Queens West development, which promises to transform an underused industrial waterfront property into one of largest and most vibrant mixed-use communities just across the East River from the United Nations. AKRF has prepared an EIS that examines issues pertaining to air quality, land use and community character, economic impacts, historic and archaeological resources, and infrastructure. As part of the project, AKRF also undertook the largest remediation venture completed to date under the Brownfields Cleanup Program (BCP). Mr. Grens performed environmental oversight including the implantation of the site specific health and safety plan (HASP) during excavation activities at the site. The environmental clean-up activities were done in accordance with the U.S. Environmental Protection Agency (EPA) and the New York State Department of Environmental Conservation (NYSDEC) under the Brownfields Clean-Up Program.

Sutphin Boulevard Underpass, Jamaica, Queens

Mr. Grens performed the Phase I Environmental Site Assessment, Phase II Subsurface Investigation and asbestos and lead-based paint surveys at the LIRR-owned Sutphin Boulevard site. Portions of the Phase I report were used in the Hazardous Materials Chapter of the Environmental Impact Statement. Mr. Grens reviewed previous environmental reports, performed oversight for the installation of soil gas points and soil borings, and performed the asbestos and lead paint surveys. The proposed redevelopment of the property included retail and commercial spaces.

Parkway Road Site, Bronxville, NY

Mr. Grens supervised and documented the removal of USTs, two hydraulic lifts, dry wells, and petroleum contaminated soil from a parcel that was formerly utilized as a gasoline service station. This site would eventually be redeveloped into multi-unit residential apartments.

Hanover Hall, Stamford, CT

Mr. Grens performed a remote camera observation of the sanitary sewer line to determine the presence of cracks associated with the contamination of surrounding soil. This procedure was implemented as a cost effective means to determine the precise location of possible soil and/or groundwater contamination.

East 135th Street Site, Bronx, NY

Mr. Grens supervised and documented the removal of approximately 8,000 tons of urban fill and metal-contaminated soil for the construction of a storage facility on the Harlem River. He was responsible for the delineation of contaminated areas, and subsequent confirmation soil sampling. Soil was delineated to the extent feasible in order to make way for the storage facility.

Montagano Oil Blending Facility, Pleasantville, NY

Mr. Grens supervised and documented the removal of numerous aboveground storage tanks (ASTs) and oil mixing kettles. Approximately ten 550-gallon aboveground fuel oil storage tanks were rendered free of their contents, cleaned, cut, and removed off-site for disposal. All removal activities were performed in accordance with applicable state and federal regulations. Additional on-site activities included the removal of a 1,000-gallon underground gasoline storage tank, and the installation of site-wide groundwater monitoring wells.

Bridgeport Municipal Stadium (Former Jenkins Valve Property), Bridgeport, CT

As part of the City of Bridgeport's revitalization program for the construction of a minor league baseball facility, Mr. Grens supervised and documented the removal of approximately 14,000 tons of solvent, petroleum, and metal-contaminated soil. He was responsible for the delineation of contaminated areas as well as subsequent confirmation soil sampling for the local sponsoring municipality. Additional on-site activities included the installation of groundwater monitoring wells, removal of underground storage tanks, and management of the current groundwater monitoring program.

Catskill/Delaware Water Treatment Facility, Mount Pleasant and Greenburgh, NY

Mr. Grens was responsible for the contaminated materials analysis as part of the Environmental Impact Statement (EIS) for the New York City Department of Environmental Protection (DEP). The analysis included the Phase I site assessment, a description of the chemicals to be used in the direct filtration process, and their alternatives. Mr. Grens also worked on the Electromagnetic Fields (EMF) analysis for this EIS. It included the interpretation of electromagnetic data from existing on-site sources, including transformers, high-voltage lines, and electrical panels.

Former Sterns Department Store, Queens, NY

Mr. Grens conducted asbestos air monitoring and sampling at the former Sterns department store during asbestos abatement procedures conducted as part of demolition operations in preparation for a multiplex cinema and outlet store.

Former Jay Street Welfare Building and Adams Street Family Courthouse Building, Brooklyn, NY

Mr. Grens acted as the on-site asbestos project manager during asbestos abatement activities required prior to interior renovations. Tasks included project management and collecting asbestos air samples during abatement activities in accordance with applicable New York City and State regulations.

East 75th/76th Street Development Site, New York, NY

As the designated health and safety officer (HSO), Mr. Grens' responsibilities included the personal well-being of all on-site personnel during Phase II activities. He managed and supervised the excavation, removal, and off-site disposal of numerous hazardous materials and petroleum-containing underground storage tanks, associated hazardous and contaminated soil, and stained bedrock. This site was formerly utilized as a dry-cleaning facility, parking garage, and automobile repair facility. It was classified as a hazardous waste site because of leaking underground storage tanks. Additional tasks at this site included the continuous monitoring of work-zone and community air and dust particulate levels, implementing the health and safety plan (HASP), and collecting soil and tank product samples in accordance with applicable New York State regulations. Remedial activities at the site began in December 2000 (prior to the demolition of the on-site buildings) and were successfully completed in May 2001. The construction of a new school is anticipated on the site in the near future.

Memorial Sloan Kettering Cancer Center, New York, NY

Mr. Grens has performed numerous noise impact studies on the east side of midtown Manhattan to assist in the determination of the various project scenarios within each site's respective EIS. Noise produced by mobile sources (automobiles, trucks, and trains), stationary sources (machinery, ventilation systems, and manufacturing operations), and construction activities can cause stress-related illness, disrupt sleep, and break concentration. The

noise impact study for the Memorial Sloan Kettering Cancer Center was conducted to determine real time noise levels prior to renovations and construction activities. This provided a background level reference point for when construction activities started. Mr. Grens' tasks included collecting relevant noise data at numerous locations during morning, afternoon, and evening rush hours to determine real time noise levels utilizing a Larsen Davis decibel level indicator.

Con Edison East Side Development Sites, New York, NY

Mr. Grens has performed numerous noise impact studies on the east side of midtown Manhattan to assist in the determination of the various project scenarios within each site's respective EIS. Mr. Grens' tasks included collecting relevant noise data at numerous locations during morning, afternoon, and evening rush hours to determine real time noise levels utilizing a Larsen Davis decibel level indicator.

Supermarket Redevelopment, New Fairfield, CT

AKRF provided consulting services to the developer and owner of a 9-acre site included conducting a remedial investigation and remediation of a site contaminated from former dry cleaning operations and off-site gasoline spills. The investigation included the installation of monitoring wells in three distinct aquifers, geophysical logging, pump tests, and associated data analysis. Mr. Grens performed remediation oversight, including the excavation of solvent-contaminated soil and health and safety air monitoring for volatile organic compounds (VOCs). Additionally, Mr Grens performed weekly inspections of the groundwater treatment system, including the collection of groundwater samples as art of the operation and maintenance of the system.

Columbia University Manhattanville Academic Mixed-Use Development, New York, NY

Mr. Grens performed numerous Phase I Environmental Site Assessments for the Columbia Manhattanville re-zoning project. He also performed Phase II subsurface activities recommended in AKRF's Phase I reports. Phase II activities included the installation of soil borings and groundwater monitoring wells and the collection of soil and groundwater samples.

St. Agnes Hospital Redevelopment, White Plains, NY

AKRF is currently working for North Street Community, LLC on the former St. Agnes Hospital campus in White Plains, New York. The project involves redeveloping the property into an assisted living and nursing home facility. Some of the existing buildings and uses will remain and several new buildings will be built for the new facility. AKRF's assignment includes preparing the site plan package to accompany the Draft Environmental Impact Statement (DEIS) for the project. Mr. Grens performed a Phase I Environmental Site Assessments of the numerous structures located on the property.

Roosevelt Union Free School District, Roosevelt, NY

Mr Grens performed numerous inspections for asbestos-containing materials (ACM) in the site buildings. Asbestos samples were collected as part of the ACM survey. Remediation activities include removal/closure of contaminated dry wells and underground petroleum storage tanks, and excavation and off-site disposal of petroleum- and pesticide-contaminated soil.

Flushing Waterfront Development, Queens, NY

The Muss Development Company's 14-acre waterfront site in Downtown Flushing was previously a Consolidated Edison facility, and included transformer storage and repair and multiple fueling facilities. Other former site uses included a foundry, a paint house, and an incinerator. The site contained extensive PCB contamination including non-aqueous phase liquid (NAPL). The project required extensive investigation to design a remediation plan under the State's BCP program. Remediation, including removal of more than 100,000 tons of contaminated soil has been completed and foundation work is underway. By 2009, the site will be redeveloped with a 3 million square

foot retail and residential complex. The project will transform a neighborhood blight into a spectacular mixed-use development that will help revitalize the Flushing economy.

APPENDIX F

QUALITY ASSURANCE PROJECT PLAN (QAPP)

2477 Third Avenue Site

BRONX, NEW YORK

Quality Assurance Project Plan

BCP Site No. C203047

AKRF Project Number: 11160

Prepared for:

Jiten, LLC
30 Byrd Avenue
Carle Place, NY 11514

Prepared by:

AKRF, Inc.
440 Park Avenue South, 7th Floor
New York, New York 10016
212-696-0670

SEPTEMBER 2010

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TABLES

ATTACHMENTS

1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) describes the protocols and procedures that will be followed during implementation of the Remedial Action Work Plan (RAWP) at the 2477 Third Avenue site. The legal definition of the subject property is Tax Block 2320, Lot 11. The objective of the QAPP is to provide for Quality Assurance (QA) and maintain Quality Control (QC) of remedial activities conducted. Adherence to the QAPP will ensure that defensible data will be obtained during the investigation and remediation.

2.0 PROJECT TEAM

The project team will be drawn from AKRF professional and technical personnel and AKRF's subcontractors. All field personnel and subcontractors will have completed a 40-hour training course and updated 8-hour refresher course that meet the Occupational Safety and Health Administration (OSHA) requirements of 29 CFR Part 1910. The following sections describe the key project personnel and their responsibilities.

2.1 PROJECT DIRECTOR

The project director will be responsible for the general oversight of all aspects of the project, including scheduling, budgeting, data management and decision-making regarding the field program. The project director will communicate regularly with all members of the AKRF project team, the New York State Department of Environmental Conservation (NYSDEC), and to ensure a smooth flow of information between involved parties. Michelle Lapin will serve as the project director for the RAWP. Ms. Lapin's resume is included in Attachment A.

2.2 PROJECT MANAGER

The project manager will be responsible for directing and coordinating all elements of the RAWP. He will prepare reports and participate in meetings with Jiten LLC and/or the NYSDEC. Axel Schwendt will serve as the project manager for the RAWP. Mr. Schwendt's resume is included in Attachment A.

2.3 FIELD TEAM LEADER

The field team leader will be responsible for supervising the daily sampling and health and safety activities in the field and will ensure adherence to the work plan and HASP. He will report to the Project Manager on a regular basis regarding daily progress and any deviations from the work plan. The field team leader will be a qualified, responsible person, able to act professionally and promptly during soil disturbing activities. Steve Grens will be the field team leader for the RAWP.

2.4 PROJECT QUALITY ASSURANCE/QUALITY CONTROL OFFICER

The Quality Assurance/Quality Control (QA/QC) Officer will be responsible for adherence to the QAPP. She will review the procedures with all personnel prior to commencing any fieldwork to assess implementation of the procedures. Michelle Lapin will serve as the QA/QC officer for the RAWP.

2.5 LABORATORY QUALITY ASSURANCE/QUALITY CONTROL OFFICER

The laboratory QA/QC officer will be responsible for quality control procedures and checks in the laboratory and ensuring adherence to laboratory protocols. She will track the movement of samples from the time they are checked in at the laboratory to the time that analytical results are

issued. She will conduct a final check on the analytical calculations and sign off on the laboratory reports. The laboratory QA/QC officer will be Gina Bartolomeo of Alpha Analytical Laboratories of Westborough, Massachusetts.

3.0 STANDARD OPERATING PROCEDURES

The following sections describe the standard operating procedures (SOPs) for the remedial activities included in the RAWP. During these operations, safety monitoring will be performed as described in the project Health and Safety Plan (HASP) and all field personnel will wear appropriate personal protective equipment.

3.1 SOIL SAMPLING

Soil sampling will be conducted as necessary in the event that contamination is discovered at the Site during construction excavation or test pit activities, and when the Contingency Plan described in AKRF's September 2010 RAWP is implemented. Soil sampling would be conducted to insure the complete removal of contaminated soil and would be executed in consultation with the NYSDEC. Soil may also be sampled for waste characterization for off-site disposal. Any soil intended for off-site disposal will be tested in accordance with the requirements of the intended receiving facility and in accordance with AKRF's September 2010 RAWP.

The soil samples designated for analysis will be collected into laboratory-supplied containers, sealed and labeled, and placed in an ice-filled cooler. The samples will be analyzed in a in a New York State Department of Health Environmental Laboratory Approval Program (NYSDOH-ELAP) laboratory in accordance with NYSDEC requirements. Any sampling equipment will be decontaminated in accordance with Section 3.4 of this QAPP.

3.2 GROUNDWATER MONITORING WELL INSTALLATION AND DEVELOPMENT

New post-remediation monitoring well installation will include four wells screened across the water table as detailed in the RAWP. New well locations and/or screen depths may be adjusted based on observations and data compiled during the RAWP.

The wells will be constructed with two-inch diameter PVC. Ten feet of 0.02 slotted PVC screen will be installed. The road box will be sealed with a concrete collar to prevent water run-off into the well. The well will be completed according to the following procedure:

- Install No. 2 sand filter pack around the well screen to a depth of one to two feet above the top of the screen.
- Install a bentonite seal to a depth of one to two feet above the filter pack.
- Backfill the remainder of the annular space using a bentonite-cement grout.
- Cut the exterior casing below grade surface.
- Complete the well with a locking cap and flush-to-grade manhole (road box) set in concrete. Seal the road box with a concrete collar to prevent water run-off into the well.
- Decontaminate the augers prior to and following installation of each well as described in Section 3.4 of this QAPP.
- Document well installation data (location, depth, construction details, water level measurements) in the field logbook or on field data sheets.

- Following well installation, the new and existing wells will be developed according to the following procedure:

    1. Measure the depth to water using an oil/water interface probe and the total depth of the well using a weighted tape. Use these measurements to calculate the length of the water column. Calculate the volume of water in the well using 0.163 volumes per foot of water column (gallons) as the conversion factors for a 2-inch diameter well.
    2. For the first five minutes of well development, develop the well using a submersible pump and re-circulate the water back into the well to create maximum agitation. This method is intended to remove fines from the sand pack, the adjacent formation and from the well.
    3. After the first five minutes of well development, develop the well using a submersible pump and discharge the water to five-gallon buckets. Transfer water from the buckets to 55-gallon drums designated for well development water.
    4. During development, collect periodic samples and analyze for turbidity and water quality indicators (pH, temperature, dissolved oxygen, reduction-oxidation potential, and specific conductivity) with measurements collected approximately every five minutes.
    5. Continue developing the well until turbidity is less than 50 nephelometric turbidity units (NTUs) for three successive readings and until water quality indicators have stabilized to within 10% for pH, temperature and specific conductivity for three successive readings, or until three well volumes have been purged from the well.
    6. Document the volume of water removed and any other observations made during well development in the field logbook or on field data sheets.
    7. Decontaminate the equipment prior to and following development at each well location as described in Section 3.4 of this QAPP. All well development water, decontamination, and purge water will be containerized in 55-gallon drums and handled as described in Section 3.5 of this QAPP.

Monitoring wells will not be sampled until at least two weeks following initial development. Prior to collecting any samples, each well will be screened for the presence of VOCs using a photoionization detector (PID) after removing the well cap. The depth to groundwater will then be measured in the wells using an electronic oil/water interface probe attached to a measuring tape accurate to 0.01 feet. The water level data, well diameter and depth will be used to calculate the volume of water in each well. Any floating or sinking free-phase product will be documented, if present. The wells that do not contain free-phase product will then be purged using low-flow purging techniques and sampled as described in Section 4.2.

3.3 SURVEYING AND WATER TABLE READINGS

New groundwater monitoring wells will be surveyed by a New York State-licensed surveyor. Two elevation measurements will be taken at each well location; the elevation of the flush-to-grade road box and the elevation of the top of PVC casing.

Water table readings will be taken in the groundwater monitoring wells using an oil/water interface probe. The gate boxes will be unlocked and opened at each well location. The oil/water interface probe will be turned on and sound tested. The probe of the meter will be inserted into the PVC casing. The probe will be lowered down the casing until the meter alarm indicates the

probe is at the water table. A reading of the depth from the top of the top of the PVC casing to the groundwater table will be recorded in the field notebook.

3.4 DECONTAMINATION OF SAMPLING EQUIPMENT

All sampling equipment (augers, drilling rods, split spoon samplers, probe rods and pumps, etc.) will be either dedicated or decontaminated between sampling locations. The decontamination procedure will be as follows:

1. Scrub using tap water/Simple Green® mixture and bristle brush.
2. Rinse with tap water.
3. Scrub again with tap water/ Simple Green® and bristle brush.
4. Rinse with tap water.
5. Rinse with distilled water.
6. Air-dry the equipment, if possible.

Decontamination will be conducted on plastic sheeting (or equivalent) that is bermed to prevent discharge to the ground.

3.5 MANAGEMENT OF INVESTIGATION DERIVED WASTE

Any investigation-derived waste (IDW) (i.e., development water or purge water) will be containerized in DOT-approved 55-gallon drums stored in a secured location on concrete within the fenced property boundary. The drums will be sealed at the end of each work day and labeled with the date, the well or boring number(s), the type of waste and the name of an AKRF point-of-contact. All IDW will be disposed of or treated according to applicable local, state and federal regulations.

4.0 SAMPLING AND LABORATORY PROCEDURES

4.1 SOIL SAMPLING

Depending upon conditions encountered during construction and monitoring of the Site, soil sampling may be required. Soil sampling will be conducted according to the following procedures:

- Characterize the sample according to the modified Burmister soil classification system.
- Collect an aliquot of soil from each sampling location and place in labeled sealable plastic bags. The bag should be labeled with the soil boring number and the depth the sample was collected. Place the plastic bags in a chilled cooler to await selection of samples for laboratory analysis.
- After selecting which samples will be analyzed in the laboratory, fill the required laboratory-supplied sample jars with the soil from the selected sampling location or labeled sealable plastic bags. Seal and label the sample jars as described in Section 4.5 of this QAPP and place in an ice-filled cooler.
- Decontaminate any soil sampling equipment between sample locations as described in Section 3.4 of this QAPP.

- Record boring number, sample depth and sample observations (evidence of contamination, PID readings, soil classification) in field log book and boring log data sheet, if applicable.

4.2 MONITORING WELL SAMPLING

Groundwater samples will be collected using low flow sampling techniques, as described in U.S. EPA's Ground-Water Sampling Guidelines for Superfund and RCRA Project Managers [EPA 542-S-02-001, May 2002]. No new wells will be sampled before they are allowed to stabilize for at least two weeks. Sampling will be conducted according to the following procedure:

- Prepare the sampling area by placing plastic sheeting over the well. Cut a hole in the sheeting to provide access to the well cover.
- Slowly remove the locking cap and immediately measure the vapor concentrations in the well with a PID calibrated to the manufacturer's specifications.
- Measure the depth to water and total well depth, and check for the presence of floating non-aqueous phase liquid (NAPL) using an oil/water interface probe. Measure the thickness of NAPL, if any, and record in field book and well log. Collect a sample of NAPL using a disposable plastic weighted bailer or similar collection device. Groundwater samples will not be collected from wells containing measurable NAPL; however, we will collect a sample of the product for fingerprint analysis.
- Use the water level and total well depth measurements to calculate the length of the mid-point of the water column within the screened interval. For example, for a well where the total depth is 20 feet, screened interval is 10 to 20 feet, and depth to water is 14 feet, the mid-point of the water column within the screened interval would be 17 feet.
- Connect dedicated tubing to either a submersible or bladder pump and lower the pump such that the intake of the pump is set at the mid-point of the water column within the screened interval of the well. Connect the discharge end of the tubing to the flow-through cell of a multi-parameter meter. Connect tubing to the output of the cell and place the discharge end of the tubing in a five-gallon bucket.
- Activate the pump at the lowest flow rate setting of the pump.
- Measure the depth to water within the well. The pump flow rate may be increased such that the water level measurements do not change by more than 0.3 feet as compared to the initial static reading. The well-purging rate should be adjusted so as to produce a smooth, constant (laminar) flow rate and so as not to produce excessive turbulence in the well. The expected targeted purge rate will be approximately 0.5 liters and will be no greater than 3.8 liters/minute.
- Transfer discharged water from the 5-gallon buckets to 55-gallon drums designated for well-purge water.
- During purging, collect periodic samples and analyze for water quality indicators (e.g., turbidity, pH, temperature, dissolved oxygen, reduction-oxidation potential, and specific conductivity) with measurements collected approximately every five minutes.
- Continue purging the well until turbidity is less than 50 NTU and water quality indicators have stabilized to the extent practicable. The criteria for stabilization will be three successive readings for the following parameters and criteria:

Table 1
Stabilization Criteria

Parameter	Stabilization Criteria
PH	+/- 0.1 pH units
Specific Conductance	+/- 3% mS/cm
ORP/Eh	+/- 10mV
Turbidity	<50 NTU
Dissolved Oxygen	+/- 0.3 mg/l

Notes: mS/cm = millisievert per centimeter
mV = millivolts
NTU = nephelometric turbidity units
mg/l = milligrams per liter

- If the water quality parameters do not stabilize and/or turbidity is greater than 50 NTU within two hours, purging may be discontinued. Efforts to stabilize the water quality for the well must be recorded in the field book, and samples may then be collected as described herein.
- After purging, disconnect the tubing to the inlet of the flow-through cell. Collect groundwater samples directly from the discharge end of the tubing and place into the required sample containers as described in Section 4.3 of this QAPP. Label the containers as described in Section 4.5 of this QAPP and place in a chilled cooler.
- Collect one final field sample and analyze for turbidity and water quality parameters (pH, temperature, dissolved oxygen, reduction-oxidation potential, and specific conductivity).
- Once sampling is complete, remove the pump and tubing from the well. Disconnect the tubing and place it back in the well for reuse during the next sampling event. Dispose of the sample filter in a 55-gallon drum designated for disposable sampling materials and PPE. The purge water will be managed as described in Section 3.5 of this QAPP.
- Decontaminate the pump, oil/water interface probe, and flow-through cell, as described in Section 3.4 of this QAPP.
- Record all measurements (depth to water, depth to NAPL, water quality parameters, turbidity), calculations (well volume) and observations in the project logbook and field data sheet, if applicable.

Groundwater samples will be placed directly into laboratory-supplied sample bottles. The samples will be analyzed in a laboratory for volatile organic compounds (VOCs) using EPA Method 8260 and semi-volatile organic compounds (SVOCs) using EPA Method 8270 to confirm the effects of the in-situ remediation on the petroleum contamination at the Site.

4.3 LABORATORY METHODS

Table 2 summarizes the laboratory methods that will be used, and could potentially be used, to analyze field samples and the sample container type, preservation, and applicable holding times.

Table 2
Laboratory Analytical Methods for Analysis Groups

Matrix	Analysis	EPA Method	Bottle Type	Preservative	Hold Time
Soil	TCL VOCs	8260	2 oz. clear glass w/ septa top	4 ºC	14 days
	TCL SVOCs	8270	Glass 4 oz. Jar	4 ºC	7 days
	TCL Metals	6010	Glass 4 oz. Jar	4 ºC	180 days
	Pesticides	8081	Glass 4 oz. Jar	4 ºC	7 days
	PCBs	8082	Glass 4 oz. Jar	4 ºC	7 days
Groundwater	TCL VOCs	8260	40 mL glass vial, septa top	4 ºC, HCL	14 days
	TCL SVOCs	8270	Glass 1L Bottle - TFE cap	4 ºC	7 days
	TCL Metals (total and dissolved)	6010B/7470A/7471A	Plastic 500 ml Bottle	4 ºC	180 days/ Hg 28 days
	Pesticides	8081	Glass 1L Bottle – TFE cap	4 ºC	7 days
	PCBs	8082	Glass 1L Bottle – TFE cap	4 ºC	7 days

4.4 QUALITY CONTROL SAMPLING

In addition to the laboratory analysis of any soil and groundwater samples, additional analysis will be included for quality control measures. These samples will include field blanks and trip blanks at a frequency of one sample per 20 field samples collected. The field blanks will be analyzed for all target analytes selected, which would be in consultation with the NYSDEC. The trip blanks will be analyzed for VOCs only.

4.5 SAMPLE HANDLING

4.5.1 Sample Identification

All samples will be consistently identified in all field documentation, chain-of-custody documents and laboratory reports using an alpha-numeric code. Groundwater samples will be identified by the monitoring well number, and soil samples will be identified with the sample depth interval (in parenthesis). Soil samples will be labeled with the depth interval and its location carefully measured and logged in the field book. Trip blanks and field blanks will be identified with "TB" and "FB", respectively.

Table 3 provides examples of the sampling identification scheme.

Table 3
Examples of Sample Names

Sample Description	Sample Designation
Soil sample collected from 5 to 7 feet in an excavation	SS-1 (5-7)
Groundwater sample collected from monitoring well MW-206	MW-206
Field Blank sample for groundwater sampling	FB/GW-1

4.5.2 Sample Labeling and Shipping

All sample containers will be provided with labels containing the following information:

- Project identification

- Sample identification
- Date and time of collection
- Analysis(es) to be performed
- Sampler's initials

Once samples are collected and labeled, they will be placed in chilled coolers and stored in a cool area away from direct sunlight to await shipment to the laboratory. All samples will be shipped to the laboratory twice per week. At the start and end of each workday, field personnel will add ice to the coolers as needed.

The samples will be prepared for shipment by placing each sample in a sealable plastic bag, then wrapping each container in bubble wrap to prevent breakage, adding freezer packs and/or fresh ice in sealable plastic bags and the chain-of-custody (COC) form. Samples will be shipped overnight (e.g., Federal Express) or transported by a laboratory courier. All coolers shipped to the laboratory will be sealed with mailing tape and a COC seal to ensure that the coolers remain sealed during delivery.

4.5.3 Sample Custody

Field personnel will be responsible for maintaining the sample coolers in a secured location until they are picked up and/or sent to the laboratory. The record of possession of samples from the time they are obtained in the field to the time they are delivered to the laboratory or shipped off-site will be documented on chain-of-custody (COC) forms. The COC forms will contain the following information: project name; names of sampling personnel; sample number; date and time of collection and matrix; and signatures of individuals involved in sample transfer, and the dates and times of transfers. Laboratory personnel will note the condition of the custody seal and sample containers at sample check-in.

4.6 FIELD INSTRUMENTATION

Field personnel will be trained in the proper operation of all field instruments at the start of the field program. Instruction manuals for the equipment will be on file at the site for referencing proper operation, maintenance and calibration procedures. The equipment will be calibrated according to manufacturer specifications at the start of each day of fieldwork, if applicable. If an instrument fails calibration, the project manager or QA/QC officer will be contacted immediately to obtain a replacement instrument. A calibration log will be maintained to record the date of each calibration, any failure to calibrate and corrective actions taken. The PID will be calibrated each day using 100 parts per million (ppm) isobutylene standard gas.

ATTACHMENT A

RESUME OF PROJECT QA/QC OFFICER, PROJECT DIRECTOR, AND PROJECT MANAGER

MICHELLE LAPIN, P.E.

SENIOR VICE PRESIDENT

Michelle Lapin is a Senior Vice President with more than 20 years of experience in the assessment and remediation of hazardous waste issues. She leads the firm's Hazardous Materials group and offers extensive experience providing strategic planning and management for clients. Ms. Lapin has been responsible for the administration of technical solutions to contaminated soil, groundwater, air and geotechnical problems. Her other duties have included technical and report review, proposal writing, scheduling, budgeting, and acting as liaison between clients and regulatory agencies, and project coordination with federal, state, and local authorities.

Ms. Lapin's hydrogeologic experience includes groundwater investigations, and formulation and administration of groundwater monitoring programs in New York, New Jersey, Connecticut, New Hampshire, Massachusetts, Rhode Island, Virginia, and Maryland. Her experience with groundwater contamination includes Level B hazardous waste site investigations; leaking underground storage tank studies, including hazardous soil removal and disposal and associated soil and water issues; soil gas/vapor intrusion surveys; and wetlands issues. Ms. Lapin is experienced in coordinating and monitoring field programs concerning hazardous waste cell closures. She has directed numerous Phase I, Phase II, and Phase III investigations, many of them in conjunction with developers, law firms, lending institutions, and national retail chains. She is also experienced in the cleanup of contaminated properties under Brownfield Cleanup Program (BCP) regulations.

BACKGROUND

Education

M.S., Civil Engineering, Syracuse University, 1985

B.S., Civil Engineering, Clarkson University, 1983

Professional Licenses/Certifications

New York State P.E.

State of Connecticut P.E.

Professional Memberships

Member, American Society of Professional Engineers (ASPE), National and CT Chapters

Member, American Society of Civil Engineers (ASCE), National and CT Chapters

Member, Connecticut Business & Industry Association (CBIA), CBIA Environmental Policies Council

Years of Experience

Year started in company: 1994

Year started in industry: 1986

RELEVANT EXPERIENCE

West 61st Street Rezoning/Residential Development, New York, NY

Ms. Lapin is directing the firm's hazardous materials work for this mixed-use development in Manhattan. AKRF was retained by the Algin Management Co. to prepare an EIS for the proposed rezoning of the western portion of the block between West 60th and 61st Streets, between Amsterdam and West End Avenues. The proposed action

rezoned the western half of the block, thus facilitating the development of two 30-story residential towers with accessory parking spaces, and landscaped open space. The EIS examined a "worst case" condition for rezoning the block, which allowed Algin to build a residential building of approximately 375,000 square feet at their site. The building now contains 475 apartments, 200 accessory parking spaces, a health club, and community facility space. This site, with the services of AKRF, entered into New York State's Brownfield Cleanup Program (BCP). On-site issues included underground storage tanks remaining from previous on-site buildings, petroleum contamination from these tanks and possibly from off-site sources, and other soil contaminants (metals, semi-volatile organic compounds, etc.) from fill materials and previous on-site buildings. AKRF oversaw the adherence to the Construction Health and Safety Plan (HASP), which was submitted to and approved by the NYSDEC, and monitoring the waste streams, to ensure that the different types of waste are being disposed of at the correct receiving facilities. This oversight also included confirmation and characteristic soil sampling for the receiving facilities and NYSDEC. A "Track 1" Clean up of the majority of the property (the portion including the buildings) was completed and the final Engineering Report was approved by the NYSDEC. AKRF is currently completing a smaller portion of the property which includes a tennis court and landscaped areas.

68, 76 and 78 Forest Street and 96-98 Grove Street, Stamford, CT

Ms. Lapin led this project, for which AKRF was retained to complete a Phase I Environmental Site Assessment (ESA) of five residential properties, and asbestos surveys and XRF paint surveys of the five multi-family residential structures prior to a real estate transaction. The investigations were completed to clear the way for demolition of the residential structures and prepare the properties for development into the Highgrove high rise condominium complex. AKRF represented the purchaser and site developer during the due diligence process, identified areas of environmental concern, and completed underground storage tank closure activities prior to initiating site development. In addition, AKRF conducted a Phase I ESA of a property on Summer Street that was being used by the developer as a "temporary" office building and a parking area utilized as a sales center and apartment model for the Highgrove residential development.

Shelton Storage Deluxe, Shelton, CT

AKRF completed Phase I, Phase II and Tank Removal/Remediation services for a proposed storage facility in Shelton, Connecticut. Based on this information from the Phase I ESA, AKRF conducted a Phase II study that revealed groundwater impact (gasoline), possibly from an off-site source. Additional testing was then conducted to determine the source of the gasoline contamination. Testing of a wood block floor revealed concentrations of volatile and semivolatile organic compounds and total petroleum hydrocarbons; therefore, disposal of this material had to be as a petroleum-contaminated waste. The additional testing included upstream and downstream surface water samples, and on-site detention pond water and sediment samples. Subsequent to the Phase II testing, a 4,000-gallon on-site underground storage tank was removed. Upon removal, contaminated soil and groundwater were observed and a spill was called into the CTDEP. Following completion of remedial activities and submission of a closure report, the spill was closed by the CTDEP. Ms. Lapin directed the firm's efforts to complete this project.

Hudson River Park, New York, NY

Ms. Lapin is directing AKRF's hazardous materials work during construction of Hudson River Park, a 5-mile linear park along Manhattan's West Side. As the Hudson River Park Trust's (HRPT's) environmental consultant, AKRF is overseeing preparation and implementation of additional soil and groundwater investigations (working with both NYSDEC and NYCDEP), all health and safety activities, removal of both known underground storage tanks and those encountered during construction. Previously, the firm performed hazardous materials assessments as part of the Environmental Impact Statement (EIS) process, including extensive database and historical research, as well as soil and groundwater investigations. Ms. Lapin has been the senior consultant for the soil and groundwater investigations and remediation, and the asbestos investigations and abatement oversight.

Fiterman Hall Deconstruction and Decontamination Project, New York, NY

The 15-story Fiterman Hall building, located at 30 West Broadway between Barclay and Murray Streets, originally constructed as an office building in the 1950s, had served as an extension of the City University of New York (CUNY) Borough of Manhattan Community College (BMCC) since 1993. The building was severely damaged during the September 11, 2001, attack on the World Trade Center (WTC) when 7 WTC collapsed and struck the south façade of the building, resulting in the partial collapse of the southwest corner of the structure. The building was subsequently stabilized, with breaches closed and major debris removed, however extensive mold and WTC dust contaminants remain within the building, which must be taken down. The project requires the preparation of two EASs for the redevelopment of Fiterman Hall—one for the deconstruction and decontamination of the building and one for the construction of a replacement building on the site. AKRF is currently preparing the EAS for the Deconstruction and Decontamination project, which includes the decontamination of the interior and exterior of the building, the removal and disposal of all building contents, and the deconstruction of the existing, approximately 377,000-gross-square-foot partially collapsed structure. Ms. Lapin was the reviewer for the deconstruction and decontamination plans for the EAS. The cleanup plan is due to be submitted shortly to the U.S. Environmental Protection Agency; once approved, remediation work will begin, followed by the deconstruction and rebuilding of Fiterman.

Brooklyn Bridge Park, Brooklyn, NY

AKRF is preparing an Environmental Impact Statement (EIS) and providing technical and planning support services for Brooklyn Bridge Park, which will revitalize the 1.3-mile stretch of the East River waterfront between Jay Street on the north and Atlantic Avenue on the south. The new park, to be completed by 2010, would allow public access to the water's edge, allowing people to enjoy the spectacular views of the Manhattan skyline and New York Harbor. It would also provide an array of passive and active recreational opportunities, including lawns, pavilions, and a marina. As with many waterfront sites around New York City, the lands along the Brooklyn waterfront have a long history of industrial activities. Some of these industries used dangerous chemicals and generated toxic by-products that could have entered the soil and groundwater. In addition, landfilling activities along the shoreline also made use of ash and other waste materials from industrial processes. Based on site inspections and historical maps, government records, and other sources, AKRF is in the process of investigating the potential for the presence for hazardous materials in the park. This information will be compiled into a Phase 1 Environmental Site Assessment report. AKRF will also provide support to the design team related to designing the project to minimize costs related to remediating hazardous materials where possible. Ms. Lapin is serving as senior manager for the hazardous materials investigations, including procuring a Beneficial Use Determination (BUD) from the New York State Department of Environmental Conservation (NYSDEC) for the acceptance of fill materials to the site.

Columbia University Manhattanville Academic Mixed-Use Development, New York, NY

Ms. Lapin is serving as Hazardous Materials Task Leader on this Environmental Impact Statement (EIS) for approximately 4 million square feet of new academic, research and neighborhood uses to be constructed north of Columbia University's existing Morningside campus. The work has included Phase I Environmental Site Assessments for the properties within the site boundaries and estimates for upcoming investigation and remediation.

To date, the firm's Hazardous Materials group has performed 30 Phase I Environmental Site Assessments for properties within the development area. In addition, a Preliminary Environmental Site Assessment (PESA) was completed in conjunction with the Environmental Impact Statement (EIS). Based on the Phase I studies, AKRF conducted a subsurface (Phase II) investigation in accordance with an NYCDEP-approved investigative work plan and health and safety plan. The objective of the subsurface investigation was to characterize the subsurface conditions on the property and determine whether past or present on-site and/or off-site potential sources of contamination have adversely affected the study site, and to use the analytical data collected during AKRF's subsurface investigation, to evaluate any potential environmental risks and/or the need for remedial action at the site prior to future development. Subsurface activities included the advancement of soil borings, groundwater

monitor wells, and the collection of soil and groundwater samples for laboratory analysis. This study was used to estimate remediation costs of contaminated soil, groundwater and hazardous building materials, including lead-based paint and asbestos-containing materials.

Albert Einstein College of Medicine Center for Genetic and Translational Medicine, Bronx, NY

Ms. Lapin directed the firm's hazardous materials work in connection with the construction a new Center for Genetics and Translational Medicine (CGTM) building on the Bronx campus of the Albert Einstein College of Medicine of Yeshiva University. AKRF prepared an Environmental Assessment Statement (EAS) that examined such issues as land use, zoning, air quality, urban design and visual resources, hazardous materials, traffic, noise, and air quality. Ms. Lapin's work included analysis of the existing conditions and potential impacts that the construction could cause to the environment and human health.

Yonkers Waterfront Redevelopment Project, Yonkers, NY

For this redevelopment along Yonkers Hudson River waterfront, Ms. Lapin headed the remedial investigation and remediation work that included Phase I assessments of 12 parcels, investigations of underground storage tank removals and associated soil remediation, remedial alternatives reports, and remedial work plans for multiple parcels. Several of the city-owned parcels were remediated under a Voluntary Cleanup Agreement; others were administered with state Brownfields grants. Hazardous waste remediation was completed on both brownfield and voluntary clean-up parcels, which enabled construction for mixed-use retail, residential development, and parking.

Davids Island Site Investigations, New Rochelle, NY

Ms. Lapin managed the hazardous materials investigation of Davids Island, the largest undeveloped island on the Long Island Sound in Westchester County. The 80-acre island features pre- and post-Civil War military buildings and parade grounds, and is viewed as a major heritage, tourism, and recreational amenity. The island, formerly known as Fort Slocum, was used by the U.S. military, beginning in the 19th century, as an Army base, hospital, and training center. The island was planned for county park purposes. The investigation included a Phase I site assessment, with historical research going back to the 17th century, a Phase II subsurface investigation, underground storage tank investigations, and asbestos surveys of all remaining structures. Cost estimates were submitted to Westchester County for soil remediation, asbestos abatement, and building demolition.

Site Selection and Installation of 11 Turbine Generators, New York and Long Island, NY

AKRF was retained by the New York Power Authority (NYPA) to assist in the State Environmental Quality Review Act (SEQRA) review of the proposed siting, construction, and operation of 11 single-cycle gas turbine generators in the New York metropolitan area. Ms. Lapin managed the hazardous materials investigation of the sites. The work has included Phase I site assessments, subsurface investigations, and construction health and safety plans.

Cross Westchester (I-287) Expressway Phases V and VI, Westchester County, NY

For the New York State Department of Transportation (NYSDOT), Ms. Lapin served as Project Manager and was responsible for directing the contaminated materials aspect of the final design effort for the reconstruction of Westchester County's major east-west artery. As part of her duties, Ms. Lapin was responsible for managing the asbestos investigations at eight bridges and wetland delineation along the entire corridor, as well as writing the scope of work and general management of the project.

Supermarket Redevelopment, New Fairfield, CT

AKRF provided consulting services to the developer and owner of a 9-acre site included conducting a remedial investigation and remediation of a site contaminated from former dry cleaning operations and off-site gasoline spills. The investigation included the installation of monitoring wells in three distinct aquifers, geophysical logging, pump tests, and associated data analysis. Ms. Lapin presented the environmental issues and planned remediation to

local and state officials during the early stages of the planning process to incorporate their comments into the final remedial design. A remedial action work plan (RAWP) was completed and approved by the Connecticut Department of Environmental Protection within a year to enable redevelopment work for a new supermarket and shopping center. The RAWP included the remediation of soil within the source area and a multi-well pump and treat system for the recovery of non-aqueous and dissolved phase contamination in groundwater. The design of the recovery well system included extensive groundwater modeling to ensure capture of the contaminant plume and the appropriate quantity and spacing of the wells. Ms. Lapin directed the soil removal remedial activities and monitoring for additional potential contamination during construction. In addition, AKRF performed comprehensive pre-demolition asbestos and lead-based paint surveys of the former site structures, and provided environmental consulting support for the development of the site. The groundwater remediation system was installed during site development and began operation once development was complete.

Target Stamford, Stamford, CT

AKRF originally completed a Phase I Environmental Site Assessment (ESA) for a developer of this property, located at southeastern corner of Broad Street and Washington Boulevard in downtown Stamford, Connecticut, for a proposed residential development. Four years later, an update of this Phase I ESA was conducted for a proposed Target retail development. The study area included the current Target site and the west-adjacent site currently under construction as a residential building. Following the Phase I report, a subsurface (Phase II) investigation was conducted, which included 21 soil borings, groundwater monitor wells, soil and groundwater sample collection and analysis. The results of the Phase II investigation were used to develop a remediation strategy. An additional Phase I/Phase II investigation was conducted of the adjacent former transmission repair facility, which included a site inspection, review of local and state records, an underground storage tank markout survey, advancement of 12 soil borings, and collection of soil samples for laboratory analysis. AKRF also conducted asbestos surveys prior to abatement and demolition of the former Broad Street and Washington Boulevard buildings.

East 75th/East 76th Street Site, New York, NY

Ms. Lapin served as Senior Manager for this project that encompassed coordination and direct remediation efforts of this former dry cleaning facility and parking garage prior to the sale of the property and its ultimate redevelopment for use as a private school. A preliminary site investigation identified 20 current and former petroleum and solvent tanks on the property. A soil and groundwater testing program was designed and implemented to identify the presence and extent of contamination resulting from potential tank spills. This investigation confirmed the presence of subsurface petroleum contamination in the soil and solvent contamination from former dry cleaning activities in the bedrock. AKRF completed oversight of the remediation under the State's Voluntary Cleanup Program. Remediation, consisting of tank removals and excavation of contaminated soil and the removal of solvent-contaminated bedrock down to 30 feet below grade, has been completed. AKRF completed oversight of the pre-treatment of groundwater prior to discharge to the municipal sewer system and is currently completing an off-site study to determine impacts to groundwater in downgradient locations.

Former Macy's Site, White Plains, NY

Ms. Lapin managed the pre-demolition work for Tishman Speyer. Work included a Phase I site assessment; subsurface investigation (Phase II), including the analysis of soil and groundwater samples for contamination; a comprehensive asbestos, lead paint, and PCB investigation; radon analysis; and coordination and oversight of the removal of hazardous materials left within the building from previous tenants. Work also included asbestos abatement specifications and specifications for the removal of two 10,000-gallon vaulted fuel-oil underground storage tanks.

Storage Deluxe, Various Locations, NY

Ms. Lapin manages the firm's ongoing work with Storage Deluxe, which includes Phase I and Phase II subsurface investigations, underground storage tank removals and associated remediation, asbestos surveys and abatement oversight, and contaminated soil removal and remediation for multiple sites in Connecticut, the Bronx, Brooklyn, Manhattan, Westchester County, and Long Island.

Home Depot, Various Locations, NY

Ms. Lapin, serving as either Project Manager or Senior Manager, has managed the investigations and remediation at multiple Home Depot sites in the five boroughs, Long Island, and Connecticut. The investigations have included Phase I and II site assessments, asbestos and lead paint surveys, abatement specifications and oversight, and soil and groundwater remediation.

Avalon on the Sound, New Rochelle, NY

For Avalon Bay Communities, Ms. Lapin is managing the investigations and remediation of two phases of this residential development, including two luxury residential towers and an associated parking garage. Remediation of the first phase of development (the first residential tower and the parking garage) included gasoline contamination from a former taxi facility, fuel oil contamination from multiple residential underground storage tanks, and chemical contamination from former on-site manufacturing facilities. The remediation and closure of the tank spills was coordinated with the New York State Department of Environmental Conservation (NYSDEC). The initial investigation of the Phase II development—an additional high-rise luxury residential building—detected petroleum contamination. A second investigation was conducted to delineate the extent of the contamination and estimate the costs for remediation. AKRF oversaw the remediation and conducted the Health and Safety Monitoring. The remediation was completed with closure and approvals of the NYSDEC.

Mill Basin, Gerritsen Inlet, and Paerdegat Basin Bridges, Final Design, Shore Parkway, Brooklyn, NY

Following the preparation of the Generic Environmental Impact Statement (GEIS) for the Belt Parkway Bridges Project, the firm was retained for supplemental work during the final design phase of the project. This included NEPA and SEQRA documentation for three of the bridges—Mill Basin, Gerritsen Inlet, and Paerdegat Basin—which will be federally funded. Ms. Lapin managed the contaminated materials investigation that included a detailed subsurface contaminated materials assessment, both subaqueous and along the upland approaches.

NYSDOT Transportation Management Center (TMC), Hawthorne, NY

AKRF conducted environmental studies for the NYSDOT at the current troopers' headquarters in Hawthorne, NY. The property is the proposed site of a new Transportation Management Center. AKRF completed a comprehensive asbestos survey of the on-site building and prepared asbestos abatement specifications; performed a Phase I site assessment; conducted an eletromagnetic (EM) survey that located two fuel oil underground storage tanks, and developed removal specifications for the two underground storage tanks and an aboveground storage tank.

Metro-North Railroad Poughkeepsie Intermodal Station/Parking Improvement Project, Poughkeepsie, NY

Ms. Lapin served as Project Manager of the hazardous materials investigation in connection with AKRF's provision of planning and environmental services for parking improvement projects at this station along the Hudson Line. The project included an approximately 600-space garage, additional surface parking, and an intermodal station to facilitate bus, taxi, and kiss-and-ride movements. Ms. Lapin conducted Phase I and II contaminated materials assessments and worked with the archaeologists to locate an historical roundhouse/turntable.

Metro-North Railroad Golden's Bridge Station Parking Project, Westchester County, New York

For Metro-North Railroad, Ms. Lapin managed a Phase I Environmental Site Assessment of a property that has since become the new parking area, used by the existing Golden's Bridge train station. Ms. Lapin also conducted a subsurface (Phase II) investigation of the original parking area, track area, and existing platform for the potential impact of moving tracks in the siding area to extend the existing parking area and adding an access from a proposed overhead walkway (connecting the train station to the new parking area). The study also included an assessment for lead-based paint and asbestos on the platform structures.

East River Science Park, New York, NY

Originally, New York University School of Medicine (NYUSOM) retained the firm to prepare a full Environmental Impact Statement (EIS) for its proposed East River Science Park (ERSP). The proposed complex was to occupy an underutilized portion of the Bellevue Hospital campus between East 30th Street and approximately East 28th Street, immediately south of NYU's campus. Phase I was to consist of 618,000 square feet of development, including a clinical practice and research building, a biotech center, 220 housing units for post-doctorate staff, a child care center, and a conference center. This phase would include reuse of the former Bellevue Psychiatric Building, an historic structure on 30th Street east of First Avenue. Phase II would see development of a second biotech building with a library to serve NYU and Bellevue at the eastern end of the block between 29th and 30th Streets. Phase III would follow with a third biotech building and parking.

The EIS for the project considered a full range of issues, including land use, socioeconomics, shadows, historic resources, open space, traffic and transportation, air quality, noise, and construction. The firm also prepared all of the traffic and transportation studies for the urban design and master planning efforts. Ms. Lapin managed the Phase I Environmental Site Assessment and other hazardous materials-related issues. Events relating to September 11, 2001 put a hold on the project for a number of years. When it resurfaced, a new developer stepped in and the scope of the project decreased. Ms. Lapin updated the hazardous materials issues for the new developer and consulted with them regarding remediation strategies and involvement of regulatory agencies. For the actual remediation/development, the city requested oversight by AKRF to represent their own interests (the city is retaining ownership of the land). Ms. Lapin is currently directing the remediation oversight on behalf of the City of New York for the remediation of this former psychiatric hospital building, laundry building and parking areas associated with Bellevue Hospital. The new development includes a biotechnology center (Commercial Life Science Research and Office Park) comprising two buildings (combined 550,000 square feet), street level retail, and an elevated plaza.

Roosevelt Union Free School District – District-wide Improvement Program, Roosevelt, NY

Ms. Lapin managed the hazardous materials investigation for the Draft and Final Environmental Impact Statements for the improvement program, which included the demolition of three existing elementary schools and portions of the junior-senior high school, and the reconstruction of three replacement elementary schools, a separate replacement middle school, and renovations to the high school. Following the EIS, additional hazardous materials investigations were completed, including comprehensive asbestos and lead surveys; Phase I and Phase II Environmental Site Assessments; preparing asbestos, lead, hazardous materials and demolition specifications; and obtaining site-specific variances from the New York State Department of Labor (NYSDOL). AKRF continues to provide asbestos and lead project monitoring and air monitoring, and environmental remediation oversight. The middle school remediation was conducted through coordination with the NYSDEC, NYSDOH, the New York State Education Department and the local school district. The project was approved and construction/renovation for the new middle school is complete. The school will be open for the Fall 2008 semester as planned. AKRF continues to provide oversight for ongoing abatement at a number of the schools, and overall environmental consulting to the school district. AKRF continues to provide asbestos and lead project monitoring and air monitoring, and environmental remediation oversight during the program's demolition and construction phases.

AXEL E. SCHWENDT, P.G.

PROFESSIONAL GEOLOGIST

Mr. Schwendt is a senior professional geologist for AKRF and has 11 years of experience in the environmental consulting field. Mr. Schwendt has extensive experience in Phase II activities involving subsurface soil and groundwater investigations, and has been involved in all aspects of soil and groundwater remediation, including those related to manufactured gas plants (MGP). He has managed and implemented large-scale site investigations and remedial measures for various properties under different regulatory programs including the New York State Department of Environmental Conservation's (NYSDEC) Voluntary Cleanup Program, New Jersey's Industrial Site Recovery Act (ISRA), and Pennsylvania's Land Recycling program. Mr. Schwendt also conducts and manages Phase I Environmental Site Assessments for various clients from a variety of industries.

In addition, Mr. Schwendt has extensive experience in underground and aboveground storage tank (UST) management, including UST removals, installations, and upgrades. He has designed and implemented remedial investigations surrounding UST releases and overseen the installation and maintenance of pump-and-treat remedial systems. He has performed storage tank compliance audits and maintenance inspections all across the country and prepared Spill Prevention, Control, and Countermeasures Plans (SPCC Plans) for over 90 individual facilities, including personnel training programs.

Mr. Schwendt worked with several other firms prior to joining AKRF, which provided him with a variety of skills. He has expertise with Environmental Emergency Response Plans, Integrated Contingency Plans, Phase I Environmental Site Assessments, and multi-phase compliance audits, including some international projects. He has also performed various types of hydrogeologic testing, including pilot tests, slug tests, pump tests and groundwater modeling, and has been responsible for data review and management.

BACKGROUND

Education

B.A., Earth Science and Environmental Studies, Tulane University, 1991

M.S., Geology, University of Delaware, 2002

Years of Experience

Year started in company: 2002

Year started in industry: 1995

RELEVANT EXPERIENCE

Lincoln Center Development Project, New York, NY

On behalf of the Lincoln Center Development Project, Inc., Mr. Schwendt conducted a Subsurface (Phase II) Investigation in the area of an underground storage tank (UST) farm located beneath the lower garage level of the West 62nd Street parking garage at Lincoln Center. The Phase II study was prompted by a request from the New York State Department of Environmental Conservation (NYSDEC) to properly close out the tanks. The tank farm includes seventeen (17) 550-gallon gasoline USTs and one (1) 550-gallon waste oil UST. The purpose of this Phase II investigation was to determine whether historic leaks from the tanks had affected the subsurface and to assist with future tank closure activities. The Phase II report was submitted to the NYSDEC for review and included a request to close the tanks in-place instead of removing them due to the structural constraints of the tank farm location.

Rose Plaza on the River, Brooklyn, NY

Mr. Schwendt conducted a Subsurface (Phase II) Investigation at the 470 Kent Avenue property located in Brooklyn, New York. The objective of the subsurface investigation was to characterize the subsurface soil and groundwater conditions and determine whether past or present on-site and/or off-site potential sources of contamination have adversely affected the site. Results of the Phase II study were also intended to be used to evaluate any potential environmental risks and/or the need for remedial action at the site prior to future development. The proposed development of the site includes the construction of approximately 665 market rate dwelling units and approximately 33,750 square feet of commercial uses. The scope of the Phase II study was based on a Phase I Environmental Site Assessment (January 2004) performed by AKRF, which identified recognized environmental conditions for the site, including the potential for soil and groundwater contamination from a historical on-site manufactured gas plant, and potential underground storage tanks. Phase II activities were conducted in accordance with AKRF's Sampling Protocol and site-specific Health and Safety Plan (HASP), which was reviewed and approved by the New York City Department of Environmental Protection (NYCDEP).

Albert Einstein College of Medicine Environmental Investigation, Bronx, NY

Mr. Schwendt managed a Subsurface (Phase II) Investigation at an approximately eight-acre portion of the Jacobi Medical Center fronting on Eastchester Road in the Bronx, New York. The site, owned by New York City, contained an old boiler house, a storage warehouse, a laundry facility, and several paved parking areas. The objective of the subsurface investigation was to characterize the subsurface conditions on the property and determine whether past or present on-site and/or off-site potential sources of contamination have adversely affected the study site.

Storage Deluxe, Various Locations, NY

Mr. Schwendt is currently the project manager for assisting Storage Deluxe with the ongoing expansion of their self-storage facilities primarily in the five boroughs of New York City and Westchester County. He conducts and manages environmental due diligence needs related to their property transactions including conducting Phase I ESAs, Phase II investigations, and geophysical surveys, as well as consulting on petroleum bulk storage tank management. He assists Storage deluxe in making decisions with respect to environmental risk issues.

270 Greenwich Street, New York NY

Mr. Schwendt conducted a subsurface (Phase II) investigation that included the advancement of soil borings and the collection of soil and groundwater samples from the 270 Greenwich Street property in the Tribeca neighborhood of New York City. The site will be developed with approximately 402 dwelling units (172 rental units and 230 for sale condominiums), approximately 224,084 gross square feet of destination and local retail space, and below-grade public parking. The purpose of this Phase II subsurface investigation was to ascertain subsurface soil and groundwater quality beneath the study site and determine whether past on- or off-site operations have affected the subject property. The subsurface investigation was also intended to determine whether there are any special handling or disposal requirements for pumped groundwater, should dewatering be necessary during site development. The Phase II study included soil and groundwater sampling as well as a geophysical investigation to determine whether unknown underground storage tanks were present at the site. Field activities were performed in accordance with Mr. Schwendt's Sampling Protocol and Health and Safety Plan (HASP), which were approved by the New York City Department of Environmental Protection (NYCDEP).

Columbia University Manhattanville Rezoning and Academic Mixed-Use Development, New York, NY

Mr. Schwendt is managing the hazardous materials task on the EIS for approximately 4 million square feet of new academic, research and neighborhood uses to be constructed north of Columbia University's existing Morningside campus. The work has included more than 25 Phase I Environmental Site Assessments for the properties within

the site boundaries and estimates for upcoming investigation and remediation. In addition, a Preliminary Environmental Site Assessment (PESA) was completed for the whole project area. Recognized environmental concerns in the area included: current and historical underground storage tanks; current and historical auto-related use such as repair shops and gasoline stations; two historical manufactured gas holders; and a Consolidated Edison cooling plant located on West 132nd Street. Mr. Schwendt conducted a subsurface investigation at the site to characterize the subsurface conditions on the property and determine whether past or present on-site and/or off-site potential sources of contamination have adversely affected the study site, and to use the analytical data to evaluate any potential environmental risks and/or the need for remedial action at the site prior to future development.

Hudson River Park, New York, NY

Mr. Schwendt serves as an on-call consultant for the ongoing development of the Hudson River Park, the approximately 5 to 6 mile section of waterfront property from Battery Place to 59th Street along the western edge of Manhattan. He conducts subsurface investigations, provides guidance on construction and environmental health and safety issues, interfaces with regulatory agencies as necessary, and manages the mitigation of environmental conditions encountered during site development activities.

Brooklyn Bridge Park, Brooklyn, NY

AKRF is providing environmental planning and review services for the development of a new 70-acre park that will revitalize 1.5 miles of the East River waterfront between Jay Street and Atlantic Avenue. When completed, the park would provide open space and recreational facilities as well as a hotel, restaurants, retail, and historic and educational venues. Mr. Schwendt conducted a Phase I ESA and Phase II Subsurface Investigation for the proposed Brooklyn Bridge Park area and is involved with the completion of the Environmental Impact Statement.

Titan Property Management, Rego Park, NY

Mr. Schwendt is currently involved with an extensive site investigation for a property involved in the New York State Voluntary Cleanup Program. The property is resting on a plume of PCE contamination. The goal of the investigation is to determine whether the property is the source of the contamination and to collect data to provide information for the design and implementation of a site remedial system. The investigation involves extensive soil, soil gas, and groundwater investigation, and includes the investigation of surrounding properties.

ABCO Refrigeration Company, Long Island, NY

Mr. Schwendt is managing a tank closure and dry well assessment and remediation project for the ABCO Refrigeration Company. Historic contamination was found seeping from the ground in the location of an old underground storage tank, which is believed to be a source of adverse impact. An adjacent drywell has been impacted by the tank as well as from past dumping activities of a former typewriter ribbon ink manufacturing company. A site-wide investigation of the ten drywells was also implemented at the request of the Nassau County Department of Health. Mr. Schwendt undertook soil remedial activities that led to the property receiving closure with respect to the underground storage tank. Drywell remedial activities were successful and the site received approval from the EPA to continue use of on-site drywells.

Levin Management Corporation Property—Site Investigation, Pelham Manor, NY

Mr. Schwendt has been involved in the on-going site investigation of a former manufactured gas plant (MGP) and petroleum off-loading and storage until the late 1950s. Soils have also been observed to have been affected by non-aqueous phase liquid (NAPL) consisting of oil- and tar-like material. Floating or light NAPL (LNAPL) has also been detected in one on-site groundwater. The objectives of the site investigation are to collect additional data to further determine the extent of NAPL-affected soil both above and below the water table throughout the site; collect additional data to further delineate groundwater contamination throughout the site; and confirm the on-

site groundwater flow direction and that NAPL has not migrated to the downgradient perimeter of the site, including Eastchester Creek. Mr. Schwendt was brought on board for this project for his expertise in soil and groundwater MGP contaminant delineation.

NYCDEP Bureau of Environmental Engineering 26th Ward Wastewater Treatment Plant—Site Investigation, Brooklyn, New York

Mr. Schwendt managed and conducted environmental sampling and testing at the 26th Ward Wastewater Treatment Plant property located in Brooklyn, New York. This investigation was performed to determine the presence or absence of contamination in the soil and groundwater that would affect the proposed construction of a new raw sewage pump station. Mr. Schwendt provided the 26th Ward with the protocol necessary for the special handling and disposal of the excavated soil as well as for the groundwater that would be pumped during dewatering operations.

Olnick Organization, New York, NY

AKRF was retained by the Olnick Organization to prepare and implement an SPCC Plan for their aboveground storage tank system for an office building in Manhattan. Mr. Schwendt performed the site inspections and provided the Olnick Organization with a list of recommendations for upgrades to their fuel transfer piping system that would bring the facility into compliance with SPCC regulations. He also provided Olnick with a plan for implementing the required SPCC training program for their facility personnel.

Site investigations of former MGP Facilities/Properties for Consolidated Edison, New York City, NY & Westchester County, NY

While with another firm, Mr. Schwendt worked on this project, which included a service station in New York City and an electrical substation in Westchester County, New York. Mr. Schwendt performed the site characterizations, including subsurface soil and groundwater impact delineation and aquifer testing. The findings from these characterizations are being used by Consolidated Edison to make appropriate changes to the design specifications and to plan for appropriate handling of impacted materials and health and safety protocols during future construction activities.

UST Site Investigation and Remediation for Consolidated Edison Service Center, Queens, NY

While with another firm, Mr. Schwendt worked on this project, which included due diligence site reviews, soil boring installation, monitoring well installation, hydrogeologic testing, and water quality sampling. Risk-based closures incorporating natural attenuation and groundwater monitoring activities have been proposed. Remedial work plans are under development for other facilities where more aggressive remedial actions are required. Performed subsurface investigations and site characterizations for several other Consolidated Edison facilities including soil-gas surveys and radiological scoping survey.

Petroleum Bulk Storage Management Program for Bell Atlantic-New York (now Verizon), Manhattan, Brooklyn, Queens, Bronx, Staten Island, and Long Island, NY

While with another firm, Mr. Schwendt personally designed and conducted subsurface investigations for UST remediations including characterization of releases, soil and ground water investigations, pilot tests, slug tests, pump tests, groundwater modeling, horizontal and vertical impact delineation, and preparation of compliance documentation for regulatory agencies. He performed oversight of the installation of 'pump and treat' remedial systems and performed maintenance activities. He also supervised UST installations, upgrades and closures; implemented tank tightness testing programs; addressed on-site health and safety issues and other regulatory requirements; prepared closure reports; and managed soil disposal.

Hertz Rent-A-Car Corporate Headquarters, Park Ridge, NJ

Mr. Schwendt served as an in-house consultant/project manager for the environmental department at Hertz's corporate office in Park Ridge, New Jersey. He managed Phase I and Phase II investigations for real estate purchases, leases and acquisitions throughout the United States and Canada. He coordinated Hertz's subcontractors and environmental consulting firms, reviewed reports, and made recommendations to the legal and real estate departments with respect to environmental risk issues.

Temple University, Philadelphia, PA

Mr. Schwendt was a lead auditor for a multi-phase compliance audit of the five campuses of Temple University. The audit included an assessment of all of the Temple University Hospitals, the School of Medicine, the College of Science and Technology, the Tyler School of Art, the College of Engineering, Ambler College (Community and Regional Planning, Horticulture, Landscape Architecture), the Physical Plant Department, and all university facilities and maintenance departments. Regulatory programs targeted as part of the audit included, but were not limited to, federal and state air and water programs, hazardous waste management, hazardous chemicals and substances, FIFRA (pesticides), emergency response, Community Right-to-Know, TSCA (toxic substances), and petroleum bulk storage regulations. Following completion of the audit, Mr. Schwendt prepared and implemented an environmental management system that conformed to the needs and culture of the Temple University organization.

University of Pennsylvania, Philadelphia, PA

Mr. Schwendt was the lead auditor for an environmental compliance audit of the University of Pennsylvania's Department of Environmental Health and Radiation Safety. The audit included an assessment for the preparation and implementation of the university's Spill Prevention, Control, and Countermeasures Plans (SPCC Plans). Mr. Schwendt prepared and implemented the university's environmental management program and provided training for the facility personnel.

Wistar Institute, Philadelphia, PA

Mr. Schwendt was the lead auditor for an environmental compliance audit of the Wistar Institute, an independent non-profit biomedical research institute in West Philadelphia, Pennsylvania. The multi-phase audit comprised an assessment of the entire facility for compliance with federal, state and local environmental regulations and included the development of an environmental management system.

Seton Hall University, South Orange, NJ

Mr. Schwendt was a lead auditor for a multi-phase compliance audit of the Seton Hall University campus. The audit comprised an assessment of the entire facility for compliance with federal and state air and water programs, hazardous waste management programs, hazardous chemicals and substances programs, FIFRA (pesticides), emergency response and Community Right-to-Know regulations, TSCA (toxic substances), and petroleum bulk storage regulations. The audit included the development and implementation of an environmental management system for the Seton Hall University faculty and staff.

South Bronx Overall Economic Development Corporation (SoBRO) Port Morris Brownfield Opportunity Areas (BOA), Bronx, NY

Mr. Schwendt is assisting SoBRO with the in-depth and thorough analysis of existing conditions, opportunitires, and reuse potential for properties located in the proposed Port Morris Brownfield Opportunity Area with an emphasis on the identification and reuse potential of strategic brownfield sites that may be catalysts for revitalization. His work so far has included the preparation of Phase I Environmental Site Assessments for the catalyst sites and advertising on the suitability of enacting zoning changes to permit various property uses.

STEPHEN R. GRENS, JR.

ENVIRONMENTAL SPECIALIST

Stephen Grens, Jr. is an Environmental Specialist with expertise in Phase I and II site assessments and comprehensive asbestos surveys. He has completed assessments in New York, New Jersey, Connecticut, Pennsylvania, North Carolina, South Carolina, and Georgia. Mr. Grens is also actively involved in data interpretation and report preparation.

BACKGROUND

Education

B.S., Environmental Sciences, State University of New York (SUNY), Purchase, Expected Graduation Date: May 2010

Licenses/Certifications

New York State Certified Asbestos Inspector, Asbestos Project Monitor, and Air Sampling Technician

LIRR Roadway Worker

OSHA HAZWOPER Site Safety Supervisor

NYC Department of Buildings (DOB) Expediter

Years of Experience

Year started in company: 1996

Year started in industry: 1996

RELEVANT EXPERIENCE

Former Domino Sugar Refinery

Mr. Grens performed environmental oversight for the installation of numerous groundwater monitor wells, soil borings and soil and groundwater sampling. Soil and groundwater sampling and monitoring are being performed in accordance with the NYCDEP approved workplan.

Triangle Parcel

Mr. Grens performed environmental oversight for the installation of numerous groundwater monitor wells, soil borings and soil and groundwater sampling. Soil and groundwater sampling and monitoring are being performed in accordance with the NYSDEC approved workplan.

Gedney Way Landfill, White Plains, NY

Mr. Grens performed environmental oversight for the installation of numerous groundwater monitor wells, soil gas vapor extraction points, test pits, soil removal and soil and groundwater sampling. Remedial activities at the landfill are being performed for landfill closure in accordance with the NYSDEC approved workplan.

Flushing Industrial Park, Flushing, NY

Mr. Grens performed environmental and remediation oversight including the implantation of the site specific health and safety plan (HASP) during excavation activities at the Flushing Industrial Park site. Approximately 22,762 tons of PCB contaminated soil and 55,629 tons of non-hazardous soil were remediated and disposed of at the appropriate receiving facilities. The environmental clean-up activities at the Flushing Industrial site were done in accordance with the U.S. Environmental Protection Agency (EPA) and the New York State Department of Environmental Conservation (NYSDEC) under the Brownfields Clean-Up Program. Mr. Grens is currently overseeing the construction related remedial oversight activities at the Flushing Industrial Park site and will continue through 2008/2009.

Queens West Development Project, Long Island City, NY

For over 20 years, AKRF has played a key role in advancing the Queens West development, which promises to transform an underused industrial waterfront property into one of largest and most vibrant mixed-use communities just across the East River from the United Nations. AKRF has prepared an EIS that examines issues pertaining to air quality, land use and community character, economic impacts, historic and archaeological resources, and infrastructure. As part of the project, AKRF also undertook the largest remediation venture completed to date under the Brownfields Cleanup Program (BCP). Mr. Grens performed environmental oversight including the implantation of the site specific health and safety plan (HASP) during excavation activities at the site. The environmental clean-up activities were done in accordance with the U.S. Environmental Protection Agency (EPA) and the New York State Department of Environmental Conservation (NYSDEC) under the Brownfields Clean-Up Program.

Sutphin Boulevard Underpass, Jamaica, Queens

Mr. Grens performed the Phase I Environmental Site Assessment, Phase II Subsurface Investigation and asbestos and lead-based paint surveys at the LIRR-owned Sutphin Boulevard site. Portions of the Phase I report were used in the Hazardous Materials Chapter of the Environmental Impact Statement. Mr. Grens reviewed previous environmental reports, performed oversight for the installation of soil gas points and soil borings, and performed the asbestos and lead paint surveys. The proposed redevelopment of the property included retail and commercial spaces.

Parkway Road Site, Bronxville, NY

Mr. Grens supervised and documented the removal of USTs, two hydraulic lifts, dry wells, and petroleum contaminated soil from a parcel that was formerly utilized as a gasoline service station. This site would eventually be redeveloped into multi-unit residential apartments.

Hanover Hall, Stamford, CT

Mr. Grens performed a remote camera observation of the sanitary sewer line to determine the presence of cracks associated with the contamination of surrounding soil. This procedure was implemented as a cost effective means to determine the precise location of possible soil and/or groundwater contamination.

East 135th Street Site, Bronx, NY

Mr. Grens supervised and documented the removal of approximately 8,000 tons of urban fill and metal-contaminated soil for the construction of a storage facility on the Harlem River. He was responsible for the delineation of contaminated areas, and subsequent confirmation soil sampling. Soil was delineated to the extent feasible in order to make way for the storage facility.

Montagano Oil Blending Facility, Pleasantville, NY

Mr. Grens supervised and documented the removal of numerous aboveground storage tanks (ASTs) and oil mixing kettles. Approximately ten 550-gallon aboveground fuel oil storage tanks were rendered free of their contents, cleaned, cut, and removed off-site for disposal. All removal activities were performed in accordance with applicable state and federal regulations. Additional on-site activities included the removal of a 1,000-gallon underground gasoline storage tank, and the installation of site-wide groundwater monitoring wells.

Bridgeport Municipal Stadium (Former Jenkins Valve Property), Bridgeport, CT

As part of the City of Bridgeport's revitalization program for the construction of a minor league baseball facility, Mr. Grens supervised and documented the removal of approximately 14,000 tons of solvent, petroleum, and metal-contaminated soil. He was responsible for the delineation of contaminated areas as well as subsequent confirmation soil sampling for the local sponsoring municipality. Additional on-site activities included the installation of groundwater monitoring wells, removal of underground storage tanks, and management of the current groundwater monitoring program.

Catskill/Delaware Water Treatment Facility, Mount Pleasant and Greenburgh, NY

Mr. Grens was responsible for the contaminated materials analysis as part of the Environmental Impact Statement (EIS) for the New York City Department of Environmental Protection (DEP). The analysis included the Phase I site assessment, a description of the chemicals to be used in the direct filtration process, and their alternatives. Mr. Grens also worked on the Electromagnetic Fields (EMF) analysis for this EIS. It included the interpretation of electromagnetic data from existing on-site sources, including transformers, high-voltage lines, and electrical panels.

Former Sterns Department Store, Queens, NY

Mr. Grens conducted asbestos air monitoring and sampling at the former Sterns department store during asbestos abatement procedures conducted as part of demolition operations in preparation for a multiplex cinema and outlet store.

Former Jay Street Welfare Building and Adams Street Family Courthouse Building, Brooklyn, NY

Mr. Grens acted as the on-site asbestos project manager during asbestos abatement activities required prior to interior renovations. Tasks included project management and collecting asbestos air samples during abatement activities in accordance with applicable New York City and State regulations.

East 75th/76th Street Development Site, New York, NY

As the designated health and safety officer (HSO), Mr. Grens' responsibilities included the personal well-being of all on-site personnel during Phase II activities. He managed and supervised the excavation, removal, and off-site disposal of numerous hazardous materials and petroleum-containing underground storage tanks, associated hazardous and contaminated soil, and stained bedrock. This site was formerly utilized as a dry-cleaning facility, parking garage, and automobile repair facility. It was classified as a hazardous waste site because of leaking underground storage tanks. Additional tasks at this site included the continuous monitoring of work-zone and community air and dust particulate levels, implementing the health and safety plan (HASP), and collecting soil and tank product samples in accordance with applicable New York State regulations. Remedial activities at the site began in December 2000 (prior to the demolition of the on-site buildings) and were successfully completed in May 2001. The construction of a new school is anticipated on the site in the near future.

Memorial Sloan Kettering Cancer Center, New York, NY

Mr. Grens has performed numerous noise impact studies on the east side of midtown Manhattan to assist in the determination of the various project scenarios within each site's respective EIS. Noise produced by mobile sources (automobiles, trucks, and trains), stationary sources (machinery, ventilation systems, and manufacturing operations), and construction activities can cause stress-related illness, disrupt sleep, and break concentration. The

noise impact study for the Memorial Sloan Kettering Cancer Center was conducted to determine real time noise levels prior to renovations and construction activities. This provided a background level reference point for when construction activities started. Mr. Grens' tasks included collecting relevant noise data at numerous locations during morning, afternoon, and evening rush hours to determine real time noise levels utilizing a Larsen Davis decibel level indicator.

Con Edison East Side Development Sites, New York, NY

Mr. Grens has performed numerous noise impact studies on the east side of midtown Manhattan to assist in the determination of the various project scenarios within each site's respective EIS. Mr. Grens' tasks included collecting relevant noise data at numerous locations during morning, afternoon, and evening rush hours to determine real time noise levels utilizing a Larsen Davis decibel level indicator.

Supermarket Redevelopment, New Fairfield, CT

AKRF provided consulting services to the developer and owner of a 9-acre site included conducting a remedial investigation and remediation of a site contaminated from former dry cleaning operations and off-site gasoline spills. The investigation included the installation of monitoring wells in three distinct aquifers, geophysical logging, pump tests, and associated data analysis. Mr. Grens performed remediation oversight, including the excavation of solvent-contaminated soil and health and safety air monitoring for volatile organic compounds (VOCs). Additionally, Mr Grens performed weekly inspections of the groundwater treatment system, including the collection of groundwater samples as art of the operation and maintenance of the system.

Columbia University Manhattanville Academic Mixed-Use Development, New York, NY

Mr. Grens performed numerous Phase I Environmental Site Assessments for the Columbia Manhattanville re-zoning project. He also performed Phase II subsurface activities recommended in AKRF's Phase I reports. Phase II activities included the installation of soil borings and groundwater monitoring wells and the collection of soil and groundwater samples.

St. Agnes Hospital Redevelopment, White Plains, NY

AKRF is currently working for North Street Community, LLC on the former St. Agnes Hospital campus in White Plains, New York. The project involves redeveloping the property into an assisted living and nursing home facility. Some of the existing buildings and uses will remain and several new buildings will be built for the new facility. AKRF's assignment includes preparing the site plan package to accompany the Draft Environmental Impact Statement (DEIS) for the project. Mr. Grens performed a Phase I Environmental Site Assessments of the numerous structures located on the property.

Roosevelt Union Free School District, Roosevelt, NY

Mr Grens performed numerous inspections for asbestos-containing materials (ACM) in the site buildings. Asbestos samples were collected as part of the ACM survey. Remediation activities include removal/closure of contaminated dry wells and underground petroleum storage tanks, and excavation and off-site disposal of petroleum- and pesticide-contaminated soil.

Flushing Waterfront Development, Queens, NY

The Muss Development Company's 14-acre waterfront site in Downtown Flushing was previously a Consolidated Edison facility, and included transformer storage and repair and multiple fueling facilities. Other former site uses included a foundry, a paint house, and an incinerator. The site contained extensive PCB contamination including non-aqueous phase liquid (NAPL). The project required extensive investigation to design a remediation plan under the State's BCP program. Remediation, including removal of more than 100,000 tons of contaminated soil has been completed and foundation work is underway. By 2009, the site will be redeveloped with a 3 million square

foot retail and residential complex. The project will transform a neighborhood blight into a spectacular mixed-use development that will help revitalize the Flushing economy.

APPENDIX G

DETAILS OF THE CHEMICAL OXIDATION PRODUCTS

RegenOx™

CHEMICAL OXIDATION REDEFINED...

RegenOx™ is an advanced in situ chemical oxidation technology designed to treat organic contaminants including high concentration source areas in the saturated and vadose zones*

PRODUCT FEATURES:

- Rapid and sustained oxidation of target compounds
- Easily applied with readily available equipment
- Destroys a broad range of contaminants
- More efficient than other solid oxidants
- Enhances subsequent bioremediation
- Avoids detrimental impacts to groundwater aquifers

RegenOx product application

HOW IT WORKS:

RegenOx maximizes in situ performance using a solid alkaline oxidant that employs a sodium percarbonate complex with a multi-part catalytic formula. The product is delivered as two parts that are combined and injected into the subsurface using common drilling or direct-push equipment. Once in the subsurface, the combined product produces an effective oxidation reaction comparable to that of Fenton's Reagent without a violent exothermic reaction. RegenOx safely, effectively and rapidly destroys a wide range of contaminants in both soil and groundwater (Table 1).

ACHIEVES RAPID OXIDATION VIA A NUMBER OF MECHANISMS

RegenOx directly oxidizes contaminants while its unique catalytic complex generates a suite of highly charged, oxidative free radicals that are responsible for the rapid destruction of contaminants. The mechanisms by which RegenOx operates are:

- Surface- Mediated Oxidation: (see Figure 1 and description below)
- Direct Oxidation: $C_2Cl_4 + 2\ Na_2CO_3 \bullet 3\ H_2O_2 + 2\ H_2O \longleftrightarrow 2CO_2 + 4\ NaCl + 4\ H_2O + 2\ H_2CO_3$
- Free Radical Oxidation:
  - Perhydroxyl Radical ($HO_2\bullet$)
  - Hydroxyl Radical ($OH\bullet$)
  - Superoxide Radical ($O_2\bullet$)

Figure 1. RegenOx™ Surface-Mediated Oxidation

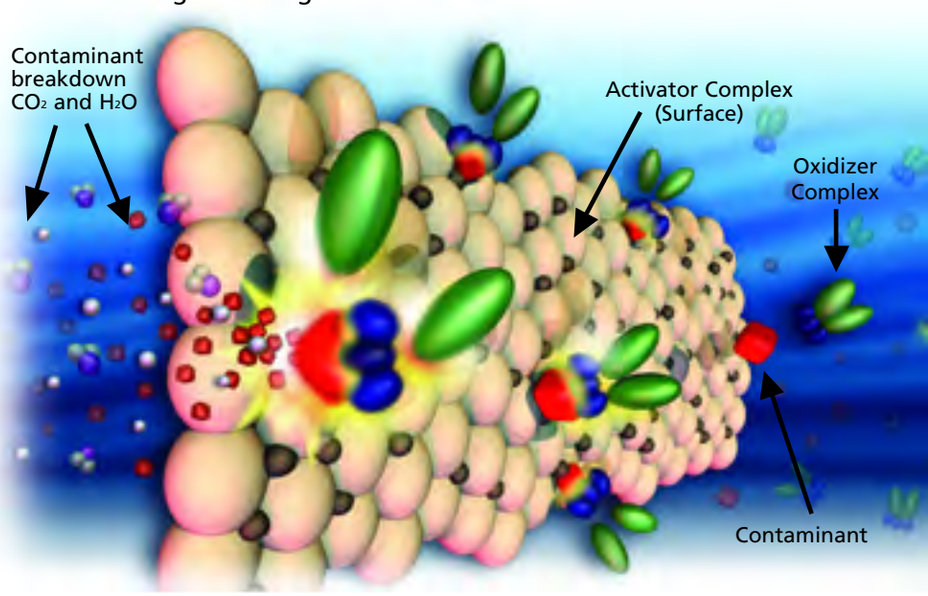

Figure 1. Surface-Mediated Oxidation is responsible for the majority of RegenOx contaminant destruction. This process takes place in two stages. First, the RegenOx activator complex coats the subsurface. Second, the oxidizer complex and contaminant react with the activator complex surface destroying the contaminant.

* Patent applied for

RegenOx™

From Mass Reduction to Bioremediation:

RegenOx™ is an effective and rapid contaminant mass reduction technology. A single injection will remove significant amounts of target contaminants from the subsurface. Strategies employing multiple Regenox injections coupled with follow-on accelerated bioremediation can be used to treat highly contaminated sites to regulatory closure. In fact, RegenOx was designed specifically to allow for a seamless transition to low-cost accelerated bioremediation using any of Regenesis controlled release compounds.

Significant Longevity:

RegenOx has been shown to destroy contaminants for periods of up to one month.

Product Application Made Safe and Easy:

RegenOx produces minimal heat and as with all oxidants proper health and safety procedures must be followed. The necessary safety guidance accompanies all shipments of RegenOx and additional resources are available on request. Through the use of readily available, highly mobile, direct-push equipment and an array of pumps, RegenOx has been designed to be as easy to install as other Regenesis products like ORC® and HRC®.

Effective on a Wide Range of Contaminants:

RegenOx has been rigorously tested in both the laboratory and the field on petroleum hydrocarbons (aliphatics and aromatics), gasoline oxygenates (e.g., MTBE and TAME), polyaromatic hydrocarbons (e.g., naphthalene and phenanthrene) and chlorinated hydrocarbons (e.g., PCE, TCE, TCA).

Oxidant Effectiveness vs. Contaminant Type:

Table 1

Contaminant	RegenOx™	Fenton's Reagent	Permanganate	Persulfate	Activated Persulfate	Ozone
Petroleum Hydrocarbons	**A**	**A**	B	B	B	**A**
Benzene	**A**	**A**	D	B	B	**A**
MTBE	**A**	B	B	C	B	B
Phenols	**A**	**A**	B	C	B	**A**
Chlorinated Ethenes (PCE, TCE, DCE, VC)	**A**	**A**	**A**	B	**A**	**A**
Chlorinated Ethanes (TCA, DCA)	**A**	B	C	D	C	B
Polycyclic Aromatic Hydrocarbons (PAHs)	**A**	**A**	B	B	**A**	**A**
Polychlorinated Biphenyls (PCBs)	B	C	D	D	D	B
Explosives (RDX, HMX)	**A**	**A**	**A**	**A**	**A**	**A**

Based on laboratory kinetic data, thermodynamic calculations, and literature reports.

Oxidant Effectiveness Key:

A = Short half life, low free energy (most energetically favored), most complete
B = Intermediate half life, low free energy, intermediate degree of completion
C = Intermediate half life, intermediate free energy, low degree of completion
D = Long half life, high free energy (least favored), very low degree of completion

REGENESIS
Advanced Technologies for Groundwater Resources
1011 Calle Sombra / San Clemente / California 92673-6244
Tel: 949/366-8000 / Fax: 949/366-8090 / www.regenesis.com

ORC ADVANCED™

"The Evolution of Controlled Release Oxygen"

ORC Advanced™ is the state-of-the-art technology for stimulating aerobic bioremediation. It offers unparalleled, maximum oxygen release for periods up to 12 months on a single injection and is specifically designed to minimize oxygen waste while maximizing contaminated site remediation.

HOW IT WORKS

Oxygen has been shown to be the limiting factor for microbes capable of aerobically degrading contaminants such as petroleum hydrocarbons.

Without adequate oxygen, contaminant degradation will either cease or may proceed by much slower anaerobic (oxygen-free) processes.

When hydrated, ORC Advanced is designed to release its full amount of oxygen (17% by weight) over a 12 month period. Upon injection into the subsurface, ORC Advanced utilizes its patented **Controlled Release Technology (CRT™)** to deliver its oxygen consistently over an extended period of time, avoiding excessive foaming and oxygen loss seen with commodity chemicals. This enables aerobic microbes to significantly accelerate rates of natural attenuation over long periods of time.

PRODUCT FEATURES AND BENEFITS

Highest Available Oxygen Content

More active oxygen (17%) plus Regenesis' patented CRT™ saves time and money by increasing degradation rates and improving remediation performance by providing more oxygen on a single injection. It is particularly effective at higher demand sites where oxygen may be limited and scavenged by competing carbon sources.

Patented Controlled Release Technology (CRT™)

Based on the same proven technology employed in the industry standard Oxygen Release Compound (ORC®), CRT allows for an efficient, long-term release of oxygen providing the optimal conditions for sustained aerobic biodegradation. This can save time and money by reducing the potential need for multiple applications. Also, oxygen release "lock-up" is avoided – an unfortunate problem experienced with commodity chemicals. (See Details of CRT in Figure 1).

In-Situ Application

Remediation with ORC Advanced is typically more cost-effective than *ex-situ* treatments. With the use of ORC Advanced there is minimal site disturbance with no above-ground piping or mechanical equipment, no operations and maintenance costs and no hazardous materials handling or disposal.

Free Technical Design and Support from Regenesis

Regenesis has been designing and evaluating *in-situ* accelerated bioremediation projects for over 10 years. This "free of charge" service offers the user the highest level of information available on stimulating natural attenuation and ensures a high level of project success.

REGENESIS
Leaders in Accelerated Natural Attenuation

1011 Calle Sombra / San Clemente / California 92673-6244 / Tel: 949/366-8000 / Fax: 949/366-8090 / www.regenesis.com

ORC ADVANCED™
OXYGEN RELEASE COMPOUND

DEFINING THE SCIENCE BEHIND CONTROLLED RELEASE TECHNOLOGY (CRT™)

Early on, Regenesis researchers noted that in order to optimally stimulate the natural attenuation of aerobically degradable contaminants, biologically usable oxygen was best supplied in low but constant concentrations. Big bursts of oxygen are wasteful and simply "bubble off", often generating undesirable foaming and producing unwanted preferential flow paths in the subsurface. Regenesis sought to solve this problem by controlling the rate of oxygen release from solid oxygen sources.

The answer was provided by the development of CRT. The CRT process involves intercalating (embedding) phosphates into the crystal structure of solid peroxygen molecules. This patented feature, now available in the ORC Advanced™ formulation, slows the reaction that yields oxygen within the crystal, minimizing "bubble off" which can waste the majority of oxygen available in common solid peroxygen chemicals.

CRT™ provides "balance" – it slows down the rate of oxygen release while at the same time preventing "lock-up". Commodity solid peroxygen chemicals, when in contact with water, will produce an initial rapid and uncontrolled release of oxygen. Then, as hydroxides form, a significant portion of the oxygen deeper in the crystal is made unavailable or becomes "locked up." This undesirable effect is ineffiecient and costly. CRT prevents lock up and controls the rate of oxygen release, representing the state-of-the-art technology in passive oxygen delivery.

CRT Specifics

Uniformly embedded within the crystalline structure of the peroxygen are phosphate ions. These ions do two important things:

1. they slow the rate of hydration that liberates oxygen thereby creating the CRT effect and
2. they form exit pathways for the oxygen in an otherwise tightly packed crystal that can become even more "locked-up" when hydroxides begin to form as a reaction by-product following oxygen liberation.

This patented process optimizes peroxygen performance and is only available in the Regenesis line of products.

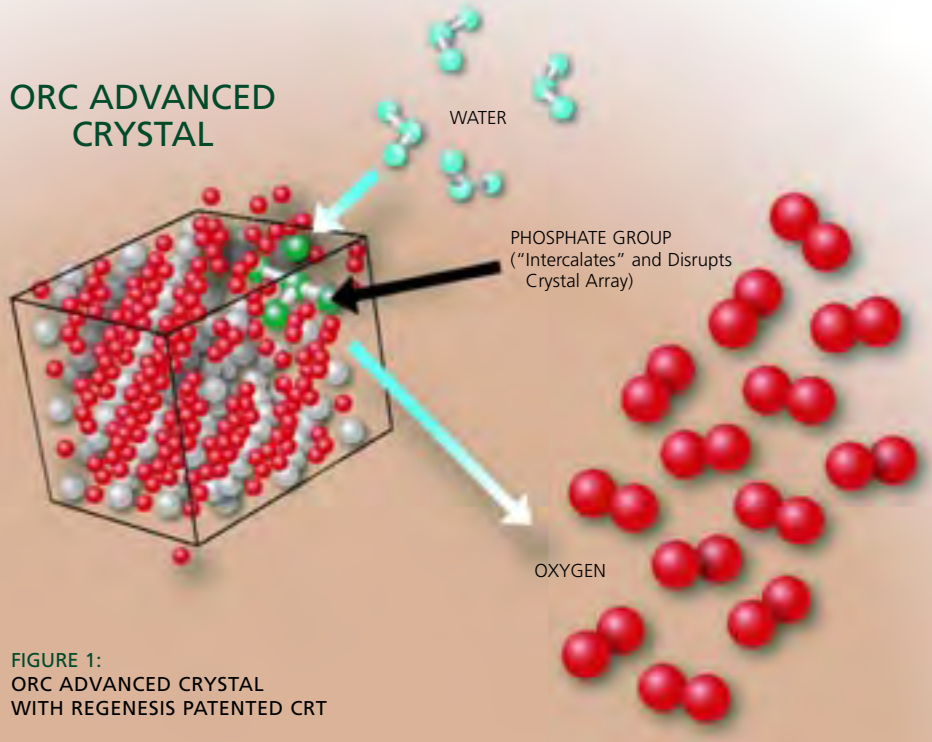

FIGURE 1:
ORC ADVANCED CRYSTAL
WITH REGENESIS PATENTED CRT

For more information or a free project evaluation contact Regenesis at (949) 366-8000 or visit our website at www.regenesis.com

REGENESIS
Leaders in Accelerated Natural Attenuation

Oxygen Release Compound – Advanced (ORC *Advanced*™)
MATERIAL SAFETY DATA SHEET (MSDS)

Last Revised: March 13, 2007

Section 1 - Material Identification

Supplier:

REGENESIS

1011 Calle Sombra
San Clemente, CA 92673

Phone:	**949.366.8000**
Fax:	**949.366.8090**
E-mail:	**info@regenesis.com**

Chemical Description:	A mixture of Calcium OxyHydroxide [$CaO(OH)_2$] and Calcium Hydroxide [$Ca(OH)_2$].
Chemical Family:	Inorganic Chemical
Trade Name:	Advanced Formula Oxygen Release Compound (ORC *Advanced*™)
Chemical Synonyms	Calcium Hydroxide Oxide; Calcium Oxide Peroxide
Product Use:	Used to remediate contaminated soil and groundwater (environmental applications)

Section 2 – Composition

CAS No.	Chemical
682334-66-3	**Calcium Hydroxide Oxide [$CaO(OH)_2$]**
1305-62-0	**Calcium Hydroxide [$Ca(OH)_2$]**
7758-11-4	**Dipotassium Phosphate (HK_2O_4P)**
7778-77-0	**Monopotassium Phosphate (H_2KO_4P)**

Section 3 – Physical Data

Form:	Powder
Color:	White to Pale Yellow
Odor:	Odorless
Melting Point:	527 °F (275 °C) – Decomposes
Boiling Point:	Not Applicable (NA)
Flammability/Flash Point:	NA
Auto- Flammability:	NA
Vapor Pressure:	NA
Self-Ignition Temperature:	NA
Thermal Decomposition:	527 °F (275 °C) – Decomposes
Bulk Density:	0.5 – 0.65 g/ml (Loose Method)
Solubility:	1.65 g/L @ 68° F (20° C) for calcium hydroxide.
Viscosity:	NA
pH:	11-13 (saturated solution)
Explosion Limits % by Volume:	Non-explosive
Hazardous Decomposition Products:	Oxygen, Hydrogen Peroxide, Steam, and Heat
Hazardous Reactions:	None

Section 4 – Reactivity Data

Stability:	Stable under certain conditions (see below).
Conditions to Avoid:	Heat and moisture.
Incompatibility:	Acids, bases, salts of heavy metals, reducing agents, and flammable substances.
Hazardous Polymerization:	Does not occur.

Section 5 – Regulations

TSCA Inventory List:	Listed

CERCLA Hazardous Substance (40 CFR Part 302)

Listed Substance:	No
Unlisted Substance:	Yes
Reportable Quantity (RQ):	100 pounds
Characteristic(s):	Ignitibility
RCRA Waste Number:	D001

SARA, Title III, Sections 302/303 (40 CFR Part 355 – Emergency Planning and Notification)

Extremely Hazardous Substance:	No

SARA, Title III, Sections 311/312 (40 CFR Part 370 – Hazardous Chemical Reporting: Community Right-To-Know

Hazard Category:	Immediate Health Hazard Fire Hazard
Threshold Planning Quantity:	10,000 pounds

Section 5 – Regulations (cont)

SARA, Title III, Section 313 (40 CFR Part 372 – Toxic Chemical Release Reporting: Community Right-To-Know

Extremely Hazardous Substance:	No	
WHMIS Classification:	C	Oxidizing Material Poisonous and Infectious Material
	D	Material Causing Other Toxic Effects – Eye and Skin Irritant
Canadian Domestic Substance List:	Not Listed	

Section 6 – Protective Measures, Storage and Handling

Technical Protective Measures

Storage:	Keep in tightly closed container. Store in dry area, protected from heat sources and direct sunlight.
Handling:	Clean and dry processing pipes and equipment before operation. Never return unused product to the storage container. Keep away from incompatible products. Containers and equipment used to handle this product should be used exclusively for this material. Avoid contact with water or humidity.

Section 6 – Protective Measures, Storage and Handling (cont)

Personal Protective Equipment (PPE)

Engineering Controls:	Calcium Hydroxide ACGIH® TLV® (2000) 5 mg/m^3 TWA OSHA PEL Total dust–15 mg/m^3 TWA Respirable fraction– 5 mg/m^3 TWA NIOSH REL (1994) 5 mg/m^3
Respiratory Protection:	For many conditions, no respiratory protection may be needed; however, in dusty or unknown atmospheres use a NIOSH approved dust respirator.
Hand Protection:	Impervious protective gloves made of nitrile, natural rubbber or neoprene.
Eye Protection:	Use chemical safety goggles (dust proof).
Skin Protection:	For brief contact, few precautions other than clean clothing are needed. Full body clothing impervious to this material should be used during prolonged exposure.
Other:	Safety shower and eyewash stations should be present. Consultation with an industrial hygienist or safety manager for the selection of PPE suitable for working conditions is suggested.
Industrial Hygiene:	Avoid contact with skin and eyes.
Protection Against Fire & Explosion:	NA

Section 7 – Hazards Identification

Emergency Overview:	Oxidizer – Contact with combustibles may cause a fire. This material decomposes and releases oxygen in a fire. The additional oxygen may intensify the fire.
Potential Health Effects:	Irritating to the mucous membrane and eyes. If the product splashes in ones face and eyes, treat the eyes first. Do not dry soiled clothing close to an open flame or heat source. Any

	clothing that has been contaminated with this product should be submerged in water prior to drying.
Inhalation:	High concentrations may cause slight nose and throat irritation with a cough. There is risk of sore throat and nose bleeds if one is exposed to this material for an extended period of time.
Eye Contact:	Severe eye irritation with watering and redness. There is also the risk of serious and/or permanent eye lesions.
Skin Contact:	Irritation may occur if one is exposed to this material for extended periods.
Ingestion:	Irritation of the mouth and throat with nausea and vomiting.

Section 8 – Measures in Case of Accidents and Fire

After Spillage/Leakage/Gas Leakage:	Collect in suitable containers. Wash remainder with copious quantities of water.
Extinguishing Media:	See next.
Suitable:	Large quantities of water or water spray. In case of fire in close proximity, all means of extinguishing are acceptable.
Further Information:	Self contained breathing apparatus or approved gas mask should be worn due to small particle size. Use extinguishing media appropriate for surrounding fire. Apply cooling water to sides of transport or storage vessels that are exposed to flames until the fire is extinguished. Do not approach hot vessels that contain this product.
First Aid:	After contact with skin, wash immediately with plenty of water and soap. In case of contact with eyes, rinse immediately with plenty of water and seek medical attention. Consult an opthalmologist in all cases.

Section 8 – Measures in Case of Accidents and Fire

Eye Contact:	Flush eyes with running water for 15 minutes, while keeping the eyelids wide open. Consult with an ophthalmologist in all cases.
Inhalation:	Remove subject from dusty environment. Consult with a physician in case of respiratory symptoms.

Ingestion:	If the victim is conscious, rinse mouth and admnister fresh water. DO NOT induce vomiting. Consult a physician in all cases.
Skin Contact:	Wash affected skin with running water. Remove and clean clothing. Consult with a physician in case of persistent pain or redness.
Special Precautions:	Evacuate all non-essential personnel. Intervention should only be done by capable personnel that are trained and aware of the hazards associated with this product. When it is safe, unaffected product should be moved to safe area.
Specific Hazards:	Oxidizing substance. Oxygen released on exothermic decomposition may support combustion. Confined spaces and/or containers may be subject to increased pressure. If product comes into contact with flammables, fire or explosion may occur.

Section 9 – Accidental Release Measures

Precautions:	Observe the protection methods cited in Section 3. Avoid materials and products that are incompatible with product. Immediately notify the appropriate authorities in case of reportable discharge (> 100 lbs).
Cleanup Methods:	Collect the product with a suitable means of avoiding dust formation. All receiving equipment should be clean, vented, dry, labeled and made of material that this product is compatible with. Because of the contamination risk, the collected material should be kept in a safe isolated place. Use large quantities of water to clean the impacted area. See Section 12 for disposal methods.

Section 10 – Information on Toxicology

Toxicity Data

Acute Toxicity:	Oral Route, LD_{50}, rat, > 2,000 mg/kg (powder 50%) Dermal Route, LD_{50}, rat, > 2,000 mg/kg (powder 50%) Inhalation, LD_{50}, rat, > 5,000 mg/m^3 (powder 35%)
Irritation:	Rabbit (eyes), severe irritant

Sensitization:	No data
Chronic Toxicity:	In vitro, no mutagenic effect (Powder 50%)
Target Organ Effects:	Eyes and respiratory passages.

Section 11 – Information on Ecology

Ecology Data	
	10 mg $Ca(OH)_2$/L: pH = 9.0
	100 mg $Ca(OH)_2$/L: pH = 10.6
Acute Exotoxicity:	Fishes, Cyprinus carpio, LC_{50}, 48 hrs, 160 mg/L
	Crustaceans, Daphnia sp., EC_{50}, 24 hours, 25.6 mg/L
	(Powder 16%)
Mobility:	Low Solubility and Mobility
	Water – Slow Hydrolysis.
	Degradation Products: Calcium Hydroxide
Abiotic Degradation:	Water/soil – complexation/precipitation. Carbonates/sulfates present at environmental concentrations.
	Degradation products: carbonates/sulfates sparingly soluble
Biotic Degradation:	NA (inorganic compound)
Potential for Bioaccumulation:	NA (ionizable inorganic compound)

Section 11 – Information on Ecology (cont)

Comments:

Observed effects are related to alkaline properties of the product. Hazard for the environment is limited due to the product properties of:

- No bioaccumulation
- Weak solubility and precipatation as carbonate or sulfate in an aquatic environment.

Diluted product is rapidly neutralized at environmental pH.

Further Information: NA

Section 12 – Disposal Considerations

Waste Disposal Method:	Consult current federal, state and local regulations regarding the proper disposal of this material and its emptied containers.

Section 13 – Shipping/Transport Information

D.O.T Shipping Name:	Oxidizing Solid, N.O.S [A mixture of Calcium OxyHydroxide [$CaO(OH)_2$] and Calcium Hydroxide [$Ca(OH)_2$].
UN Number:	1479
Hazard Class:	5.1
Label(s):	5.1 (Oxidizer)
Packaging Group:	II
STCC Number:	4918717

Section 14 – Other Information

HMIS® Rating	Health – 2 Flammability – 0	Reactivity – 1 PPE - Required

HMIS® is a registered trademark of the National Painting and Coating Association.

NFPA® Rating	Health – 2 Flammability – 0	Reactivity – 1 OX

NFPA® is a registered trademark of the National Fire Protection Association.

Reason for Issue: Update toxicological and ecological data

Section 15 – Further Information

The information contained in this document is the best available to the supplier at the time of writing, but is provided without warranty of any kind. Some possible hazards have been determined by analogy to similar classes of material. The items in this document are subject to change and clarification as more information become available.

Regen OX – Part A (Oxidizer Complex)

Material Safety Data Sheet (MSDS)

Last Revised: November 7, 2005

Section 1 – Supplier Information and Material Identification

Supplier:

1011 Calle Sombra
San Clemente, CA 92673
Telephone: 949.366.8000
Fax: 949.366.8090
E-mail: info@regenesis.com

Chemical Description:	A mixture of sodium percarbonate [$2Na_2CO_3 \cdot 3H_2O_2$], sodium carbonate [Na_2CO_3], sodium silicate and silica gel.
Chemical Family:	Inorganic Chemicals
Trade Name:	Regen Ox – Part A (Oxidizer Complex)
Product Use:	Used to remediate contaminated soil and groundwater (environmental applications)

Section 2 – Chemical Information/Other Designations

CAS No.	Chemical
15630-89-4	Sodium Percarbonate
5968-11-6	Sodium Carbonate Monohydrate
1344-09-8	Silicic Acid, Sodium Salt, Sodium Silicate
63231-67-4	Silica Gel

Section 3 – Physical Data

Form:	Powder
Color:	White
Odor:	Odorless
Melting Point:	NA
Boiling Point:	NA

Section 3 – Physical Data (cont)

Flammability/Flash Point:	NA
Vapor Pressure:	NA
Bulk Density:	0.9 – 1.2 g/cm^3
Solubility:	Min 14.5g/100g water @ 20 ºC
Viscosity:	NA
pH (3% solution):	˜ 10.5
Decomposition Temperature:	Self-accelerating decomposition with oxygen release starts at 50 ºC.

Section 4 – Reactivity Data

Stability:	Stable under normal conditions
Conditions to Avoid/Incompatibility:	Acids, bases, salts of heavy metals, reducing agents, and flammable substances
Hazardous Decomposition Products:	Oxygen. Contamination with many substances will cause decomposition. The rate of decomposition increases with increasing temperature and may be very vigorous with rapid generation of oxygen and steam.

Section 5 – Regulations

TSCA Inventory Listed:	Yes
CERCLA Hazardous Substance (40 CFR Part 302)	
Listed Substance:	*No*
Unlisted Substance:	*Yes*
SARA, Title III, Sections 313 (40 CFR Part 372) – Toxic Chemical Release Reporting: Community Right-To-Know	
Extremely Hazardous Substance:	No
WHMIS Classification:	C, D2B
Canadian Domestic Substance List:	Appears

Section 6 – Protective Measures, Storage and Handling

Technical Protective Measures

Storage:	Oxidizer. Store in a cool, well ventilated area away from all sources of ignition and out of the direct sunlight. Store in a dry location away from heat and in temperatures less than 40 ?C.
	Keep away from incompatible materials and keep lids tightly closed. Do not store in improperly labeled containers.
	Protect from moisture. Do not store near combustible materials. Keep containers well sealed.
	Store separately from reducing materials. Avoid contamination which may lead to decomposition.
Handling:	Avoid contact with eyes, skin and clothing. Use with adequate ventilation.
	Do not swallow. Avoid breathing vapors, mists or dust. Do not eat, drink or smoke in the work area.
	Label containers and keep them tightly closed when not in use.
	Wash hands thoroughly after handling.

Personal Protective Equipment (PPE)

Engineering Controls:	General room ventilation is required if used indoors. Local exhaust ventilation, process enclosures or other engineering controls may be needed to maintain airborne levels below recommended exposure limits. Avoid creating dust or mists. Maintain adequate ventilation at all times. Do not use in confined areas. Keep levels below recommended exposure limits. To determine actual exposure limits, monitoring should be performed on a routine basis.
Respiratory Protection:	For many conditions, no respiratory protection is necessary; however, in dusty or unknown conditions or when exposures exceed limit values a NIOSH approved respirator should be used.
Hand Protection:	Wear chemical resistant gloves (neoprene, rubber, or PVC).

Section 6 – Protective Measures, Storage and Handling (cont)

Eye Protection:	Wear chemical safety goggles. A full face shield may be worn in lieu of safety goggles.
Skin Protection:	Try to avoid skin contact with this product. Chemical resistant gloves (neoprene, PVC or rubber) and protective clothing should be worn during use.
Other:	Eye wash station.
Protection Against Fire & Explosion:	Product is non-explosive. In case of fire, evacuate all non-essential personnel, wear protective clothing and a self-contained breathing apparatus, stay upwind of fire, and use water to spray cool fire-exposed containers.

Section 7 – Hazards Identification

Potential Health Effects

Inhalation:	Causes irritation to the respiratory tract. Symptoms may include coughing, shortness of breath, and irritations to mucous membranes, nose and throat.
Eye Contact:	Causes irritation, redness and pain.
Skin Contact:	Causes slight irritation.
Ingestion:	May be harmful if swallowed (vomiting and diarrhea).

Section 8 – Measures in Case of Accidents and Fire

After Spillage/Leakage:	Eliminate all ignition sources. Evacuate unprotected personnel and never exceed any occupational exposure limit. Shovel or sweep spilt material into plastic bags or vented containers for disposal. Do not return spilled or contaminated material to the inventory.
Extinguishing Media:	Water

First Aid

Eye Contact:	Flush eyes with running water for at least 15 minutes with eyelids held open. Seek a specialist.
Inhalation:	Remove affected person to fresh air. Seek medical attention if the effects persist.
Ingestion:	If the individual is conscious and not convulsing, give two-four cups of water to dilute the chemical and seek medical attention immediately. **Do Not** induce vomiting.

Section 8 – Measures in Case of Accidents and Fire (cont)

Skin Contact:	Wash affected areas with soap and a mild detergent and large amounts of water.

Section 9 – Accidental Release Measures

Precautions:	
Cleanup Methods:	Shovel or sweep spilt material into plastic bags or vented containers for disposal. Do not return spilled or contaminated material to the inventory.

Section 10 – Information on Toxicology

Toxicity Data	
LD50 Oral (rat):	2,400 mg/kg
LD50 Dermal (rabbit):	Min 2,000 mg/kg
LD50 Inhalation (rat):	Min 4,580 mg/kg

Section 11 – Information on Ecology

Ecology Data	
Ecotoxicological Information:	NA

Section 12 – Disposal Considerations

Waste Disposal Method	
Waste Treatment:	Dispose of in an approved waste facility operated by an authorized contactor in compliance with local regulations.
Package (Pail) Treatment:	The empty and clean containers are to be recycled or disposed of in conformity with local regulations.

Section 13 – Shipping/Transport Information

D.O.T. Shipping Name:	Oxidizing Solid, N.O.S. [A mixture of sodium percarbonate [$2Na_2CO_3 \cdot 3H2O_2$], sodium carbonate [Na_2CO_3], sodium silicate and silica gel.]
UN Number:	1479
Hazard Class:	5.1
Labels:	5.1 (Oxidizer)
Packaging Group:	III

Section 14 – Other Information

HMIS® Rating	Health – 1 (slight)	Reactivity – 1 (slight)
	Flammability – 0 (none)	Lab PPE – goggles, gloves, and lab coat

HMIS® is a registered trademark of the National Painting and Coating Association.

Section 15 – Further Information

The information contained in this document is the best available to the supplier at the time of writing, but is provided without warranty of any kind. Some possible hazards have been determined by analogy to similar classes of material. The items in this document are subject to change and clarification as more information become available. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person. Individuals receiving this information must exercise their independent judgment in determining its appropriateness for a particular purpose.

Regen OX – Part B (Activator Complex)

Material Safety Data Sheet (MSDS)

Last Revised: November 7, 2005

Section 1 – Supplier Information and Material Identification

Supplier:

REGENESIS
1011 Calle Sombra
San Clemente, CA 92673
Telephone: 949.366.8000
Fax: 949.366.8090
E-mail: info@regenesis.com

Chemical Description:	A mixture of sodium silicate solution, silica gel and ferrous sulfate
Chemical Family:	Inorganic Chemicals
Trade Name:	Regen Ox – Part B (Activator Complex)
Product Use:	Used for environmental remediation of contaminated soils and groundwater

Section 2 – Chemical Information/Other Designations

CAS No.	Chemical
1344-09-8	Silicic Acid, Sodium Salt, Sodium Silicate
63231-67-4	Silica Gel
7720-78-7	Ferrous Sulfate
7732-18-5	Water

Section 3 – Physical Data

Form:	Liquid
Color:	Blue/Green
Odor:	Odorless
Melting Point:	NA
Boiling Point:	NA
Flammability/Flash Point:	NA
Vapor Pressure:	NA

Section 3 – Physical Data (cont)	
Specific Gravity	1.39 g/cm^3
Solubility:	Miscible
Viscosity:	NA
pH (3% solution):	11
Hazardous Decomposition Products:	Oxides of carbon and silicon may be formed when heated to decomposition.

Section 4 – Reactivity Data	
Stability:	Stable under normal conditions.
Conditions to Avoid:	None.
Incompatibility:	Avoid hydrogen fluoride, fluorine, oxygen difluoride, chlorine trifluoride, strong acids, strong bases, oxidizers, aluminum, fiberglass, copper, brass, zinc, and galvanized containers.

Section 5 – Regulations	
TSCA Inventory Listed:	Yes
CERCLA Hazardous Substance (40 CFR Part 302)	
Listed Substance:	*No*
Unlisted Substance:	*Yes*
SARA, Title III, Sections 302/303 (40 CFR Part 355) – Emergency Planning and Notification	
Extremely Hazardous Substance:	No
SARA, Title III, Sections 311/312 (40 CFR Part 370) – Hazardous Chemical Reporting: Community Right-To-Know	
Hazard Category:	Acute
SARA, Title III, Sections 313 (40 CFR Part 372) – Toxic Chemical Release Reporting: Community Right-To-Know	
Extremely Hazardous Substance:	No

Section 6 – Protective Measures, Storage and Handling

Technical Protective Measures

Storage:	Keep in a tightly closed container (steel or plastic) and store in a cool, well ventilated area away from all incompatible materials (acids, reactive metals, and ammonium salts). Store in a dry location away from heat and in temperatures less than 24 ?C. Do not store in aluminum, fiberglass, copper, brass, zinc or galvanized containers.
Handling:	Avoid contact with eyes, skin and clothing. Avoid breathing spray mist. Use with adequate ventilation. Do not use product if it is brownish-yellow in color.

Personal Protective Equipment (PPE)

Engineering Controls:	General room ventilation is required if used indoors. Local exhaust ventilation, process enclosures or other engineering controls may be needed to maintain airborne levels below recommended exposure limits. Safety shower and eyewash station should be within direct access.
Respiratory Protection:	Use NIOSH-approved dust and mist respirator where spray mist exists. Respirators should be used in accordance with 29 CFR 1910.134.
Hand Protection:	Wear chemical resistant gloves.
Eye Protection:	Wear chemical safety goggles. A full face shield may be worn in lieu of safety goggles.
Skin Protection:	Try to avoid skin contact with this product. Gloves and protective clothing should be worn during use.
Other:	
Protection Against Fire & Explosion:	Product is non-explosive and non-combustible.

Section 7 – Hazards Identification

Potential Health Effects	
Inhalation:	Causes irritation to the respiratory tract. Symptoms may include coughing, shortness of breath, and irritations to mucous membranes, nose and throat.
Eye Contact:	Causes irritation, redness and pain.
Skin Contact:	Causes irritation. Symptoms include redness, itching and pain.
Ingestion:	May cause irritation to mouth, esophagus, and stomach.

Section 8 – Measures in Case of Accidents and Fire

After Spillage/Leakage (small):	Mop up and neutralize liquid, then discharge to sewer in accordance with local, state and federal regulations.
After Spillage/Leakage (large):	Keep unnecessary personnel away; isolate hazard area and do not allow entrance into the affected area. Do not touch or walk through spilled material. Stop leak if possible without risking injury. Prevent runoff from entering into storm sewers and ditches that lead to natural waterways. Isolate the material if at all possible. Sand or earth may be used to contain the spill. If containment is not possible, neutralize the contaminated area and flush with large quantities of water.
Extinguishing Media:	Material is compatible with all extinguishing media.
Further Information:	
First Aid	
Eye Contact:	Flush eyes with running water for at least 15 minutes with eyelids held open. Seek a specialist.
Inhalation:	Remove affected person to fresh air. Give artificial respiration if individual is not breathing. If breathing is difficult, give oxygen. Seek medical attention if the effects persist.
Ingestion:	If the individual is conscious and not convulsing, give two-four cups of water to dilute the chemical and seek medical attention immediately. **DO NOT** induce vomiting.
Skin Contact:	Wash affected areas with soap and a mild detergent and large amounts of water. Remove contaminated clothing and shoes.

Section 9 – Accidental Release Measures

Precautions:

PPE:	Wear chemical goggles, body-covering protective clothing, chemical resistant gloves, and rubber boots (see Section 6).
Environmental Hazards:	Sinks and mixes with water. High pH of this material may be harmful to aquatic life. Only water will evaporate from a spill of this material.
Cleanup Methods:	Pick-up and place in an appropriate container for reclamation or disposal. US regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities.

Section 10 – Information on Toxicology

Toxicity Data

Sodium Silicate:	When tested for primary eye irritation potential according to OECD Guidelines, Section 405, a similar sodium silicate solution produced corneal, iridal and conjunctival irritation. Some eye irritation was still present 14 days after treatment, although the average primary irritation score has declined from 29.7 after 1 day to 4.0 after 14 days. When tested for primary skin irritation potential, a similar sodium silicate solution produced irritation with a primary irritation index of 3 to abraded skin and 0 to intact skin. Human experience confirms that irritation occurs when sodium silicates get on clothes at the collar, cuffs, or other areas where abrasion may exist. The acute oral toxicity of this product has not been tested.
Ferrous Sulfate:	LD50 Oral (rat): 319 mg/kg not a suspected carcinogen.

Section 11 – Information on Ecology

Ecology Data

Ecotoxicological Information:	Based on 100% solid sodium silicate, a 96 hour median tolerance for fish of 2,320 mg/l; a 96 hour median tolerance for water fleas of 247 mg/L; a 96 hour median tolerance for snail eggs of 632 mg/L; and a 96 hour median tolerance for Amphipoda of 160 mg/L.

Section 12 – Disposal Considerations

Waste Disposal Method

Waste Treatment:	Neutralize and landfill solids in an approved waste facility operated by an authorized contactor in compliance with local regulations.
Package (Pail) Treatment:	The empty and clean containers are to be recycled or disposed of in conformity with local regulations.

Section 13 – Shipping/Transport Information

D.O.T.	This product is not regulated as a hazardous material so there are no restrictions.

Section 14 – Other Information

HMIS® Rating	Health – 2 (moderate)	Reactivity – 0 (none)
	Flammability – 0 (none)	Lab PPE – goggles, gloves, and lab coat
	Contact – 1 (slight)	

HMIS® is a registered trademark of the National Painting and Coating Association.

Section 15 – Further Information

The information contained in this document is the best available to the supplier at the time of writing, but is provided without warranty of any kind. Some possible hazards have been determined by analogy to similar classes of material. The items in this document are subject to change and clarification as more information become available. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person. Individuals receiving this information must exercise their independent judgment in determining its appropriateness for a particular purpose.

REGENESIS

April 13, 2007

RegenOx and ORC *Advanced* Simultaneous Application

RegenOx™ is a two part chemical oxidant capable of treating a broad range of soil and groundwater contaminants. RegenOx was designed as an easily handled and applied high-contaminant-concentration mass reduction technology. RegenOx is an aggressive fast acting oxidative technology that can be coupled with a less aggressive slow release technology like Oxygen Release Compound Advanced (ORC *Advanced*) without negative effects on either products contaminant destructive ability or the aquifer/soil geochemistry.

ORC *Advanced*™ is a state-of-the-art innovative product designed to stimulate aerobic bioremediation through controlled release of oxygen within the subsurface. It offers unparalleled, maximum oxygen release for periods up to 12 months on a single injection and is specifically designed to minimize oxygen waste while maximizing contaminant remediation.

Preliminary Aquifer Volume Testing

Prior to application of the RegenOx + ORC *Advanced* material, it is critical that a clear water injection be performed at the site. The injection a non-reactive (clear water) material at a volume that is approximately 25% greater than the anticipated application volume of RegenOx will provide good evidence of the aquifers capacity to accept the designed volume of RegenOx + ORC-*Advanced*.

RegenOx Solution Mixing Calculation

RegenOx s a two part product, the RegenOx Part A is an oxidant and the Part B is an activator. Depending on the relative aquifer capacity (effective pore volume) of the target zone soil matrix a RegenOx solution should be applied as a solution ranging from 3-5% by weight. The volume of water required to make a 3-5% RegenOx solution can be calculated using the formula provided below (a detailed discussion on RegenOx Mixing Instructions is attached).

Volume of water (gallons/vertical foot of injection):

$$\frac{\text{RegenOx Oxidizer lbs/foot}}{(8.34\,\text{lbs/gal water})(\%\,\text{R}egenOx\_Oxidizer\ \text{solids})}\left[1-(\%\,\text{R}egenOx\_Oxidizer\ \text{solids})\right]$$

Quick Reference Solution Estimates

- Approximate 3% oxidant solution: 10 lbs of Part A oxidant mixed with 39 gallons of water.
- Approximate 4% oxidant solution: 10 lbs of Part A oxidant mixed with 29 gallons of water.
- Approximate 5% oxidant solution: 10 lbs of Part A oxidant mixed with 23 gallons of water.

1011 CALLE SOMBRA ~ SAN CLEMENTE, CA 92673 ~ TELEPHONE: 949-366-8000 ~ FAX: 949-366-8090

tech@regenesis.com ~ www.regenesis.com

ORC *Advanced* Solutions Mixing Calculation

In a traditional ORC *Advanced* only application a slurry can be mixed at a solids solution ranging from 15-35% by weight with water. This slurry is well documented in the literature. For a detailed discussion of these techniques please see the ORC/ORC *Advanced* mixing instructions available on the Regenesis website (www.regenesis.com).

For application of ORC-Advanced + RegenOx the RegenOx material solution should be the basis for delivery volume calculations. That is, design the application solution based on RegenOx (at 3-5%) and then add the desired weight of ORC-A.

RegenOx + ORC-A Solution Mixing & Application

A solution ranging from 3-5% RegenOx solution can be easily mixed directly together with the recommended quantity of ORC *Advanced* and injected simultaneously as described below:

1. Prepare the site specific designed RegenOx Part A solution (3-5% solution).

2. Open the 5-gallon bucket and remove the pre-measured bag of ORC *Advanced* (each bag contains 25 lbs of ORC *Advanced*).

2. Measure and pour the ORC Advanced powder into the previously prepared RegenOx solution.

3. Use an appropriate mixing device to thoroughly mix the ORC *Advanced* into the RegenOx solution. A hand-held drill with a "jiffy mixer" or a stucco mixer on it may be used in conjunction with a small paddle to scrape the bottom and sides of the container. Standard environmental slurry mixers may also be used, following the equipment instructions for operation.

4. Transfer the contents of the mixing tank to the pump hopper using a gravity drain or a sump pump.

5. For some types of pumps (e.g. piston pumps), it may be desirable to perform a volume check prior to injecting RegenOx/ORC *Advanced*. Determining the volume displaced per pump stroke can be accomplished in two easy steps.

    a) Determine the number of pump strokes needed to deliver 3 gallons of RegenOx/ORC *Advanced* (use a graduated bucket for this)

    b) Divide the resulting 3 gallons by the results from the first step to determine the number of gallons of RegenOx/ORC *Advanced* delivered by each pump stroke.

6. Connect the delivery hose to the pump outlet and the delivery sub-assembly. Circulate RegenOx/ORC *Advanced* through the hose and the delivery sub-assembly to displace air in the hose.

7. Connect the sub-assembly to the drive rod. After confirming that all of the connections are secure, pump the RegenOx/ORC *Advanced* through the delivery system to displace the water/fluid in the rods.

8. Slowly withdraw the drive rods. Commonly RegenOx/ORC *Advanced* injection progress at 1-foot intervals. However, continuous injection while slowly withdrawing single lengths of drive rod (3 or 4 feet) is an acceptable option. The pre-determined volume of RegenOx/ORC *Advanced* should be pumped into the aquifer across the desired treatment interval.

9. Remove one section of the drive rod. The drive rod may contain some residual RegenOx/ORC *Advanced* solution. Place the RegenOx/ORC *Advanced*-filled rod in a clean, empty bucket and allow the RegenOx/ORC *Advanced* to drain. Eventually, the RegenOx/ORC *Advanced* should be returned to the pump hopper for reuse.

10. Observe any indications of aquifer refusal. This is typically indicated by a high-pitched squeal in the pump's hydraulic system or (in the case of shallow applications) RegenOx/ORC *Advanced* "surfacing" around the injection rods or previously installed injection points. At times backpressure caused by gassing will impede pump movement. This can be corrected by bleeding the pressure off using a pressure relief/bypass valve (placed inline between the pump discharge and the delivery sub-assembly) and then resume pumping. If aquifer acceptance appears to be low, allow enough time for the aquifer to equilibrate prior to removing the drive rod.

11. Repeat steps 1 through 11 until treatment of the entire contaminated vertical zone has been achieved. It is recommended that the procedure extend to the top of the capillary fringe/smear zone, or to the top of the targeted treatment interval.

12. Install an appropriate seal, such as bentonite, above the RegenOx/ORC *Advanced* material through the entire vadose zone. Prior to emplacing the borehole seal, we recommend placing clean sand in the hole to the top of the RegenOx/ORC *Advanced* treatment zone (especially important in holes that stay open). Bentonite chips or granular bentonite should be placed immediately above the treatment zone, followed by a cement/bentonite grout to roughly 0.5 feet below ground surface. Quick-set concrete should then be used as a surface seal.

13. Remove and clean the drive rods as necessary.

14. Finish the borehole at the surface as appropriate (concrete or asphalt cap, if necessary). We recommend a quick set concrete to provide a good surface seal with minimal set up time.

15. A proper borehole and surface seal assures that the RegenOx/ORC *Advanced* remains properly placed and prevents contaminant migration from the surface. Each borehole should be sealed immediately following RegenOx/ORC *Advanced* application to minimize RegenOx/ORC *Advanced* surfacing during the injection process. If RegenOx/ORC *Advanced* continues to "surface" up the direct push borehole, an appropriately sized (oversized) disposable drive tip or wood plug/stake can be used to plug the hole until the aquifer equilibrates and the RegenOx/ORC *Advanced* stops surfacing. If wells are used for RegenOx/ORC *Advanced* injection the injection wells and all nearby groundwater monitoring wells should be tightly capped to reduce potential for surfacing through nearby wells.

16. Periodically compare the pre- and post-injection volumes of RegenOx/ORC *Advanced* in the pump hopper using pre-marked volume levels. Volume level indicators are not on all pump hoppers. In

this case, volume level markings can be temporarily added using known amounts of water and a carpenter's grease pencil (Kiel crayon). We suggest marking the water levels in 3-gallon increments.

17. Move to the next probe point, repeating steps 1 through 17. We recommend that the next RegenOx/ORC *Advanced* injection point be as far a distance as possible within the treatment zone from the previous RegenOx/ORC *Advanced* injection point. This will further minimize RegenOx/ORC *Advanced* surfacing and short circuiting up an adjacent borehole. When possible, due to the high volumes of liquid being injected, working from the outside of the injection area towards the center will limit expansion of the plume.

Pump Information

Regenesis has evaluated a number of pumps and many are capable of delivering RegenOx™ to the subsurface at a sufficient pressure and volumetric rate. However, even though a number of the evaluated pumps may be capable of delivering the RegenOx™ to the subsurface based on adequate pressures and delivery rates, each pump has its own set of practical issues that may make it more or less difficult to manage in a field setting.

In general, Regenesis strongly recommends using a pump with a pressure rating of 200 pounds per square inch (psi) in sandy soil settings, and 800 psi in silt, clay or weathered bedrock settings. Any pump under consideration should have a minimum delivery rate of 5 gallons per minute (gpm). A lower gpm rated pump may be used; however, they are not recommended due to the amount of time required to inject the volume of liquids typically associated with a RegenOx™ injection (i.e. 1,000 lbs of RegenOx™ [500 lbs Oxidant/500 lbs Activator] require roughly 1,100 gallons of water to make a 5% Oxidant solution).

Quite often diaphragm pumps are used for the delivery of chemical oxidants. Generally, these pumps operate pressures from 50-150 psi. Some of these pumps do not have the pressure head necessary to overcome the back pressure encountered in silt and clay lenses. In these cases the chemical oxidant thus ends up being delivered to the surrounding sands (the path of least resistance) and is not delivered to soil with residual adsorbed contamination. The use of a positive displacement pump such as a piston pump or a progressing cavity pump is may be superior because these pumps have the pressure necessary to overcome the resistance of low permeability soils. NOTE: be aware that application at pressures that are too high may over-consolidate the soil and minimize the direct contact of the oxidant. The key is to inject at a rate and pressure that maximizes the radius of influence without causing preferential flow. This can be achieved by injecting at the minimum pressure necessary to overcome the particular pressures associated with your site soil conditions.

Pump Cleaning

For best results, flush all moving parts and hoses with clean water at the end of the day, flush the injection system with a mixture of water and biodegradable cleaner such as Simple Green. Further cleaning and decontamination (if necessary due to subsurface conditions) should be performed according to the equipment supplier's standard procedures and local regulatory requirements.

Personal Protective Equipment

Personnel working with or in areas of potential contact with RegenOx/ORC *Advanced* should be required at a minimum to be fitted with modified Level D personal protective equipment:

- Eye protection – Wear well sealed goggles or a face shield (face shield recommended for full face protection)
- Head – Hard hat when required
- Respiratory – Use dust respirator approved by NIOSH/MSA
- Hands – Wear neoprene gloves
- Feet – Wear steel toe shoes with chemical resistant soles or neoprene boots
- Clothing – Wear long sleeve shirts and long pant legs. Consider using a Tyvek® body suit, Carhartt® coverall or splash gear

Typical Installation Equipment

- Direct push rig
- Drive Rods (typically 1 ½-inch O.D.) & Injection Tooling with fluid deliver sub-assembly
- Injection Pump rated for 5 gpm @ 200 psi for sandy formations and 800 psi for silt and clay formations (Geoprobe DP-800, Yamada, Moyno, Rupe Models 9-1500 and 9-1600, Wilden, etc.)
- Injection hosing and a pressure relief valve with a bypass
- Clear hosing between mixing tank/drum and pump
- Pressure gauges
- Power drill paint stirrer (3-inch diameter or smaller propeller tip)
- Plastic bucket lid puller tool/opener tool
- 5-amp sump pump (such as Little Giant) and hose
- Three to four 55-gallon drums or similarly sized mixing tanks for RegenOx and ORC *Advanced* mixing
- Sand, bentonite chips, granular bentonite, cement, hydraulic cement, and quick-set concrete for closing and sealing temporary injection holes
- Wood plugs or similar for temporarily sealing injection holes prior to grout sealing
- Access to water
- Access to electricity

APPENDIX H

VAPOR BARRIER SPECIFICATIONS AND MANUFACTURER'S CERTIFICATION LETTER

Grace Construction Products

W. R. Grace & Co.
62 Whittemore Ave
Cambridge, MA 02140

T 617.498.4303
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E mark.a.franciosi@grace.com
W www.graceconstruction.com

Mark A. Franciosi
Technical Service Engineer
Building Envelope

June 7th, 2011

Axel Schwendt
Technical Director
AKRF, Inc.
440 Park Ave South, 7th Floor New York, NY 10016
646.388.9529

RE: 2477 Third Avenue – Bronx, NY

Mr. Schwendt,

I have reviewed the Soil Analytical Results in Tables 1a-1d and the Groundwater Analytical Results in Tables 3a-3c that you provided for the above referenced project. The identified contaminants at the levels reported will not have an adverse effect on the waterproofing or vapor barrier properties of Preprufe® 300R, provided standard design and application procedures are followed. Please see attached Technical Letter # 29 in regard to long term durability of Preprufe membranes.

Standard installation instructions and details can be found on our website at www.graceconstruction.com.

If you have any questions, please feel free to call me at the number above.

Sincerely,

Mark Franciosi

Mark Franciosi

Technical Service Engineer

Building Envelope

cc: K. Burke – WR Grace

GRACE

High Density Polyethylene Long-Term Durability

Technical Letter 29

High Density Polyethylene (HDPE) sheet is a major component of the Bituthene® and Preprufe® membranes. The functions of the HDPE are to 1) provide a portion of the waterproofing protection for the structure and 2) provide increased resistance of the waterproofing adhesive from environmental exposure and backfill.

HDPE was chosen for this purpose because it has excellent mechanical properties required for this application including high puncture, tear, and tensile strengths as well as good elongation for bridging any post-formed cracks in the structure. The other advantage of HDPE is that it is extremely resistant to attack and degradation from most chemicals. Consequently, it is typically a leading candidate for use in geomembranes including landfills containment systems, pond liners, and holding tanks for waste liquids.

Below grade waterproofing membranes, such as Preprufe, are often exposed to a variety of soil contaminants in addition to water. These could include alkaline and acidic environments, petroleum-based hydrocarbons, and chlorinated hydrocarbons. A number of studies have been conducted on various materials on the long-term durability of HDPE after exposure to contaminants. The general conclusion of various studies is that HDPE is one of the more inert materials used in geomembrane systems. A 1990 publication by the American Society of Testing and Materials [1] based on an extensive survey of case study testing concluded that the service life of base polymers, such as HDPE, in flexible membrane liners (FML) used in geotextiles should last hundreds of years without premature failure. However, the study also stated that inappropriate applications or installations, such as excessive exposure to UV, heat, and ozone, could lead to degradation and shorter life expectancy. In summary, the major component of Preprufe, HDPE, provides the necessary mechanical properties for waterproofing and excellent chemical resistance provided the HDPE is protected from excessive exposure to UV, heat, and ozone.

Reference:

1. Landreth, R. E., Service Life of Geosynthetics in Hazardous Waste Management Facilities, in Geosynthetics: Microstructure and Performance, ASTM ATP 1076, I. D. Peggs, editor, American Society for Testing and Materials, Philadelphia (1990) p. 26.

WP-029 Printed in U.S.A. 4/08 FA/pdf

PRODUCT INFORMATION

Preprufe® 300R & 160R

Pre-applied waterproofing membranes that bond integrally to poured concrete for use below slabs or behind basement walls on confined sites.

Advantages

- **Forms a unique continuous adhesive bond to concrete poured against it –** prevents water migration and makes it unaffected by ground settlement beneath slabs
- **Fully-adhered watertight laps** and detailing
- **Provides a barrier to water, moisture and gas –** physically isolates the structure from the surrounding ground
- **BBA Certified** for basement Grades 2, 3, & 4 to BS 8102:1990
- **Zero permeance** to moisture
- **Solar reflective –** reduced temperature gain
- **Simple and quick to install –** requiring no priming or fillets
- **Can be applied to permanent formwork –** allows maximum use of confined sites
- **Self protecting –** can be trafficked immediately after application and ready for immediate placing of reinforcement
- **Unaffected by wet conditions –** cannot activate prematurely
- **Inherently waterproof, non-reactive system:**
  - not reliant on confining pressures or hydration
  - unaffected by freeze/thaw, wet/dry cycling
- **Chemical resistant –** effective in most types of soils and waters, protects structure from salt or sulphate attack

Description

Preprufe® 300R & 160R membranes are unique composite sheets comprising a thick HDPE film, an aggressive pressure sensitive adhesive and a weather resistant protective coating.

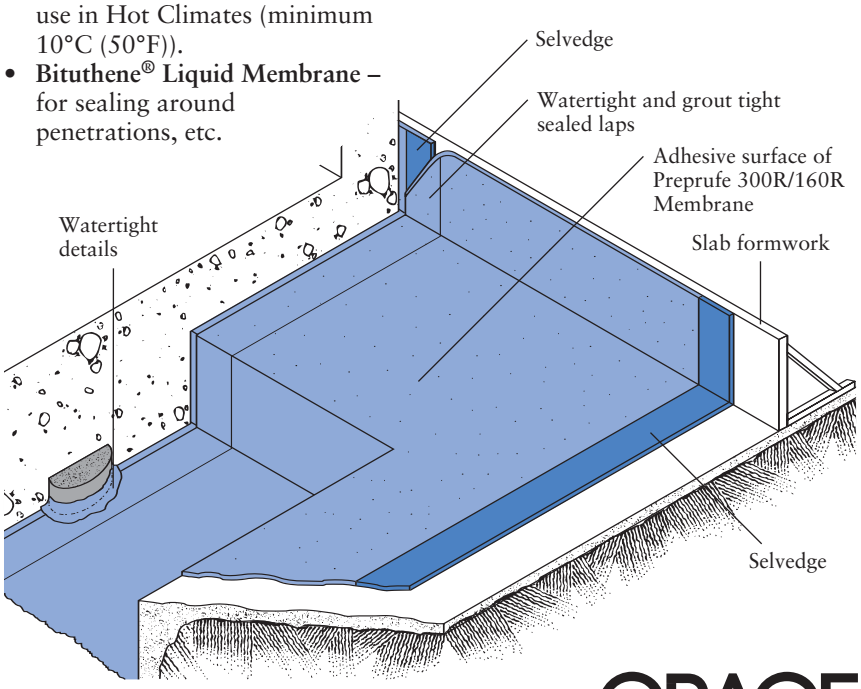
Unlike conventional non-adhering membranes, which are vulnerable to water ingress tracking between the unbonded membrane and structure, the unique Preprufe bond to concrete prevents ingress or migration of water around the structure.

The Preprufe R System includes:

- **Preprufe 300R –** heavy-duty grade for use below slabs and on rafts (i.e. mud slabs). Designed to accept the placing of heavy reinforcement using conventional concrete spacers.
- **Preprufe 160R –** thinner grade for blindside, zero property line applications against soil retention systems.
- **Preprufe Tape LT –** for covering cut edges, roll ends, penetrations and detailing (temperatures between -4°C (25°F) and +30°C (86°F)).
- **Preprufe Tape HC –** as above for use in Hot Climates (minimum 10°C (50°F)).
- **Bituthene® Liquid Membrane –** for sealing around penetrations, etc.

Preprufe 300R & 160R membranes are applied either horizontally to smooth prepared concrete, carton forms or well rolled and compacted sand or crushed stone substrate; or vertically to permanent formwork or adjoining structures. Concrete is then cast directly against the adhesive side of the membranes. The specially developed Preprufe adhesive layers work together to form a continuous and integral seal to the structure.

Preprufe can be returned up the inside face of slab formwork but is not recommended for conventional twin-sided formwork on walls, etc. Use Bituthene self-adhesive membrane or Procor® fluid applied membrane to walls after removal of formwork for a fully bonded system to all structural surfaces.



BBA BRITISH BOARD OF AGREMENT CERTIFICATE No. 97/3325

GRACE Construction Products

Installation

The most current application instructions, detail drawings and technical letters can be viewed at www.graceconstruction.com. Technical letters are provided for the following subjects to assist in the installation of Preprufe:

- Chemical Resistance
- Minimizing Concrete Shrinkage and Curling
- Rebar Chairs on Preprufe 300R Membrane
- Removal of Formwork Placed Against Preprufe Membranes
- Winter Lap Sealing and the use of Preprufe Tape LT

For other technical information contact your local Grace representative.

Preprufe 300R & 160R membranes are supplied in rolls 1.2 m (4 ft) wide, with a selvedge on one side to provide self-adhered laps for continuity between rolls. The rolls of Preprufe Membrane and Preprufe Tape are interwound with a disposable plastic release liner which must be removed before placing reinforcement and concrete.

Substrate Preparation

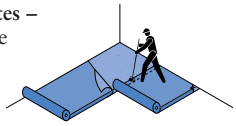
All surfaces – It is essential to create a sound and solid substrate to eliminate movement during the concrete pour. Substrates must be regular and smooth with no gaps or voids greater than 12 mm (0.5 in.). Grout around all penetrations such as utility conduits, etc. for stability.

Horizontal – The substrate must be free of loose aggregate and sharp protrusions. Avoid curved or rounded substrates. The surface does not need to be dry, but standing water must be removed.

Vertical – Use concrete, plywood, insulation or other approved facing to sheet piling to provide support to the membrane. Board systems such as timber lagging must be close butted to provide support and not more than 12 mm (0.5 in.) out of alignment.

Membrane Installation

Preprufe can be applied at temperatures of -4°C (25°F) or above. When installing Preprufe in cold or marginal weather conditions <13°C (55°F) the use of Preprufe Tape LT is recommended at all laps and detailing. Preprufe Tape LT should be applied to clean, dry surfaces and the release liner must be removed immediately after application.

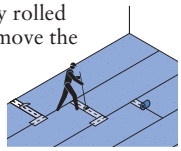


Horizontal substrates – Place the membrane HDPE film side to the substrate with the clear plastic release liner facing towards the concrete pour. End laps should be staggered to avoid a build up of layers. Leave plastic release liner in position until overlap procedure is completed.

Accurately position succeeding sheets to overlap the previous sheet 75 mm (3 in.) along the marked selvedge. Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap. Peel back the plastic release liner from between the overlaps as the two layers are bonded together. Ensure a continuous bond is achieved without creases and roll firmly with a heavy roller. Completely remove the plastic liner to expose the protective coating. Any initial tack will quickly disappear.

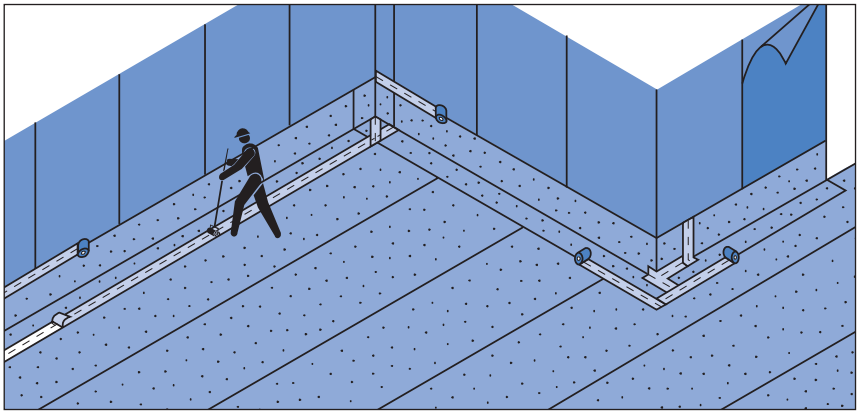
Refer to Grace Tech Letters for information on suitable rebar chairs for Preprufe.

Vertical substrates – Mechanically fasten the membrane vertically using fasteners appropriate to the substrate with the the clear plastic release liner facing towards the concrete pour. The membrane may be installed in any convenient length. Secure the top of the membrane using a batten such as a termination bar or similar 50 mm (2 in.) below the top edge. Fastening can be made through the selvedge so that the membrane lays flat and allows firmly rolled overlaps. Immediately remove the plastic release liner. Any additional fasteners must be covered with a patch of Preprufe Tape.



Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap. Roll firmly to ensure a watertight seal.

Roll ends and cut edges – Overlap all roll ends and cut edges by a minimum 75 mm (3 in.) and ensure the area is clean and free from contamination, wiping with a damp cloth if necessary. Allow to dry and apply Preprufe Tape LT (or HC in hot climates) centered over the lap and roll firmly. Immediately remove printed plastic release liner from the tape.



Details

Refer to Preprufe Field Application Manual, Section V Application Instructions or visit www.graceconstruction.com. This Manual gives comprehensive guidance and standard details for:

- internal and external corners
- penetrations
- tiebacks
- columns
- grade beam pilecaps
- tie-ins
- terminations

Membrane Repair

Inspect the membrane before installation of reinforcement steel, formwork and final placement of concrete. The membrane can be easily cleaned by jet washing if required. Repair damage by wiping the area with a damp cloth to ensure the area is clean and free from dust, and allow to dry. Repair small punctures (12 mm (0.5 in.) or less) and slices by applying Preprufe Tape centered over the damaged area and roll firmly. Remove the release liner from the tape. Repair holes and large punctures by applying a patch of Preprufe membrane, which extends 150 mm (6 in.) beyond the damaged area. Seal all edges of the patch with Preprufe Tape, remove the release liner from the tape and roll firmly. Any areas of damaged adhesive should be covered with Preprufe Tape. Remove printed plastic release liner from tape. Where exposed selvedge has lost adhesion or laps have not been sealed, ensure the area is clean and dry and cover with fresh Preprufe Tape, rolling firmly. Alternatively, use a hot air gun or similar to activate adhesive and firmly roll lap to achieve continuity.

Pouring of Concrete

Ensure the plastic release liner is removed from all areas of Preprufe R Membrane and Tape.

It is recommended that concrete be poured within 56 days (42 days in hot climates) of application of the membrane. Concrete must be placed and compacted carefully to avoid damage to the membrane. Never use a sharp object to consolidate the concrete.

Removal of Formwork

Preprufe membranes can be applied to removable formwork, such as slab perimeters, elevator and lift pits, etc. Once the concrete is poured the formwork must remain in place until the concrete has gained sufficient compressive strength to develop the surface bond. Preprufe membranes are not recommended for conventional twin-sided wall forming systems.

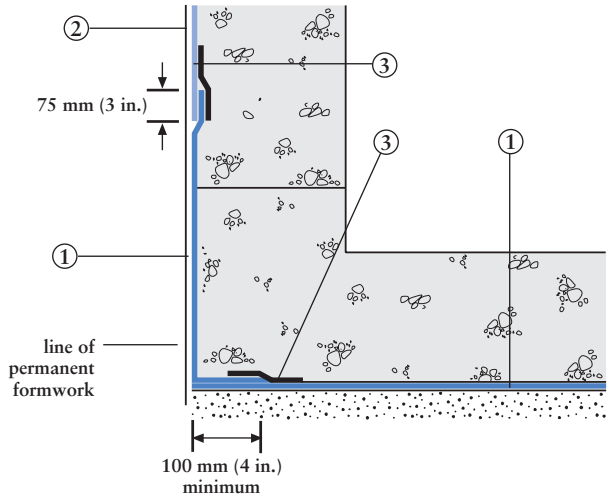
A minimum concrete compressive strength of 10 N/mm^2 (1500 psi) is recommended prior to stripping formwork supporting Preprufe membranes. Premature stripping may result in displacement of the membrane and/or spalling of the concrete.

As a guide, to reach the minimum compressive strength stated above, a structural concrete mix with an ultimate strength of 40 N/mm^2 (6000 psi) will typically require a cure time of approximately 6 days at an average ambient temperature of -4°C (25°F), or 2 days at 21°C (70°F).

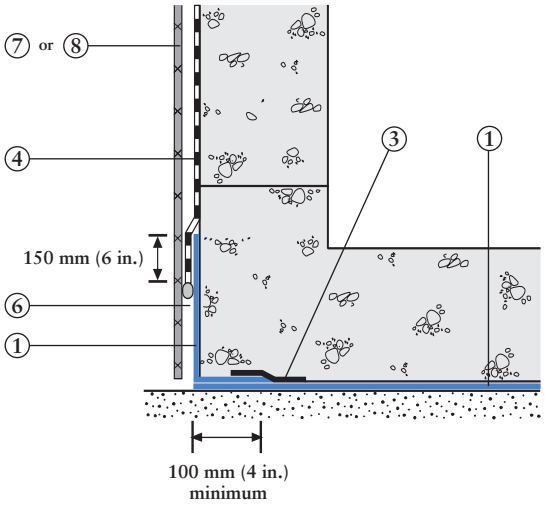
Detail Drawings

Details shown are typical illustrations and not working details. For a list of the most current details, visit us at www.graceconstruction.com. For technical assistance with detailing and problem solving please call toll free at 866-333-3SBM (3726).

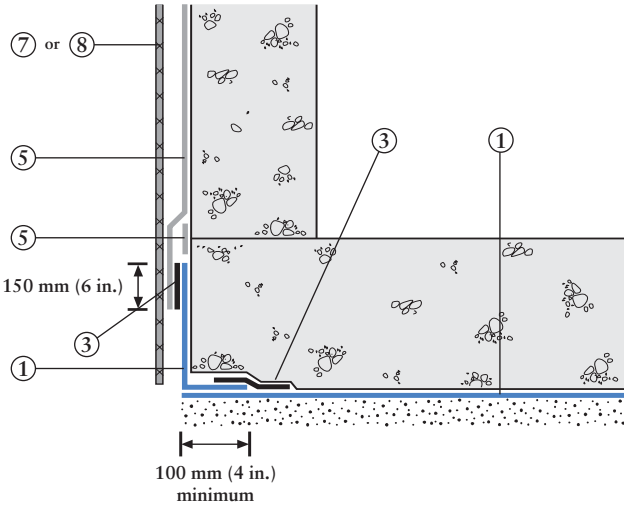
Wall base detail against permanent shutter



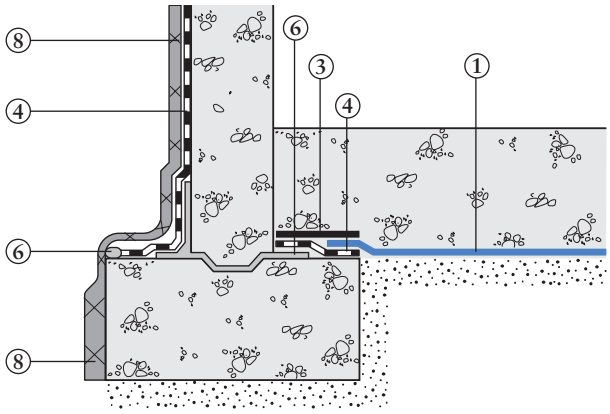
Bituthene wall base detail (Option 1)



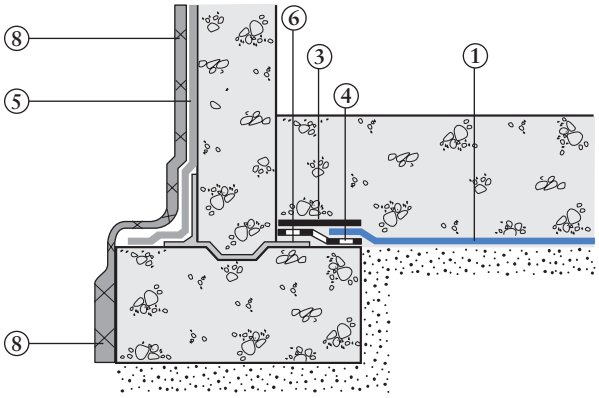
Procor wall base detail (Option 1)



Bituthene wall base detail (Option 2)



Procor wall base detail (Option 2)



1 Preprufe 300R
2 Preprufe 160R
3 Preprufe Tape
4 Bituthene
5 Procor
6 Bituthene Liquid Membrane
7 Protection
8 Hydroduct®

Supply

Dimensions (Nominal)	Preprufe 300R Membrane	Preprufe 160R Membrane	Preprufe Tape (LT or HC*)
Thickness	1.2 mm (0.046 in.)	0.8 mm (0.032 in.)	
Roll size	1.2 m x 30 m (4 ft x 98 ft)	1.2 m x 35 m (4 ft x 115 ft)	100 mm x 15 m (4 in. x 49 ft)
Roll area	36 m^2 (392 ft^2)	42 m^2 (460 ft^2)	
Roll weight	50 kg (108 lbs)	42 kg (92 lbs)	2 kg (4.3 lbs)
Minimum side/end laps	75 mm (3 in.)	75 mm (3 in.)	75 mm (3 in.)

*LT denotes Low Temperature (between -4°C (25°F) and +30°C (86°F))
HC denotes Hot Climate (>+10°C (50°F))

Ancillary Products

Bituthene Liquid Membrane – 5.7 liter (1.5 US gal) or 15.1 liter (4 US gal)

Physical Properties

Property	Typical Value 300R	Typical Value 160R	Test Method
Color	white	white	
Thickness	1.2 mm (0.046 in.) nominal	0.8 mm (0.032 in.) nominal	ASTM D3767
Low temperature flexibility	Unaffected at -23°C (-10°F)	Unaffected at -23°C (-10°F)	ASTM D1970
Resistance to hydrostatic head, minimum	70 m (231 ft)	70 m (231 ft)	ASTM D5385, modified[1]
Elongation, minimum	300%	300%	ASTM D412, modified[2]
Tensile strength, film, minimum	27.6 MPa (4000 psi)	27.6 MPa (4000 psi)	ASTM D412
Crack cycling at -23°C (-10°F), 100 cycles	Unaffected	Unaffected	ASTM C836
Puncture resistance, minimum	990 N (221 lbs)	445 N (100 lbs)	ASTM E154
Peel adhesion to concrete, minimum	880 N/m (5.0 lbs/in.) width	880 N/m (5.0 lbs/in.) width	ASTM D903, modified[3]
Lap peel adhesion	440 N/m (2.5 lbs/in.) width	440 N/m (2.5 lbs/in.) width	ASTM D1876, modified[4]
Permeance to water vapor Transmission, maximum	0.01 perms (0.6 ng/(Pa × s × m^2))	0.01 perms (0.6 ng/(Pa × s × m^2))	ASTM E96, method B
Water absorption, maximum	0.5%	0.5%	ASTM D570
Methane permeability	9.1 mls/m^2/day	N/A	University of London, QMW College[3]
Permeability[5] (hydraulic conductivity)	K=<1.4 x 10^{-11}cm.s^{-1}	K=<1.4 x 10^{-11}cm.s^{-1}	ASTM D5084-90

Footnotes:

1. Hydrostatic head tests of Preprufe Membranes are performed by casting concrete against the membrane with a lap. Before the concrete cures, a 3 mm (0.125 in.) spacer is inserted perpendicular to the membrane to create a gap. The cured block is placed in a chamber where water is introduced to the membrane surface up to the head indicated.
2. Elongation of membrane is run at a rate of 50 mm (2 in.) per minute.
3. Concrete is cast against the protective coating surface of the membrane and allowed to properly dry (7 days minimum). Peel adhesion of membrane to concrete is measured at a rate of 50 mm (2 in.) per minute at room temperature.
4. The test is conducted 15 minutes after the lap is formed (per Grace published recommendations) and run at a rate of 50 mm (2 in.) per minute at -4°C (25°F).
5. Result is lower limit of apparatus. Membrane therefore considered impermeable.

Specification Clauses

Preprufe 300R or 160R shall be applied with its adhesive face presented to receive fresh concrete to which it will integrally bond. Only Grace Construction Products approved membranes shall be bonded to Preprufe 300R/160R. All Preprufe 300R/160R system materials shall be supplied by Grace Construction Products, and applied strictly in accordance with their instructions. Specimen performance and formatted clauses are also available.

NOTE: Use Preprufe Tape to tie-in Procor with Preprufe.

Health and Safety

Refer to relevant Material Safety data sheet. Complete rolls should be handled by a minimum of two persons.

For Technical Assistance call toll free at 866-333-3SBM (3726).

Visit our web site at www.graceconstruction.com

W. R. Grace & Co.-Conn. 62 Whittemore Avenue Cambridge, MA 02140

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GRACE Construction Products

APPENDIX I

SCHEDULE

Brownfield Cleanup Program
Schedule
2477 Third Avenue, Bronx, New York
Site No. C203047

MONTHS:	Mar-11	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12
TASK DESCRIPTION																	
Preparation of Combined RWP-RAWP																	
NYSDEC Review of RWP-RAWP																	
Revisions to RAWP/RWP																	
Resubmittal and DEC Approval of RAWP/RWP																	
Public Comment on RWP/RAWP and RAWP Fact Sheet																	
DEC Preparation of Decision Document																	
Finalize RWP-RAWP and Issue of Construction Notice																	
Construction and Monitoring																	
Prepare Environmental Easement																	
DEC Review and Approval of Environmental Easement																	
File/Record Environmental Easement																	
Prepare/Submit FER and SMP																	
NYSDEC FER and SMP Review and Approval																	
Issue IC/EC Notice (Fact Sheet)																	
Issue Certificate of Completion																	

LEGEND

- Volunteer Project Work
- NYSDEC Review
- Public Coment Period/Fact Sheets

AKRF, Inc.
ENVIRONMENTAL CONSULTANTS