23 WEST 116TH STREET
(BLOCK 1600, LOT 20)
MANHATTAN, NEW YORK

Remedial Action Work Plan

NYC BCP Number: 12CBCP033M & 12CBCP034M
NYC OER E-Designation Project Number: 12RH-A116M

Prepared for:
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ESI File: LM09015

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LIST OF ACRONYMS

Acronym	Definition
AOC	Area of Concern
AS/SVE	Air Sparging/Soil Vapor Extraction
BOA	Brownfield Opportunity Area
CAMP	Community Air Monitoring Plan
C/D	Construction/Demolition
COC	Certificate of Completion
CQAP	Construction Quality Assurance Plan
CSOP	Contractors Site Operation Plan
DCR	Declaration of Covenants and Restrictions
ECs/ICs	Engineering and Institutional Controls
HASP	Health and Safety Plan
IRM	Interim Remedial Measure
BCA	Brownfield Cleanup Agreement
MNA	Monitored Natural Attenuation
NOC	Notice of Completion
NYC BCP	New York City Brownfield Cleanup Program
NYC DEP	New York City Department of Environmental Protection
NYC DOHMH	New York State Department of Health and Mental Hygiene
NYCRR	New York Codes Rules and Regulations
NYC OER	New York City Office of Environmental Remediation
NYS DEC	New York State Department of Environmental Conservation
NYS DEC DER	New York State Department of Environmental Conservation Division of Environmental Remediation
NYS DOH	New York State Department of Health
NYS DOT	New York State Department of Transportation
ORC	Oxygen-Release Compound

OSHA	United States Occupational Health and Safety Administration
PE	Professional Engineer
PID	Photo Ionization Detector
QEP	Qualified Environmental Professional
QHHEA	Qualitative Human Health Exposure Assessment
RAOs	Remedial Action Objectives
RAR	Remedial Action Report
RAWP	Remedial Action Work Plan or Plan
RCA	Recycled Concrete Aggregate
RD	Remedial Design
RI	Remedial Investigation
RMZ	Residual Management Zone
SCOs	Soil Cleanup Objectives
SCG	Standards, Criteria and Guidance
SMP	Site Management Plan
SMMP	Soil/Material Management Plan
SPDES	State Pollutant Discharge Elimination System
SVOC	Semi-Volatile Organic Compound
TOGS 1.1.1	NYSDEC Division of Water Technical and Operational Guidance Series 1.1.1, Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations
USGS	United States Geological Survey
UST	Underground Storage Tank
VOC	Volatile Organic Compound

CERTIFICATION

I, Peter Setaro, am a Professional Engineer licensed in the State of New York. I have primary direct responsibility for implementation of the remedial action for the 23 West 116th Street Site 12RH-A116M.

I, Paul H. Ciminello am a Qualified Environmental Professional as defined in §43-140. I have primary direct responsibility for implementation of the remedial action for 23 West 116th Street (Block 1600, Lot 20), NYC BCP Number: 12CBCP033M & 12CBCP034MNYC, OER E-Designation Project Number: 12RH-A116M

I certify that this Remedial Action Work Plan (RAWP) has a plan for handling, transport and disposal of soil, fill, fluids and other materials removed from the property in accordance with applicable City, State and Federal laws and regulations. Importation of all soil, fill and other material from off-Site will be in accordance with all applicable City, State and Federal laws and requirements. This RAWP has provisions to control nuisances during the remediation and all invasive work, including dust and odor suppression.

Peter D. Setaro, PE

Name

077008

NYS PE License Number

Signature

9/27/12

Date

Paul H. Ciminello

QEP Name

Signature

9/28/12

Date

EXECUTIVE SUMMARY

West 116 Residential LLC has enrolled in the New York City Brownfield Cleanup Program (NYC BCP) to investigate and remediate a 37,303-square foot site located at Block 1600, Lot 20 in Borough of Manhattan, New York. A remedial investigation (RI) was performed to compile and evaluate data and information necessary to develop this Remedial Action Work Plan (RAWP). The remedial action described in this document provides for the protection of public health and the environment consistent with the intended property use, complies with applicable environmental standards, criteria and guidance and conforms with applicable laws and regulations.

Site Location and Current Usage

The Site is located at the rear (western) portion of the property located at 1428 Fifth Avenue in the Harlem section in Manhattan, New York and is identified as Block 1600 and Lot 20 on the New York City Tax Map. **Figure 2** shows the Site location. The Site is 37,303-square feet and is bounded by West 117th Street to the north, West 116th Street to the south, multi-family residential structures to the east, and a multi-family residential structure to the west. A map of the site boundary is shown in **Figure 2**. Currently, the Site is utilized as an ancillary property associated with the eastern adjoining residential structure located at 1428 Fifth Avenue. It contains a courtyard, a private basketball court, and a paved parking area.

Summary of Proposed Redevelopment Plan

Layout of the proposed site development is presented in **Figure 3**. The current zoning designation is C4-5X, which is part of the contextual zoning districts. The proposed use is consistent with current zoning for the property.

The proposed future use of the Site will consist of a 9-story and 12-story mixed-use building (north and south buildings) with a total of 251,600 gross square footage (SF), containing approximately 221,149 SF of residential space (194 units), approximately 20,000 SF of commercial retail space, and approximately 10,418 SF of community facility space on 23 West 116th Street (project site). In addition, the proposed action would also include approximately 112 accessory parking spaces located in the cellar.

According to proposed development plans provided by West 116 Residential LLC, the 9-story north building and 12-story south building are planned to be built over the entire lot of the Site and will be approximately 100 (North building) and 125 (South building) feet tall, respectively. The north and south buildings will include a contiguous cellar used for parking space and a contiguous first story used for commercial retail space in both the North and South buildings, community facility space in the North building and a central portion open space. It is estimated that the cellar area will be excavated to a depth of approximately 11 feet below surface grade (bsg). Final excavation depth could vary, however, excavation below the water table is not anticipated at this time. An estimated 16,600 cubic yards of soil is anticipated to be excavated as part of construction activities. No demolition activities are included in the plans for development.

The remedial action contemplated under this RAWP may be implemented independently of the proposed redevelopment plan.

Summary of the Remedy

The proposed remedial action achieves protection of public health and the environment for the intended use of the property. The proposed remedial action achieves all of the remedial action objectives established for the project and addresses applicable standards, criterion, and guidance; is effective in both the short-term and long-term and reduces mobility, toxicity and volume of contaminants; is cost effective and implementable; and uses standards methods that are well established in the industry.

The proposed remedial action will consist of:

1. Preparation of a Community Protection Statement and implementation of a Citizen Participation Plan.
2. Perform a Community Air Monitoring Program for particulates and volatile organic carbon compounds.
3. Establish Track 1 Soil Cleanup Objectives (SCOs). Excavation and removal of soil/fill exceeding SCOs.

4. Construction and maintenance of an engineered composite cover consisting of a six inch (minimum) concrete building slab to prevent human exposure to residual soil/fill remaining under the Site, if Track 1 is not achieved.

5. Collection and analysis of end-point samples to determine the performance of the remedy with respect to attainment of SCOs.

6. Transportation and off-Site disposal of all soil/fill material at permitted facilities in accordance with applicable laws and regulations for handling, transport, and disposal, and this plan. Sampling and analysis of excavated media as required by disposal facilities. Appropriate segregation of excavated media onsite.

7. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID.

8. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas.

9. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations.

10. Performance of all activities required for the remedial action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and regulations.

11. Submission of a RAR that describes the remedial activities, and certifies that the remedial requirements have been achieved.

12. The installation of a vapor barrier.

13. If Track 1 cleanup is not achieved, the presence of the sub-grade parking with a ventilation system will serve to prevent human exposure to soil vapor from off-site sources.

14. If Track 1 cleanup is not achieved, submission of an approved Site Management Plan (SMP) in the RAR for long-term management of residual contamination, including plans for operation, maintenance, monitoring, inspection and certification of Engineering and Institutional Controls and reporting at a specified frequency.

15. If Track 1 cleanup is not achieved, recording of a Declaration of Covenants and Restrictions that includes a listing of Engineering Controls and a requirement that management of these controls must be in compliance with an approved SMP; and Institutional Controls including prohibition of the following: (1) vegetable gardening and farming; (2) use of groundwater without treatment rendering it safe for the intended use; (3) disturbance of residual contaminated material unless it is conducted in accordance with the SMP; and (4) higher level of land usage without OER-approval.

COMMUNITY PROTECTION STATEMENT

The Office of Environmental Remediation created the New York City Brownfield Cleanup Program (NYC BCP) to provide governmental oversight for the cleanup of contaminated property in NYC. This Remedial Action Work Plan ("cleanup plan") describes the findings of prior environmental studies that show the location of contamination at the site, and describes the plans to clean up the site to protect public health and the environment.

This cleanup plan provides a very high level of protection for neighboring communities. This cleanup plan also includes many other elements that address common community concerns, such as community air monitoring, odor, dust and noise controls, hours of operation, good housekeeping and cleanliness, truck management and routing, and opportunities for community participation. The purpose of this Community Protection Statement is to explain these community protection measures in non-technical language to simplify community review.

Remedial Investigation and Cleanup Plan. Under the NYC BCP, a thorough cleanup study of this property (called a remedial investigation) has been performed to identify past property usage, to sample and test soils, groundwater and soil vapor, and identify contaminant sources present on the property. The cleanup plan has been designed to address all contaminant sources that have been identified during the study of this property.

Identification of Sensitive Land Uses. Prior to selecting a cleanup, the neighborhood was evaluated to identify sensitive land uses nearby, such as schools, day care facilities, hospitals and residential areas. The cleanup program was then tailored to address the special conditions of this community.

Qualitative Human Health Exposure Assessment. An important part of the cleanup planning for the Site is the performance of a study to find all of the ways that people might come in contact with contaminants at the Site now or in the future. This study is called a Qualitative Human Health Exposure Assessment (QHHEA). A QHHEA was performed for this project. This assessment has considered all known contamination at the Site and evaluated the potential for people to come in contact with this contamination. All identified public exposures will be addressed under this cleanup plan.

Health and Safety Plan. This cleanup plan includes a Health and Safety Plan that is designed to protect community residents and on-Site workers. The elements of this plan are in compliance with safety requirements of the United States Occupational Safety and Health Administration. This plan includes many protective elements including those discussed below.

Site Safety Coordinator. This project has a designated Site safety coordinator to implement the Health and Safety Plan. The safety coordinator maintains an emergency contact sheet and protocol for management of emergencies. The Site safety coordinator is Paul H. Ciminello and can be reached at 845-452-1658.

Worker Training. Workers participating in cleanup of contaminated material on this project are required to be trained in a 40-hour hazardous waste operators training course and to take annual refresher training. This pertains to workers performing specific tasks including removing contaminated material and installing cleanup systems in contaminated areas.

Community Air Monitoring Plan. Community air monitoring will be performed during this cleanup project to ensure that the community is properly protected from contaminants, dust and odors. Air samples will be tested in accordance with a detailed plan called the Community Air Monitoring Plan or CAMP. Results will be regularly reported to the NYC Office of Environmental Remediation. This cleanup plan also has a plan to address any unforeseen problems that might occur during the cleanup (called a 'Contingency Plan').

Odor, Dust and Noise Control. This cleanup plan includes actions for odor and dust control. These actions are designed to prevent off-Site odor and dust nuisances and includes steps to be taken if nuisances are detected. Generally, dust is managed by application of physical covers and by water sprays. Odors are controlled by limiting the area of open excavations, physical covers, spray foams and by a series of other actions (called operational measures). The project is also required to comply with NYC noise control standards. If you observe problems in these areas, please contact the onsite Project Manager Tell Metzger (914) 834-4754 or NYC Office of Environmental Remediation Project Manager, William H. Wong at (212) 341-0659 .

Quality Assurance. This cleanup plan requires that evidence be provided to illustrate that all cleanup work required under the plan has been completed properly. This evidence will be summarized in the final report, called the Remedial Action Report. This report will be submitted to the NYC Office of Environmental Remediation and will be thoroughly reviewed.

Storm-Water Management. To limit the potential for soil erosion and discharge, this cleanup plan has provisions for storm-water management. The main elements of the storm water management include physical barriers such as tarp covers and erosion fencing, and a program for frequent inspection.

Hours of Operation. The hours for operation of cleanup will comply with the NYC Department of Buildings construction code requirements or according to specific variances issued by that agency. For this cleanup project, the hours of operation are 7 AM – 5 PM, Monday through Friday.

Signage. While the cleanup is in progress, a placard will be prominently posted at the main entrance of the property with a laminated project Fact Sheet that states that the project is in the NYC Brownfield Cleanup Program, provides project contact names and numbers, and locations of project documents can be viewed.

Complaint Management. The contractor performing this cleanup is required to address all complaints relevant to these remedial activities. If you have any complaints, you can call the facility Project Manager Tell Metzger (914) 834-4754, the NYC Office of Environmental Remediation Project Manager William H. Wong at (212) 341-0659, or call 311 and mention the Site is in the NYC Brownfield Cleanup Program.

Utility Mark-outs. To promote safety during excavation in this cleanup, the contractor is required to first identify all utilities and must perform all excavation and construction work in compliance with NYC Department of Buildings regulations.

Soil and Liquid Disposal. All soil and liquid material removed from the Site as part of the cleanup will be transported and disposed of in accordance with all applicable City, State and Federal regulations and required permits will be obtained.

Soil Chemical Testing and Screening. All excavations will be supervised by a trained and properly qualified environmental professional. In addition to extensive sampling and chemical testing of soils on the Site, excavated soil will be screened continuously using hand-held instruments, by sight, and by smell to ensure proper material handling and management, and community protection.

Stockpile Management. Soil stockpiles will be kept covered with tarps to prevent dust, odors and erosion. Stockpiles will be frequently inspected. Damaged tarp covers will be promptly replaced. Stockpiles will be protected with silt fences. Hay bales will be used, as needed to protect storm water catch basins and other discharge points.

Trucks and Covers. Loaded trucks leaving the Site will be covered in compliance with applicable laws and regulations to prevent dust and odor. Trucks will be properly recorded in logs and records and placarded in compliance with applicable City, State and Federal laws, including those of the New York State Department of Transportation. If loads contain wet material that can leak, truck liners will be used. All transport of materials will be performed by licensed truckers and in compliance with all laws and regulations.

Imported Material. All fill materials proposed to be brought onto the Site will comply with rules outlined in this cleanup plan and will be inspected and approved by a qualified worker located on-Site. Waste materials will not be brought onto the Site. Trucks entering the Site with imported clean materials will be covered in compliance with applicable laws and regulations.

Equipment Decontamination. All equipment used for cleanup work will be inspected and washed, if needed, before it leaves the Site. Trucks will be cleaned at a truck inspection station on the property before leaving the Site.

Housekeeping. Locations where trucks enter or leave the Site will be inspected every day and cleaned regularly to ensure that they are free of dirt and other materials from the Site.

Truck Routing. Truck routes have been selected to: (a) limit transport through residential areas and past sensitive nearby properties; (b) maximize use of city-mapped truck routes; (c) limit total distance to major highways; (d) promote safety in entry to highways; (e) promote overall safety in trucking; and (f) minimize off-Site line-ups (queuing) of trucks entering the property. Operators of loaded trucks leaving the Site will be instructed not to stop or idle in the local neighborhood.

Final Report. The results of all cleanup work will be fully documented in a final report (called a Remedial Action Report) that will be available for you to review in the public document repositories located at Harlem Public Library Greenpoint Branch and NYSDEC Region 2.

Long-Term Site Management. To provide long-term protection after the cleanup is complete, the property owner will be required to comply with an ongoing Site Management Plan that calls for continued inspection of protective controls, such as Site covers. The Site Management Plan is evaluated and approved by the NYC Office of Environmental Remediation. Requirements that the property owner must comply with are defined in the property's deed. A certification of continued protectiveness of the cleanup will be required from time to time to show that the approved cleanup is still effective.

REMEDIAL ACTION WORK PLAN

1.0 SITE BACKGROUND

West 116 Residential LLC has enrolled in the New York City Brownfield Cleanup Program (NYC BCP) to investigate and remediate a property at 23 West 116th Street (Block 1600, Lot 20) located between West 116th Street and West 117th Street, approximately 300 feet west of Fifth Avenue in the Harlem (Central) section of Manhattan, New York (the Site). A Remedial Investigation (RI) was performed to compile and evaluate data and information necessary to develop this Remedial Action Work Plan (RAWP) in a manner that will render the Site protective of public health and the environment consistent with the contemplated end use. This RAWP establishes remedial action objectives, provides a remedial alternatives analysis that includes consideration of a permanent cleanup, and provides a description of the selected remedial action. The remedial action described in this document provides for the protection of public health and the environment, complies with applicable environmental standards, criteria and guidance and applicable laws and regulations.

1.1 SITE LOCATION AND CURRENT USAGE

The Site is located at 23 West 116th Street in the Harlem section in Manhattan, New York and is identified as Block 1600 and Lot 20 on the New York City Tax Map. **Figure 2** shows the Site location. The Site is 37,303-square feet and is bounded by West 117th Street to the north, West 116th Street to the south, multi-family residential structures to the east, and a multi-family residential structure to the west. A map of the site boundary is shown in **Figure 2**. Currently, the Site is utilized as an ancillary property associated with the eastern adjoining residential structure located at 1428 Fifth Avenue. It contains a courtyard, a private basketball court, and a paved parking area.

1.2 PROPOSED REDEVELOPMENT PLAN

Layout of the proposed site development is presented in **Figure 3**. The current zoning designation is C4-5X, which is part of the contextual zoning districts. The proposed use is consistent with current zoning for the property.

The proposed future use of the Site will consist of a 9-story and 12-story mixed-use building (north and south buildings) with a total of 251,600 gross square footage (SF), containing approximately 221,149 SF of residential space (194 units), approximately 20,000 SF of commercial retail space, and approximately 10,418 SF of community facility space on 23 West 116th Street (project site). In addition, the proposed action would also include approximately 112 accessory parking spaces located in the cellar.

According to proposed development plans provided by West 116 Residential LLC, the 9-story north building and 12-story south building are planned to be built over the entire lot of the Site and will be approximately 100 (North building) and 125 (South building) feet tall, respectively. The north and south buildings will include a contiguous cellar used for parking space and a contiguous first story used for commercial retail space in both the North and South buildings, community facility space in the North building and a central portion open space. It is estimated that the cellar area will be excavated to a depth of approximately 11 feet below surface grade (bsg). Final excavation depth could vary, however, excavation below the water table is not anticipated at this time. An estimated 16,600 cubic yards of soil is anticipated to be excavated as part of construction activities. No demolition activities are included in the plans for development.

The remedial action contemplated under this RAWP may be implemented independently of the proposed redevelopment plan.

1.3 DESCRIPTION OF SURROUNDING PROPERTY

The Site is located in an urban area that is comprised primarily of mixed-use, institutional, and multi-family residential properties. The Site and adjoining properties to the east are zoned for residential and commercial usage. The northern adjoining properties are zoned for residential usage with commercial zone overlays; adjoining properties to the south and west are zoned for commercial usage. The “Children’s Aid Society” and “Public School #149” are located on nearby properties to the north and northwest, respectively. No other sensitive receptors (hospitals, schools, etc.) are located within 500 feet of the subject property.

The adjoining and surrounding properties are described in the Table below.

Direction	Adjoining Use(s)	Vicinity Use(s)
North	• Children's Aid Society • Mixed-use	• Residential • Public School #149 • Commercial
East	• Residential	• Residential • Mixed-use
South	• Mixed-use	• Residential • Commercial
West	• Mixed-use	• Mixed-use • Residential

1.4 REMEDIAL INVESTIGATION

A remedial investigation was performed and the results are documented in a companion document called "*Remedial Investigation Report, 23 West 116th Street (Block 1600 Lot 20)*", dated December, 2011 (RIR).

Summary of Past Uses of Site and Areas of Concern

The subject property currently contains a basketball court, a paved parking area, and a maintained courtyard area. According to Sanborn maps, the western portion of the subject property historically contained "Public School No. 184" from prior to 1902 until sometime between 1951 and 1976. The northeastern portion of the subject property formerly contained mixed-use structures from sometime between 1902 and 1976.

The AOCs identified for this site include:

1. The paved parking lot located on the western portion of the Site.
2. Portions of the property located near the Site boundaries that may have been impacted by spills and/or petroleum bulk storage at nearby properties.
3. The volume and integrity of on-site fill material had yet to be determined.

Summary of the Work Performed under the Remedial Investigation

On behalf of West 116 Residential LLC, the following services were conducted by ESI on selected portions of the Site consistent with the approved Site Investigation Work Plan. These activities were pre-reviewed and pre-approved by MOER on July 7, 2011:

1. Extended seven soil borings throughout the Site to a depth of 15 feet through a maximum depth of 22.3 feet below grade. Soil samples were collected from each of these borings and one boring was completed as a permanent monitoring well (MW-1);

2. Extended three additional soil borings in the on-site courtyard and paved parking areas to a depth of six feet below surface grade. Soil and soil gas samples were collected from each these borings;

3. Collected groundwater samples from the newly installed monitoring well MW-1, and from two pre-existing on-site monitoring wells (MW-2 and MW-3). Groundwater samples were analyzed for VOCs, polynuclear aromatic hydrocarbons (PAHs), pesticides and PCBs, and metals; and,

4. Seven subsurface soil samples and three surface soil samples were collected from the ten soil borings that were extended during fieldwork activities. Each of the soil samples were analyzed for VOCs, SVOCs, polychlorinated biphenyls (PCBs), pesticides, and TAL metals.

Summary of Environmental Findings

1. Elevation of the property is approximately 30 feet above sea level.
2. Depth to groundwater ranges from is approximately 15 feet below surface grade at the Site although the shallower groundwater (noted in some of the borings) may represent localized perched water.
3. Groundwater flow is generally from northeast to southwest beneath the Site.

4. Depth to bedrock is approximately greater than 23 feet at the Site.

5. The stratigraphy of the site, from the surface down, consists of up to 10 feet of urban fill and/or brown, dry, medium to coarse sands with gravel and brick fragments underlain by 7-9' feet of brown, moist, firm sandy silt with weathered rock. The total volume of urban fill estimated to be present on this Site is 12,500 cubic yards.

6. Soil tests and field observations document the presence of fill material on the Site from the surface to a depth of approximately 11 feet below grade. PCBs were not detected in soil samples. Metals were detected in all samples at low levels. Only barium (1160 ppm) and lead (499 pm) were detected in excess of NYSDEC Part 375 Track 2 Restricted Residential (Track 2) Soil Cleanup Objectives (SCOs). Several other metals marginally exceeded Track 1 Unrestricted SCOs but not Track 2 including zinc, nickel, copper, and cadmium. PAHs were detected in six of nine samples, but exceeded SCO only in two shallow soil samples. These exceedances included PAH compounds including benzo(a)anthracene at19 ppm, benzo(a)pyrene at 17 ppm, Benzo(b)fluoranthane at 11.6 ppm and chrysene at 22.6 ppm. Low levels of pesticides were detected in shallow soils and none above Track 2 Restricted Residential SCOs. Two VOCs were detected but were below Track 1 SCOs. They include methylene chloride which was detected in all samples including batch blank samples, indicating that it is not derived from the site. These findings are unremarkable and do not indicate an onsite source of contamination. Field observations and laboratory data support the conclusion that the source of low levels of contaminants observed is urban fill.

7. Groundwater results indicate VOC concentrations in excess of 6 NYCRR Part 703.6 Groundwater Quality Standards (GQS) in both the upgradient and the downgradient wells. MTBE was detected at 16 ppb, cis1,2-Dichloroethylene was detected at 37 ppb in one well only and in excess of GQS of 10 and 5, respectively. PCE was detected at 9.3 ppb, and TCE was detected at 4.4 ppb in one well only, with only PCE slightly above GQS of 5 ppb. No other VOCs were detected in any monitoring well. The three VOCs that exceed GQS are located near the property boundary on the upgradient portion of the property and, given the absence of these compounds in onsite soil, and the limited environmental history of the property, suggest an off-site

source area. SVOCs, pesticides and PCBs were not detected in any well. Low levels of metals were detected in all wells, but none exceeded GQS.

8. Soil vapor samples collected during the RI showed numerous VOCs detected at generally low concentrations, including compounds listed in the NYSDOH Final Guidance on Soil Vapor Intrusion (October 2006) Decision Matrices. These include acetone (160 to 260ug/m^3), TCE (4 ug/m^3) and PCE (8.0 to 90 ug/m^3). Soil gas testing documents no VOC concentrations in excess of NYSDOH guidance values.

For more detailed results, consult the RIR. Based on an evaluation of the data and information from the RIR and this RAWP, disposal of significant amounts of hazardous waste is not suspected at this site.

2.0 REMEDIAL ACTION OBJECTIVES

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

Soil

- Prevent direct contact with contaminated soil.

Groundwater

- Prevent direct exposure to contaminated groundwater.
- Prevent exposure to contaminants volatilizing from contaminated groundwater.

Soil Vapor

- Prevent migration of soil vapor into dwelling.

3.0 REMEDIAL ALTERNATIVES ANALYSIS

The goal of the remedy selection process under is to select a remedy that is protective of human health and the environment taking into consideration the current, intended and reasonably anticipated future use of the property. The remedy selection process begins by establishing RAOs for media in which chemical constituents were found in exceedance of applicable standards, criteria and guidance values (SCGs). A remedy is then developed based on the following nine criteria:

- Protection of human health and the environment;
- Compliance with SCGs;
- Short-term effectiveness and impacts;
- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility, or volume of contaminated material;
- Implementability;
- Cost effectiveness;
- Community Acceptance; and
- Land use.

The following is a detailed description of the alternatives analysis and remedy selection to address impacted media at the Site. As required, a minimum of two remedial alternatives (including a Track 1 scenario) are evaluated, as follows:

The remedial action alternatives under consideration includes two alternatives: Track 1 cleanup with attainment of Track 1 Unrestricted Use Soil Cleanup Objectives, and Track 4 cleanup with attainment of site specific soil cleanup objectives and use of institutional and engineering controls.

Alternative 1

Alternative 1 is the Track 1 Alternative (hereafter referred to as Track 1) which would involve the removal of all soil exceeding Track 1 Unrestricted Use SCOs.

Alternative 2

Alternative 2 is the Track 4 Alternative (hereafter referred to as Track 4) which would involve the attainment of site specific (Track 4) SCOs. Following soil removal, the entire Site will be covered with a cover layer consisting of the building footprint and asphalt pavement. This cover layer will serve as an engineering control to reduce exposure to contaminants in the groundwater and any residual contaminant in soils. Soil vapors would be managed by the operation of a ventilated parking area under the building. Institutional controls would also include groundwater use restrictions, a deed notice and a site management plan.

3.1 THRESHOLD CRITERIA

Protection of Public Health and the Environment

This criterion is an evaluation of the remedy's ability to protect public health and the environment, and an assessment of how risks posed through each existing or potential pathway of exposure are eliminated, reduced or controlled through removal, treatment, and implementation of Engineering Controls or Institutional Controls. Protection of public health and the environment must be achieved for all approved remedial actions.

Alternative 1 would result in removal of all soil/fill with contaminant concentrations above Track 1 SCOs. As such, this alternative would be consistent with the RAOs and would provide overall protection of public health and the environment for soil in consideration of current and potential future land use by:

- Eliminating the potential for direct contact with contaminated on-site soils;
- Minimizing potential expose to contaminated soils vapors during construction by implementing an approved soil and materials management plan and community air monitoring plan (CAMP);
- Minimizing the potential for migration of soil vapor into occupied structures and associated inhalation exposures will be eliminated by operation of a ventilated parking garage beneath the building and a Vapor Barrier.

Alternative 2 would achieve comparable protections of human health and the environment. As such, this alternative would be consistent with the RAOs and would provide overall protection of public health and the environment for soil in consideration of current and potential future land use by:

- Establish Track 4 Site Specific SCOs and removal of soils that exceed these SCOs;
- Placement of institutional and engineering controls, including a composite cover system over the site consisting of a six inch concrete building slab underlain with an eight inch gravel layer to eliminate any potential for direct exposures to remaining contaminated soils that exceed unrestricted SCOs or groundwater that exceed GQS;
- Minimizing the potential for migration of soil vapor into occupied structures and associated inhalation exposures will be eliminated by operation of a ventilated parking garage beneath the building and the installation of a vapor barrier;
- Minimizing the potential for direct contact with contaminated on-site soils during the remediation by implementing an approved soil and materials management plan and CAMP.
- Establish use restrictions to ensure that future ingestion or other exposures are eliminated;
- Establish a Site Management Plan to ensure long term management of Institutional and Engineering Controls to ensure that all Engineering and Institutional controls are inspected periodically and requires certification that the remedy continues to perform as it was designed, thus ensuring that the protections achieved for public health and the environment remain in perpetuity;
- Place a deed restriction to memorialize these controls in order to decrease the risk of future exposures with contaminated media consistent with remedial action objectives to memorialize the remedial action and the existence of Engineering and Institutional Controls and will ensure that future site owners will appropriately manage these controls.

Both Alternatives: During remedial and construction activity workers and area residents may be exposed to impacted soil and vapors. Worker exposure to soil and vapors will be minimized through implementation of a Health and Safety Plan. Exposures to area residents from dust and/or vapors will be minimized through engineering controls and through implementation of a Community Air Monitoring Plan (CAMP).

No known uses of groundwater exist in the area. It is unlikely that the surrounding community would be exposed to the groundwater. Therefore, remaining low-level groundwater contaminants are not likely to represent a significant risk to human health or the environment.

Alternatives 1 and 2 are assessed in detail in Section 3.2, below.

3.2. BALANCING CRITERIA

Compliance with Standards, Criteria and Guidance (SCGs)

Alternative 1 would comply with the SCGs, as all soil/ fill in excess of Track 1 SCOs would be removed. All soil/ fill excavated from the Site would be managed and disposed of in accordance with all applicable regulations.

Alternative 2 would address the chemical-specific SCGs for soil, groundwater, and soil vapor by establishment of Track 4 SCOs and attainment of these standards for onsite soil. Similar to the Track 1 alternative, focused attention on means and methods employed during the remedial action would ensure that handling and management of contaminated material would be incompliance with applicable SCGs.

Short-term effectiveness and impacts

This evaluation criterion assesses the effects of the alternative during the construction and implementation phase until remedial action objectives are met. Under this criterion, alternatives are evaluated with respect to their effects on public health and the environment during implementation of the remedial action, including protection of the community, environmental impacts, time until remedial response objectives are achieved, and protection of workers during remedial actions.

Both Alternative 1 and 2 would result in short-term impacts associated with excavation, handling, load out of materials, and truck traffic. However, focused attention to means and methods during the remedial action during the removal action, including community air monitoring and appropriate truck routing, would minimize or negate the overall impact of these activities.

The Track 1 and Track 4 Alternatives are considered to be effective in protecting human health and the environment in the short term. These alternatives would involve the removal of all on-site contaminated soils, and would eliminate (Track 1) or reduce (Track 4) exposure to contaminant sources. The implementation of appropriate measures, including a Community Air Monitoring Plan (CAMP) and a Soil/Materials Management Plan (SMMP), during all on-site soil disturbance activities will effectively prevent the release of significant contaminants into the environment. Construction workers operating under appropriate management procedures and a

Health and Safety Plan (HASP) will be protected from on-site contaminants (personal protective equipment would be worn consistent with the documented risks within the respective work zones). Both alternatives provide short-term effectiveness in protecting the surrounding community by decreasing the risk of contact with on-site contaminants. The implementation of a HASP (incorporating a Community Health and Safety Plan) and a CAMP will serve to minimize potential short-term impacts to the surrounding community from increased vehicle traffic, dust, vapors, and noise.

The possibility exists for the Track 1 Alternative to take additional time to implement when compared to the Track 4 Alternative. The Track 1 Alternative might require the removal of additional soil due to more stringent SCOs.

Long-Term Effectiveness and Permanence

This evaluation criterion addresses the results of a remedial action in terms of its permanence and quantity/nature of waste or residual contamination remaining at the Site after response objectives have been met, such as permanence of the remedial alternative, magnitude of remaining contamination, adequacy of controls including the adequacy and suitability of ECs/ICs that may be used to manage contaminant residuals that remain at the Site and assessment of containment systems and ICs that are designed to eliminate exposures to contaminants, and long-term reliability of Engineering Controls.

Alternative 1 and Alternative 2 would achieve long-term effectiveness and permanence by permanently removing all or most impacted soils, respectively.

Alternative 2 would provide long-term effectiveness by attaining Track 4 SCOs, placing a six-inch concrete slab under the building, establishing use restrictions, establishing a Site Management Plan to ensure long-term management of Institutional and Engineering Controls, and placing a deed restriction to memorialize these controls for the long term. Groundwater use restrictions will eliminate potential exposure to groundwater and establishment of an SMP and a deed restriction will ensure that this protection remains effective for the long-term (in perpetuity). The SMP will ensure long-term effectiveness of all Engineering and Institutional Controls by requiring periodic inspection and certification that these controls and use restrictions continue to be in place and functioning as they were intended assuring that protections designed into the remedy will provide continued high level of protection in perpetuity.

Reduction of toxicity, mobility, or volume of contaminated material

This evaluation criterion assesses the remedial alternative's use of remedial technologies that permanently and significantly reduce toxicity, mobility, or volume of contaminants as their principal element. The following is the hierarchy of source removal and control measures that are to be used to remediate a Site, ranked from most preferable to least preferable: removal and/or treatment, containment, elimination of exposure and treatment of source at the point of exposure. It is preferred to use treatment or removal to eliminate contaminants at a Site, reduce the total mass of toxic contaminants, cause irreversible reduction in contaminants mobility, or reduce of total volume of contaminated media.

Alternative 1 would permanently eliminate the toxicity, mobility, and volume of contaminants from on-site soil by removing all soil in excess of unrestricted use SCOs. Removal of soil to a depth of approximately 12 feet would occur.

Alternative 2 would greatly reduce the toxicity, mobility, and volume of contaminants from on-site soil because it would include removal of as much as 11 feet of soil/fill for development purposes and will achieve site specific SCOs.

Implementability

This evaluation criterion addresses the technical and administrative feasibility of implementing an alternative and the availability of various services and materials required during its implementation, including technical feasibility of construction and operation, reliability of the selected technology, ease of undertaking remedial action, monitoring considerations, administrative feasibility (e.g. obtaining permits for remedial activities), and availability of services and materials.

Both Alternatives are both feasible and implementable. They use standard materials, services, and well-established technology. The reliability of these remedies is also high. There are no specific difficulties associated with any of the activities proposed, which utilize standard industry methods.

Cost effectiveness

This evaluation criterion addresses the cost of alternatives, including capital costs (such as construction costs, equipment costs, and disposal costs, engineering expenses) and site

management costs (costs incurred after remedial construction is complete) necessary to ensure the continued effectiveness of a remedial action.

The capital costs associated with the Track 1 alternative may be higher than the Track 4 alternative in that a higher volume of soil/fill may need to be excavated beyond the 11 feet needed for development to achieve a Track 1 SCOs status over the entire site. Total costs for the Track 1 Alternative are estimated at $682,000. Total costs for the Track 4 Alternative are estimated at $727,000. In both cases, appropriate public health and environmental protections are achieved.

Both alternatives satisfy the threshold balancing criterion and other criterion listed here, and each is fully protective of public health and the environment, will control migration of contaminants, will comply with SCGs, are effective for the short-term and long-term, are implementable, and reduces both mobility and toxicity.

Community Acceptance

This evaluation criterion addresses community opinion and support for the remedial action. Observations here will be supplemented by public comment received on the RAWP.

No community objections are anticipated for either Track 1 or Track 4 alternatives. The project will provide the community with additional residential and commercial opportunities. The community will have the opportunity to become involved in the project throughout the process of citizen participation in the BCP. The Site went through the New York City Planning Department's Uniform Land Use Review Procedure (ULURP) and has additionally received support from Community Board 10.

Land use

This evaluation criterion addresses the proposed use of the property. This evaluation has considered reasonably anticipated future uses of the Site and takes into account: current use and historical and/or recent development patterns; applicable zoning laws and maps; NYS Department of State's Brownfield Opportunity Areas (BOA) pursuant to section 970-r of the general municipal law; applicable land use plans; proximity to real property currently used for residential use, and to commercial, industrial, agricultural, and/or recreational areas; environmental justice impacts, Federal or State land use designations; population growth patterns

and projections; accessibility to existing infrastructure; proximity of the site to important cultural resources and natural resources, potential vulnerability of groundwater to contamination that might emanate from the site, proximity to flood plains, geography and geology; and current Institutional Controls applicable to the site.

The proposed Track 1 and Track 4 alternatives provide improvement in Site and local area land use by transforming the Site from a contaminated property to a fully remediated residential/commercial development. The Site is in a mixed-use zone (C4-5X) located within a predominantly residential area (R7-2). The proposed development supports existing community master plan objectives of re-establishing a dynamic, viable community with additional affordable housing, retail, and community space.

No historical, archeological, or natural resources are located within the Site and the Site is not in close proximity to a floodplain (the Harlem River located to the east of the Site is the nearest floodplain). The Site is located adjacent to multi-family residential buildings, Public School 149, mixed-use and institutional structures.

The Site is in the vicinity of several subway stations and bus routes, which are available for the residents of the community.

Sustainability of the Remedial Action

This criterion evaluates the overall sustainability of the remedial action alternatives and the degree to which sustainable means are employed to implement the remedial action including those that take into consideration NYC's sustainability goals defined in *PlaNYC: A Greener, Greater New York.* Sustainability goals may include: maximizing the recycling and reuse of non-virgin materials; reducing the consumption of virgin and non-renewable resources; minimizing energy consumption and greenhouse gas emissions; improving energy efficiency; and promotion of the use of native vegetation and enhancing biodiversity during landscaping associated with Site development.

Both Alternatives have an equal potential to achieve sustainable remedial action goals.

4.0 REMEDIAL ACTION

4.1 SUMMARY OF PREFERRED REMEDIAL ACTION

The preferred remedial action alternative is the Track 1 Alternative. The preferred remedial action alternative achieves protection of public health and the environment for the intended use of the property. The preferred remedial action alternative will achieve all of the remedial action objectives established for the project and addresses applicable SCGs. The preferred remedial action alternative is effective in both the short-term and long-term and reduces mobility, toxicity and volume of contaminants. The preferred remedial action alternative is cost effective and implementable and uses standards methods that are well established in the industry.

The proposed remedial action will consist of:

1. Preparation of a Community Protection Statement and implementation of a Citizen Participation Plan.
2. Perform a Community Air Monitoring Program for particulates and volatile organic carbon compounds.
3. Establish Track 1 Soil Cleanup Objectives (SCOs). Excavation and removal of soil/fill exceeding SCOs.
4. Construction and maintenance of an engineered composite cover consisting of a six inch (minimum) concrete building slab to prevent human exposure to residual soil/fill remaining under the Site, if Track 1 is not achieved.
5. Collection and analysis of end-point samples to determine the performance of the remedy with respect to attainment of SCOs.
6. Transportation and off-Site disposal of all soil/fill material at permitted facilities in accordance with applicable laws and regulations for handling, transport, and disposal, and this plan. Sampling and analysis of excavated media as required by disposal facilities. Appropriate segregation of excavated media onsite.
7. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID.

8. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas.

9. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations.

10. Performance of all activities required for the remedial action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and regulations.

11. Submission of a RAR that describes the remedial activities, and certifies that the remedial requirements have been achieved.

12. The installation of a vapor barrier.

13. If Track 1 cleanup is not achieved, the presence of the sub-grade parking with a ventilation system will serve to prevent human exposure to soil vapor from off-site sources.

14. If Track 1 cleanup is not achieved, submission of an approved Site Management Plan (SMP) in the RAR for long-term management of residual contamination, including plans for operation, maintenance, monitoring, inspection and certification of Engineering and Institutional Controls and reporting at a specified frequency.

15. If Track 1 cleanup is not achieved, recording of a Declaration of Covenants and Restrictions that includes a listing of Engineering Controls and a requirement that management of these controls must be in compliance with an approved SMP; and Institutional Controls including prohibition of the following: (1) vegetable gardening and farming; (2) use of groundwater without treatment rendering it safe for the intended use; (3) disturbance of residual contaminated material unless it is conducted in accordance with the SMP; and (4) higher level of land usage without OER-approval.

4.2 SOIL CLEANUP OBJECTIVES AND SOIL/FILL MANAGEMENT

Track 1 Soil Cleanup Objectives (SCOs) are proposed for this project. The SCOs for this Site are listed in **Table 6**. Soil and materials management on-Site and off-Site, including

excavation, handling and disposal, will be conducted in accordance with the Soil/Materials Management Plan in **Appendix 3**. The location of planned excavations is shown in **Figure 4**.

Discrete contaminant sources (such as hotspots) identified during the remedial action will be identified by GPS or surveyed. This information will be provided in the Remedial Action Report.

Estimated Soil/Fill Removal Quantities

The total quantity of soil/fill expected to be excavated and disposed of off-Site is 16,600 cubic yards (estimated average excavation of 11 feet over the entire 37,500 square foot lot). Of this total, approximately 12,500 yd^3 is presumed to require management as urban fill and the balance (4,100 yd^3) is anticipated to be managed as unregulated soil.

The proposed disposal locations for Site-derived impacted materials are listed below. Additional disposal locations established at a later date will be reported promptly to the OER Project Manager.

Disposal facilities will be reported to OER when they are identified and prior to the start of remedial action.

End-Point Sampling

Removal actions under this plan will be performed in conjunction with remedial end-point sampling. Future end-point sampling will augment the sampling that was conducted during the investigative phase, which confirmed the absence of contaminants in soils beneath the on-Site fill soils. End-point sampling frequency will consist of the following:

1. Five base samples will be collected, with at least one sample collected from beneath the "basketball court" which had been inaccessible during investigative work.

2. Two wall samples per wall (8 samples in total) will be collected.

3. For sampling of volatile organics, base samples will be taken within 24 hours of excavation, and will be taken from the zero to six-inch interval at the excavation floor.

Post-remediation sample locations and depth will be biased towards the areas and depths of highest contamination identified during previous sampling episodes unless field indicators such as field instrument measurements or visual contamination identified during the remedial

action indicate that other locations and depths may be more heavily contaminated. In all cases, post-remediation samples should be biased toward locations and depths of the highest expected contamination.

New York State ELAP certified labs will be used for all end-point sample analyses. Labs for end-point sample analyses will be reported in the RAR. The RAR will provide a tabular and map summary of all end-point sample results and will include all data including non-detects and applicable standards and/or guidance values. End-point samples will be analyzed for trigger analytes (those for which SCO exceedance is identified) utilizing the following methodology:

Soil analytical methods will include:

- Volatile organic compounds by EPA Method 8260;
- Semi-volatile organic compounds by EPA Method 8270;
- Target Analyte List metals; and
- Pesticides/PCBs by EPA Method 8081/8082.

If either LNAPL and/or DNAPL are detected, appropriate samples will be collected for characterization and "finger print analysis" and required regulatory reporting (i.e. spills hotline) will be performed.

Quality Assurance/Quality Control

The fundamental QA objective with respect to accuracy, precision, and sensitivity of analysis for laboratory analytical data is to achieve the QC acceptance of the analytical protocol. The accuracy, precision and completeness requirements will be addressed by the laboratory for all data generated.

Collected samples will be appropriately packaged, placed in coolers and shipped via overnight courier or delivered directly to the analytical laboratory by field personnel. Samples will be containerized in appropriate laboratory provided glassware and shipped in plastic coolers. Samples will be preserved through the use of ice or "cold-packs" to maintain a temperature of $4^{o}C$.

Dedicated disposable sampling materials will be used for the collection endpoint samples, eliminating the need to prepare field equipment (rinsate) blanks. However, if non-disposable equipment is used, (stainless steel scoop, etc.) field rinsate blanks will be prepared at the rate of 1 for every eight samples collected. Decontamination of non-dedicated sampling equipment will consist of the following:

- Gently tap or scrape to remove adhered soil
- Rinse with tap water
- Wash with alconox® detergent solution and scrub
- Rinse with tap water
- Rinse with distilled or deionized water

Prepare field blanks by pouring distilled or deionized water over decontaminated equipment and collecting the water in laboratory provided containers. One duplicate and one matrix spike/ matrix spike duplicate will be collected for every 20 samples.

Import and Reuse of Soils

Import of soils onto the property and reuse of soils already onsite will be performed in conformance with the Soil/Materials Management Plan in **Appendix 3**. No soil is planned to be imported into the Site for backfill and cover.. To the extent feasible, the 4,100 cubic yards of non-regulated soil that is anticipated to be generated during excavation of the proposed cellar will be used reused/relocated on Site as backfill material. Should additional soil backfill/cover be necessitated, only clean soils from a source that is pre-approved by OER will be used. The estimated maximum quantity of onsite soil/fill expected to be reused/relocated on Site is 4,100 cubic yards.

4.3 ENGINEERING CONTROLS

No engineering controls are required for this site, as Track 1 cleanup is anticipated. If a Track 1 cleanup is not achieved, engineering controls will be established as defined in Alternative 2 of the Alternatives Analysis.

4.4 INSTITUTIONAL CONTROLS

No Institutional Controls (IC) are required for this site as a Track 1 Cleanup is anticipated. If a Track 1 cleanup is not achieved, institutional controls will be established as defined in Alternative 2 of the Alternatives Analysis.

4.5 SITE MANAGEMENT PLAN

No site management is required for this site, as Track 1 cleanup is anticipated. If a Track 1 cleanup is not achieved, a Site Management Plan will be established as defined in Alternative 2 of the Alternatives Analysis.

4.6 QUALITATIVE HUMAN HEALTH EXPOSURE ASSESSMENT

Investigations reported in the Remedial Investigation Report (RIR) are sufficient to complete a Qualitative Human Health Exposure Assessment (QHHEA). As part of the BCP process, a QHHEA was performed to determine whether the Site poses an existing or future health hazard to the Site's exposed or potentially exposed population. The sampling data from the RI were evaluated to determine whether there is any health risk by characterizing the exposure setting, identifying exposure pathways, and evaluating contaminant fate and transport. This EA was prepared in accordance with Appendix 3B and Section 3.3 (b) 8 of the NYSDEC Draft DER-10 Technical Guidance for Site Investigation and Remediation.

Known and Potential Sources

Based on the results of the RIR, the contaminants of concern are:

Soil :

- Metals including barium and lead were detected in excess of NYSDEC Part 375 Track 2 Restricted Residential (Track 2) Soil Cleanup Objectives (SCOs). Several other metals marginally exceeded Track 1 Unrestricted SCOs but not Track 2 including Barium, Cadmium, Copper, Lead, Nickel, and Zinc.
- sVOCs (PAHs) exceedances included benzo compounds including benzo(a)anthracene, benzo(a)pyrene, Benzo(b)fluoranthane, Benzo(k)fluoranthene, chrysene, Dibenzo(a,h)anthracene, and Indeno(1,2,3-cd)pyrene.

- Low levels of pesticides were detected in shallow soils and none above Track 2 Restricted Residential SCOs including 4,4'-DDD, 4,4'DDE, 4,4'-DDT, and Dieldrin.
- Two VOCs were detected below Track 1 SCOs including Methylene Chloride and Naphthalene. Methylene Chloride, which was detected in all samples including batch blank samples, indicating that it is not derived from the site. These findings are unremarkable and do not indicate an onsite source of contamination. Field observations and laboratory data support the conclusion that the source of low levels of contaminants observed is urban fill.

Groundwater:

- VOC concentrations above its GQS includes MTBE, cis1,2-Dichloroethylene, and Tetrachloroethylene. Naphthalene and Trichloroethylene was detected below GQS.

Soil Vapor:

- VOCs detected at generally low concentrations, including TCE and PCE. No VOC concentrations in excess of NYSDOH guidance values.

Nature, Extent, Fate and Transport of Contaminants

Soil: SVOCs were identified in the shallow soil (0-2') collected at the Site at concentrations exceeding respective Unrestricted Soil Cleanup Objectives (USCO). Metals and pesticides, were detected in the shallow soil. The findings of SVOCs and metals are consistent with the occurrence of historic fill on the property. No evidence of petroleum or petroleum staining in soil or fill was encountered during the RI.

Groundwater: The RI identified MTBE, cis1,2-Dichloroethylene, and Tetrachloroethylene above its GQS, but none were detected in any soil samples.

Soil Vapor: TCE and PCE were found in soil vapor sampling locations, and were found in groundwater. It is suspected that these compounds are derived from an offsite source.

Potential Routes of Exposure

The five elements of an exposure pathway are (1) a contaminant source, (2) contaminant release and transport mechanisms, (3) a point of exposure, (4) a route of exposure, and (5) a receptor population. An exposure pathway is considered complete when all five elements of an

exposure pathway are documented. A potential exposure pathway exists when any one or more of the five elements comprising an exposure pathway cannot be documented. An exposure pathway may be eliminated from further evaluation when any one of the five elements comprising an exposure pathway has not existed in the past, does not exist in the present, and will never exist in the future. Three potential primary routes exist by which chemicals can enter the body:

- Ingestion of water, fill, or soil;
- Inhalation of vapors and particulates; and
- Dermal contact with water, fill, soil, or building materials.

Existence of Human Health Exposure

Current Conditions: The site is currently predominantly capped with concrete and asphalt with a limited portion of the Site landscaped (north of the basketball courts). The Site is completely fenced, restricting access. Exposure to surface souls is limited spatially and temporally; that is, excavation is anticipated in a timely manner. Groundwater is not exposed at the site, and because the site is served by the public water supply, groundwater is not used at the site.

Construction/ Remediation Activities: The potential exposure pathways to onsite contamination are by ingestion, dermal, or inhalation exposure by onsite workers during the remedial action. During the remedial action, on-site exposure pathways will be eliminated by preventing access to the site, through implementation of soil/ materials management, stormwater pollution prevention, and dust controls, employment of a community air monitoring plan, and implementation of a Construction Health and Safety Plan.

Proposed Future Conditions: Under future remediated conditions, the site will be fully capped, limiting potential direct exposure to soil and groundwater remaining in place, and engineering controls will prevent potential for inhalation via soil vapor intrusion. The site is served by the public water supply, groundwater is not used at the site. There are no plausible off-site pathways for oral, inhalation, or dermal exposure to contaminants derived from the site.

Receptor Populations

On-Site Receptors: The site is currently a courtyard, a private basketball court, and paved parking area. Potential on-site receptors include adult and child visitors, construction workers, trespassers and commercial workers.

Off-Site Receptors: Potential off-site receptors within a 0.25 mile radius of the Site include: adult and child residents; commercial and construction workers; pedestrians; trespassers; and cyclists, based on the following:

1. Commercial Businesses (up to 0.25 mile) – existing and future
2. Residential Buildings (up to 0.25 mile) – existing and future
3. Building Construction/ Renovation (up to 0.25 mile) – existing and future
4. Pedestrians, Trespassers, Cyclists (up to 0.25 mile) – existing and future
5. Schools (up to 0.25 mile) – existing and future

Overall Human Health Exposure Assessment

Complete on-site exposure pathways appear to be present only during the construction and remediation phase. During the remedial action, on-site exposure pathways will be eliminated by preventing access to the site, through implementation of soil/materials management, stormwater pollution prevention, and dust controls, employment of a community air monitoring plan, and implementation of a Construction Health and Safety Plan.

5.0 REMEDIAL ACTION MANAGEMENT

5.1 PROJECT ORGANIZATION AND OVERSIGHT

Principal personnel who will participate in the remedial action include Peter Setaro, Professional Engineer (PE) of Morris Associates Engineering Consultants, PLLC and Paul H. Ciminello Qualified Environmental Professional (QEP) of Ecosystems Strategies, Inc.

5.2 SITE SECURITY

Site access will be controlled by fencing surrounding the Site and gated entrances.

5.3 WORK HOURS

The hours for operation of remedial construction will be from 7 AM to 5 PM. These hours conform to the New York City Department of Buildings (DOB) construction code requirements or according to specific variances issued by DOB.

5.4 HEALTH AND SAFETY PLAN

The Health and Safety Plan is included in **Appendix 4**. The Environmental Site Safety Coordinator will be Paul H. Ciminello. Remedial work performed under this RAWP will be in full compliance with applicable health and safety laws and regulations, including Site and OSHA worker safety requirements and HAZWOPER requirements. Confined space entry, if any, will comply with OSHA requirements and industry standards and will address potential risks. The parties performing the remedial construction work will ensure that performance of work is in compliance with the HASP and applicable laws and regulations. The HASP pertains to remedial and invasive work performed at the Site until the issuance of the Notice of Completion.

All field personnel involved in remedial activities will participate in training required under 29 CFR 1910.120. The Environmental Site Safety Coordinator will have completed a 40-hour hazardous waste operator training and general site workers who remove hazardous waste (i.e. excavators, truck drivers) will have completed an 8-hour hazardous waste operations training course or will receive specific training on health and safety matters by the ESSC. The

Environmental Site Safety Coordinator will be responsible for maintaining workers training records.

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

An emergency contact sheet with names and phone numbers is included in the HASP. That document will define the specific project contacts for use in case of emergency.

5.5 COMMUNITY AIR MONITORING PLAN

Real-time air monitoring for volatile organic compounds (VOCs) and particulate levels at the perimeter of the exclusion zone or work area will be performed. Continuous monitoring will be performed for all ground intrusive activities and during the handling of contaminated or potentially contaminated media. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pit excavation or trenching, and the installation of soil borings or monitoring wells.

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

VOC Monitoring, Response Levels, and Actions

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

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities will be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities will resume with continued monitoring.

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

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

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

Particulate Monitoring, Response Levels, and Actions

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

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques will be employed. Work will continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work will be stopped and a re-evaluation of activities initiated. Work will resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

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

5.6 AGENCY APPROVALS

All permits or government approvals required for remedial construction have been or will be obtained prior to the start of remedial construction. Approval of this RAWP by OER does not constitute satisfaction of these requirements and will not be a substitute for any required permit.

5.7 SITE PREPARATION

Pre-Construction Meeting

OER will be invited to attend the pre-construction meeting at the Site with all parties involved in the remedial process prior to the start of remedial construction activities.

Mobilization

Mobilization will be conducted as necessary for each phase of work at the Site. Mobilization includes field personnel orientation, equipment mobilization (including securing all sampling equipment needed for the field investigation), marking/staking sampling locations and utility mark-outs. Each field team member will attend an orientation meeting to become familiar with the general operation of the Site, health and safety requirements, and field procedures.

Utility Marker Layouts, Easement Layouts

The presence of utilities and easements on the Site will be fully investigated prior to the performance of invasive work such as excavation or drilling under this plan by using, at a minimum, the One-Call System (811). Underground utilities may pose an electrocution, explosion, or other hazard during excavation or drilling activities. All invasive activities will be performed incompliance with applicable laws and regulations to assure safety. Utility companies and other responsible authorities will be contacted to locate and mark the locations, and a copy of the Markout Ticket will be retained by the contractor prior to the start of drilling, excavation or other invasive subsurface operations. Overhead utilities may also be present within the anticipated work zones. Electrical hazards associated with drilling in the vicinity of overhead utilities will be prevented by maintaining a safe distance between overhead power lines and drill rig masts.

Proper safety and protective measures pertaining to utilities and easements, and compliance with all laws and regulations will be employed during invasive and other work contemplated under this RAWP. The integrity and safety of on-Site and off-Site structures will be maintained during all invasive, excavation or other remedial activity performed under the RAWP.

Dewatering

Groundwater is not present at the anticipated maximum depth of excavation (12 feet). Consistent static groundwater at the Site (as measured by on-Site monitoring wells) is approximately 15 Feet bsg, or roughly 3 feet below the maximum depth of excavation. As such, active dewatering is not proposed at this time. Should construction plans warrant the implementation of dewatering, a separate Dewatering Plan will be submitted to OER.

Equipment and Material Staging

Equipment and materials will be stored and staged in a manner that complies with applicable laws and regulations. The location of proposed equipment and material staging areas, truck inspection station, stockpile areas, and other pertinent remedial management features has not yet been determined.

Stabilized Construction Entrance

Steps will be taken to ensure that trucks departing the site will not track soil, fill or debris off-Site. Such actions may include use of cleaned asphalt or concrete roads or use of stone or other aggregate-based egress paths between the truck inspection station and the property exit. Measures will be taken to ensure that adjacent roadways will be kept clean of project related soils, fill and debris.

Truck Inspection Station

An outbound-truck inspection station will be set up close to the Site exit. Before exiting the NYC BCP Site, trucks will be required to stop at the truck inspection station and will be examined for evidence of contaminated soil on the undercarriage, body, and wheels. Soil and debris will be removed. Brooms, shovels and potable water will be utilized for the removal of soil from vehicles and equipment, as necessary.

5.8 TRAFFIC CONTROL

Drivers of trucks leaving the NYC BCP Site with soil/fill will be instructed to proceed without unnecessary stopping in the vicinity of the site to prevent neighborhood impacts. The planned route on local roads for trucks leaving the site is the following:

- West to Lenox Avenue
- North to 125th Street
- Onto the RFK Bridge and north on I87 (Major Deegan Expressway)

5.9 DEMOBILIZATION

Demobilization will include:

- As necessary, restoration of temporary access areas and areas that may have been disturbed to accommodate support areas (e.g., staging areas, decontamination areas, storage areas, temporary water management areas, and access area);
- Removal of sediment from erosion control measures and truck wash and disposal of materials in accordance with applicable laws and regulations;
- Equipment decontamination, and;
- General refuse disposal.

Equipment will be decontaminated and demobilized at the completion of all field activities. Investigation equipment and large equipment (*e.g.*, soil excavators) will be washed at the truck inspection station as necessary. In addition, all investigation and remediation derived waste will be appropriately disposed.

5.10 REPORTING AND RECORD KEEPING

Daily Reports

Daily reports providing a general summary of activities for each day of *active remedial work* will be emailed to the OER Project Manager by the end of the following day. Those reports will include:

- Project number and statement of the activities and an update of progress made and locations of work performed;
- Quantities of material imported and exported from the Site;
- Status of on-Site soil/fill stockpiles;

- A summary of all citizen complaints, with relevant details (basis of complaint; actions taken; etc.);
- A summary of CAMP excursions, if any;
- Photograph of notable Site conditions and activities.

The frequency of the reporting period may be revised in consultation with OER project manager based on planned project tasks. Daily email reports are not intended to be the primary mode of communication for notification to OER of emergencies (accidents, spills), requests for changes to the RAWP or other sensitive or time critical information. However, such information will be included in the daily reports. Emergency conditions and changes to the RAWP will be communicated directly to the OER project manager by personal communication. Daily reports will be included as an Appendix in the Remedial Action Report.

An alphanumeric site map will be used to identify locations described in reports submitted to OER and is shown in **Figure #6**.

Record Keeping and Photo-Documentation

Job-site record keeping for all remedial work will be performed. These records will be maintained on-Site during the project and will be available for inspection by OER staff. Representative photographs will be taken of the Site prior to any remedial activities and during major remedial activities to illustrate remedial program elements and contaminant source areas. Photographs will be submitted at the completion of the project in the RAR in digital format (i.e. jpeg files).

5.11 COMPLAINT MANAGEMENT

All written complaints from citizens relating to site remedial activities will be promptly reported to OER. These complaints will be addressed and outcomes will also be reported to OER in daily reports. Notices to OER will include the nature of these complaints, the party providing these complaints, and the actions taken to resolve any problems.

5.12 DEVIATIONS FROM THE REMEDIAL ACTION WORK PLAN

All changes to the RAWP will be reported to the OER Project Manager and will be documented in daily reports and reported in the Remedial Action Report. The process to be followed if there are any deviations from the RAWP will include a request for approval for the change from OER noting the following:

- Reasons for deviating from the approved RAWP;
- Effect of the deviations on overall remedy; and
- Determination that the remedial action with the deviation(s) is protective of public health and the environment.

5.13 DATA USABILITY SUMMARY REPORT

The primary objective of a Data Usability Summary Report (DUSR) is to determine whether or not data meets the site specific criteria for data quality and data use. The DUSR provides an evaluation of analytical data without third party data validation. The DUSR for post-remedial samples collected during implementation of this RAWP will be included in the Remedial Action Report (RAR).

6.0 REMEDIAL ACTION REPORT

A Remedial Action Report (RAR) will be submitted to OER following implementation of the remedial action defined in this RAWP. The RAR will document that the remedial work required under this RAWP has been completed and has been performed in compliance with this plan. The RAR will include:

- Information required by this RAWP;
- As-built drawings for all constructed remedial elements, required certifications, manifests and other written and photographic documentation of remedial work performed under this remedy;
- Site Management Plan;
- Description of any changes in the remedial action from the elements provided in this RAWP and associated design documents;
- Tabular summary of all end point sampling results and all material characterization results, QA/QC results for end-point sampling, and other sampling and chemical analysis performed as part of the remedial action and DUSR;
- Test results or other evidence demonstrating that remedial systems are functioning properly;
- Account of the source area locations and characteristics of all contaminated material removed from the Site including a map showing source areas;
- Account of the disposal destination of all contaminated material removed from the Site. Documentation associated with disposal of all material will include transportation and disposal records, and letters approving receipt of the material.
- Account of the origin and required chemical quality testing for material imported onto the Site.
- Recorded Declaration of Covenants and Restrictions.
- Reports and supporting material will be submitted in digital form.

Remedial Action Report Certification

The following certification will appear in front of the Executive Summary of the Remedial Action Report. The certification will include the following statements:

I, Peter Setaro, am currently a professional engineer licensed by the State of New York. I had primary direct responsibility for implementation of the remedial program for the 23 West 116th Street, Block 1600, Lot 20 Site.

I, Paul H. Ciminello, am a qualified Environmental Professional. I had primary direct responsibility for implementation remedial program for the 3 West 116th Street, Block 1600, Lot 20 Site.

I certify that the OER-approved Remedial Action Work Plan dated December 2011 and Stipulations in a letter dated December 2011; if any were implemented and that all requirements in those documents have been substantively complied with. I certify that contaminated soil, fill, liquids or other material from the property were taken to facilities licensed to accept this material in full compliance with applicable laws and regulations.

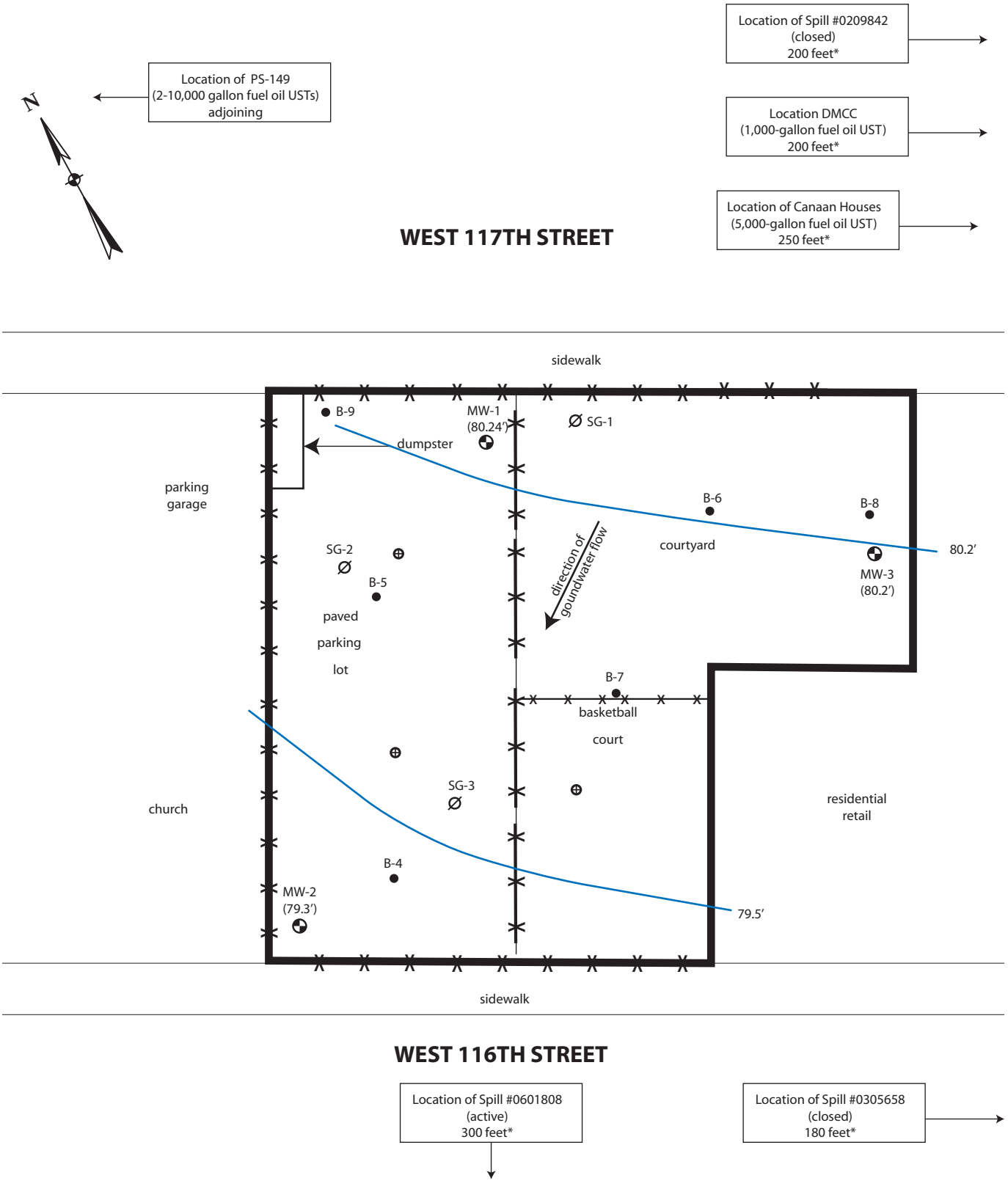
7.0 SCHEDULE

The table below presents a schedule for the proposed remedial action and reporting. If the schedule for remediation and development activities changes, it will be updated and submitted to OER. Currently, a four-month remediation period is anticipated.

Schedule Milestone	Weeks from Remedial Action Start	Duration (weeks)
OER Approval of RAWP	0	-
Fact Sheet 2 announcing start of remedy	0	-
Mobilization	1 – 3	3
Remedial Excavation	4 – 9	5
Demobilization	10 – 12	3
Record Declaration of Covenants and Restrictions	N/A	N/A
Submit Remedial Action Report	20	N/A

Figures

Ecosystems Strategies, Inc.



All feature locations are approximate. This map is intended as a schematic to be used in conjunction with the associated report, and it should not be relied upon as a survey for planning or other activities.

Figure 1: Fieldwork Map

23 West 116th Street
Borough of Manhattan, New York

Legend:
- subject property border
- chain link fence
- exterior drains
- boring location
- groundwater contours
- borings completed as monitoring wells (soil and groundwater sample locations)
- soil gas sample locations

*Distances are from the nearest Site border.

ESI File: LM09015.50

December 2011

Scale: 1" = 50'

Figures

All feature locations are approximate. This map is intended as a schematic to be used in conjunction with the associated report, and it should not be relied upon as a survey for planning or other activities.

Figure 2: Site Location Map

23 West 116th Street
Borough of Manhattan, New York

Legend:

subject property border

ESI File: LM09015.50

December 2011

Figures

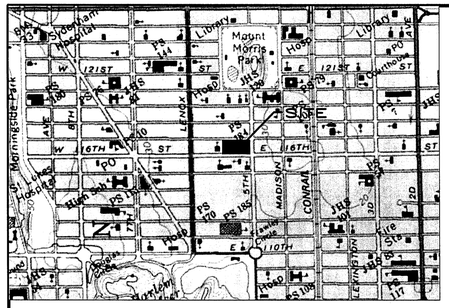
TITLE NO: ANY2009-5788C

SURVEY NO. 63167

63167001.DWG

FIGURE #3

ALTA/ACSM LAND TITLE SURVEY



VICINITY MAP
NOT TO SCALE

LEGAL DESCRIPTION

ALL that certain plot, piece or parcel of land situate, lying and being in the Borough of Manhattan, County, City and State of New York, more particularly bounded and described as follows:
BEGINNING at the corner formed by the intersection of the westerly side of Fifth Avenue and the northerly side of West 116th Street;
RUNNING thence westwardly along the northerly side of West 116th Street, 143 feet 0 inches to a point;
THENCE northwardly along a line parallel with Fifth Avenue, 100 feet 11 inches to the center line of the block between West 116th Street and West 117th Street;
THENCE westwardly along the said center line of the block, 152 feet 0 inches to a point;
THENCE southwardly along a line parallel with Fifth Avenue, 100 feet 11 inches to a point in the northerly side of West 116th Street;
THENCE westwardly along the northerly side of West 116th Street, 150 feet 0 inches to a point;
THENCE northwardly along a line parallel with Fifth Avenue, 201 feet 10 inches to the southerly side of West 117th Street;
THENCE eastwardly along the southerly side of West 117th Street, 445 feet 0 inches to the westerly side of Fifth Avenue;
THENCE southwardly along the westerly side of Fifth Avenue, 201 feet 10 inches to the point or place of BEGINNING.

PARCEL I

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

BEGINNING at a point on the southerly side of West 117th Street (60 feet wide) distant 225.35 feet westerly from the corner formed by the intersection of the southerly side of West 117th Street, with the westerly side of 5th Avenue (100 feet wide);

RUNNING THENCE southerly, at right angles to the southerly side of West 117th Street, 100 feet 11 inches to the center line of the block;

RUNNING THENCE westerly, along the center line of the block, and at right angles to the last mentioned course, 69.65 feet to a point;

RUNNING THENCE southerly, parallel with the westerly side of 5th Avenue, 100 feet 11 inches to the northerly side of West 116th Street (100 feet wide);

RUNNING THENCE westerly, along the northerly side of West 116th Street, 150 feet to a point;

RUNNING THENCE northerly, parallel with the westerly side of 5th Avenue, 201 feet 10 inches to the southerly side of West 117th Street;

RUNNING THENCE easterly, along the southerly side of West 117th Street, 219.65 feet to the point or place of BEGINNING.

PARCEL II

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

BEGINNING at the corner formed by the intersection of the southerly side of West 117th Street (60 feet wide), with the westerly side of 5th Avenue (100 feet wide);

RUNNING THENCE southerly, along the westerly side of 5th Avenue, 201 feet 10 inches to the corner formed by the intersection of the westerly side of 5th Avenue, with the northerly side of West 116th Street (100 feet wide);

RUNNING THENCE westerly, along the northerly side of West 116th Street, 143 feet to a point;

RUNNING THENCE northerly, parallel with the westerly side of 5th Avenue, 100 feet 11 inches to the center line of the block;

RUNNING THENCE westerly, along the centerline of the block, 82.35 feet to a point;

RUNNING THENCE northerly, at right angles to the last mentioned course, 100 feet 11 inches to the southerly side of West 117th Street;

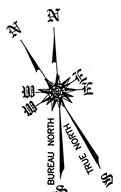
RUNNING THENCE easterly, along the southerly side of West 117th Street, 225.35 feet to the corner, the point or place of BEGINNING.

SURVEYOR'S CERTIFICATE

The undersigned, being a registered surveyor of the State of New York certifies to (i) All New York Title Agency, Inc. and (ii) Fiat American Title Insurance Company as follows:
1. This is to certify that this map or plat and the survey on which it is based were made in accordance with the "Minimum Standard Detail Requirements for ALTA/ACSM Land Title Surveys", jointly established and adopted by ALTA and NSPS in 2005, and includes items 2, 3, 4, 7(a), 8, 9, 10, 11(a), 13, 14 and 16 of Table A thereof. Pursuant to the Accuracy Standards as adopted by ALTA and NSPS and in effect on the date of this certification, undersigned further certifies that in my professional opinion, as a land surveyor registered in the State of New York, the Relative Positional Accuracy of this survey does not exceed that which is specified therein.
2. The survey was made on the ground on 4-15-2009 and accurately shows the area of the subject property, the location and type of all buildings, structures and other improvements situated on the subject property, and any other matters situated on the subject property.
3. Except as shown on the survey, there are no visible easements or rights of way of which the undersigned has been advised.
4. Except as shown on the survey, there are no observable, above ground encroachments (a) by the improvements on the subject property upon adjoining properties, streets or alleys, or (b) by the improvements on adjoining properties, street or alleys upon the subject property.
5. The location of each easement, right of way, servitude and other matter affecting the subject property and listed in the title insurance commitment dated February 13, 2009, issued by All New York Title Agency, INC. with respect to the subject property, has been shown on the survey, together with appropriate recording references, to the extent that such matters can be located.
The property shown on the survey is the property described in the title commitment. The location of all improvements on the subject property is in accord with minimum setback provisions and restrictions of records referenced in such title commitment.
6. The subject property has access to and from a duly dedicated and accepted public street or highway.
7. Except as shown on the survey, the subject property does not serve any adjoining property for drainage, utilities or ingress or egress.
8. The record description of the subject property forms a mathematically closed figure.
9. Except as shown on the survey, no portion of the property shown on the survey lies within a Special Hazard Area, as described on the Flood Insurance Rate Map for the community in which the subject property is located. The survey correctly indicates the zone designation of any area shown as being within a Special Hazard Area.
The parties listed above are entitled to rely on the survey and this certificate as being true and accurate.

Saeid Jalilvand L.S.,
License-050236

Dated: 01/06/2011



PUBLIC ROADWAY

60' WIDE

WEST 117th STREET

cc — Steel Faced Concrete Curb — cc

fence 4.53' south, wall 0.57' south, fence 0.24' south — wall 0.58' south, fence 0.23' south — curb 0.01' south, fence 0.55' south — fence 0.15' south, fence 0.07' south — fence on line, metal door 4.41' south, fence 0.06' south — fence 0.12' south

8.0' High Chain Link Fence With Barbed Wire — 13.0'± — Concrete Walk — POINT OF BEGINNING (PARCEL I) — 445' — 4.7' High Iron Fence — 225.35' — Gate — Chain Link Fence on "B" Conc. Wall — POINT OF BEGINNING (PARCEL II)

fence 3.36' east, wall 0.06' west, fence 0.36' west — wall 3.75' east — 5.0' High Conc. Block Wall Enclosure — wall 3.72' east — curb 3.73' east — 219.65'

TAX LOT 1 (1001-1002) CONDOMINIUM NO. 1075-A — Parallel With 5th Avenue — 6' Concrete Curb — 6 Parking Spaces — 18 Parking Spaces — 201'-10" — 8.0' High Chain Link Fence on 8" Concrete Curb — 8.0' High Chain Link Fence — 6' Concrete Curb — 12.0' High Chain Link Fence — Asphalt Pavement — 150'

TAX BLOCK 1600

TAX LOT 20
Parcel Area= 37,304 SQ. FT. or 0.85638 Acres

Earth — Concrete Walk — Earth — Concrete Walk — Earth — Concrete Walk — Earth — Concrete Walk — Earth

Proposed Subdivision Line — 100'-11" — 12.0' High Chain Link Fence — 69.65' — 8.0' High Chain Link Fence — 82.35' — 6.0' High Chain Link Fence — 152'

TAX LOT 21
Parcel Area= 37,172 SQ. FT. or 0.85335 Acres

ST. NO. 1428
6 STORY BRICK BUILDING
5 STORY BRICK BUILDING — Bldg. Height 57.1'± — Bldg. Height 48.8'± — Bldg. Height 58.3'± — 173.11' — 121.59' — 105.98' — 160.14'

A/C Unit Projects 0.7'± north
A/C Guard Projects 1.0'± north
Iron Angle Projects 0.4'± north
Roof Cap Projects 0.3'± north
2 STORY BRICK EXT. — STUCCO BSMT. EXT.

TAX LOT 26
REPUTED OWNER:
MALCOLM SHABAZZ COURT LLC

TAX LOT 27
REPUTED OWNER:
MALCOLM SHABAZZ COURT LLC

TAX LOT 30
REPUTED OWNER:
SECOND PROVIDENCE BAPTIST CHURCH INC

Center Line of The Block

curb 1.90' west — 0.13' east — Window Projects 0.4'± West Wnot Open — 9 STORY BRICK BUILDING — Parallel With 5th Avenue — 0.16' east — 2 STORY 0.15' east

4 STORY BRICK & STUCCO — 4 STORY BRICK — Yard — 6.0' High Chain Link Fence on Concrete Block Wall — 4.0' High Chain Link Fence — Gate — 8.0' High Chain Link Fence on 12" Conc. Wall With Barbed Wire — Wire Runs Along Fence — Column — Ramp — 143'

fence 0.41' west, wall 0.04' west — fence 3.17' west — fence 2.51' west, curb 1.83' west — 152' — column 0.17' west — fence 0.34' west east side of wall on line — 0.10' east — 0.07' west

fence 0.30' south, fence 0.34' south — 20.5'± — fence 0.29' south, fence 1.09' north — Concrete Walk — wall 4.54' north, fence 4.86' north — wall 4.81' north, fence 4.81' north — ramp 0.11' north — fence 0.02' south — POINT OF BEGINNING TAX LOT 20 — fence 0.02' south — fence 0.21' east

cc — Steel Faced Concrete Curb

fence 0.07' west — 17.49' — 23.92' — fence 0.10' east — 10.59' — 6.90' — Gate — fence 0.03' east — cwa (Covered) — cwa 4.66' west — 20.4'± — 201'-10" — Concrete Walk — Steel Faced Concrete Curb

100' WIDE — 6 STORY BRICK BUILDING — 5th AVENUE — PUBLIC ROADWAY — 5.0' High Iron Fence — 4.99' — 23.98' north — 4.81' north — 49.19' — 39.11'± — 0.75' north — 6.86'

WEST 116th STREET

PUBLIC ROADWAY

100' WIDE

Total Parcel Area=74,476 SQ. FT. or 1.70973 Acres

NOTES:

1. BELOW GRADE ENCROACHMENTS AND VAULTS IF ANY NOT LOCATED.
2. THERE ARE 33 PARKING SPACES & 3 HANDICAPED SPACES ON THE PREMISES.
3. THE PREMISES IS SERVED BY GAS, WATER, ELECTRICITY, TELEPHONE AND SANITARY SEWER LINES INSTALLED IN STREET.

SCHEDULE "B" ITEMS

5.Regulatory Agreement For Insured Multi-Family Housing Projects between Impac Associates Redevelopment Company and the Secretary of Housing and Urban Development dated 4-7-1981 recorded 4-14-1981 in Reel 562 Page 1033. Not Plottable.

6.Terms, covenants, conditions and provisions for the revesting of title in The City of New York, as contained in the Deed from the City of New York to Impac Associates Redevelopment Company dated as of 3-13-1981 recorded 4-14-1981 in Reel 562 page 1016 and in the Land Disposition Agreement between the same parties dated as of 12-4-1980 recorded 4-22-1981 in Reel 563 page 1043. Not Plottable.

FLOOD HAZARD NOTE

THE PARCEL SURVEYED IS COMPRISED OF AREAS DESIGNATED AS ZONE X (LESS THAN 0.2% CHANCE OF FLOODING)
FEDERAL EMERGENCY MANAGEMENT AGENCY
NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP
COMMUNITY PANEL NUMBER 360497 0087 F
EFFECTIVE DATE SEPTEMBER 5, 2007

20 0 20 40 60
GRAPHIC SCALE - FEET

LEGEND

ASPH.....ASPHALT
BK.....BRICK
BSMT.....BASEMENT
CC.....CURB CUT
CCR.....CONCRETE CURB ROUND
CD.....CELLAR DOOR
CLF.....CHAIN LINK FENCE
CO.....CATCH BASIN CLEAN OUT
CONC.....CONCRETE
CRF.....CHAIN ROPE FENCE
CWA.....CELLAR WINDOW AREA
DR.....DRAIN
EL.....ELEVATION
FAB.....FIRE ALARM BOX
FC.....FILL CAP
FL EL.....FLOOR ELEVATION
GP.....GUARD POLE
GV.....GAS VALVE
IF.....IRON FENCE
INL.....CATCH BASIN INLET ELEVATION
INV.....SEWER INVERT ELEVATION
LIGHT POLE
MB.....MAIL BOX
MHU.....UNKNOWN MANHOLE
OF.....OIL FILL
OHW.....OVERHEAD WIRES
P.....POLE
PAVT.....PAVEMENT
PM.....PARKING METER
PMULT.....POLE, MULTIPLE USAGE
PR.....PEDESTRIAN RAMP
RET.....RETAINING
RIM.....RIM ELEVATION SEWER MANHOLE
SFCR....STEEL FACED CURB ROUND
STY.....STORY
TB.....TOP OF BANK ELEVATION
TRAFFIC LIGHT
TEL.....TELEPHONE
TP.....TREE PIT
TRAFFIC SIGN
TW.....ELEVATION AT TOP OF WALL
UP.....UTILITY POLE
VU.....VALVE UNKNOWN
VLTU.....VAULT UNKNOWN
VP.....VENT PIPE
WV.....WATER VALVE
12"G.....GAS MAIN WITH SIZE
12"S.....SEWER MAIN WITH SIZE
12"W.....WATER MAIN WITH SIZE
CATCH BASIN
E ...ELECTRIC MANHOLE / VAULT
F .....FIRE MANHOLE
G .....GAS MANHOLE
S .....SEWER MANHOLE
T .....TELEPHONE MANHOLE
W .....WATER MANHOLE
TR .....TRAFFIC VAULT
.....HYDRANT
TB.....TREE WITH SIZE
17.0 ...ESTABLISHED GRADE

DRAWN: O.A.

REV	DATE	DESCRIPTION	ck

REV	DATE	DESCRIPTION	ck
	04-15-09	ALTA-ACSM LAND TITLE SURVEY	
A	—	TAX LOT NUMBERS REVISED	
B	—	TOTAL PARCEL AREA REVISED	

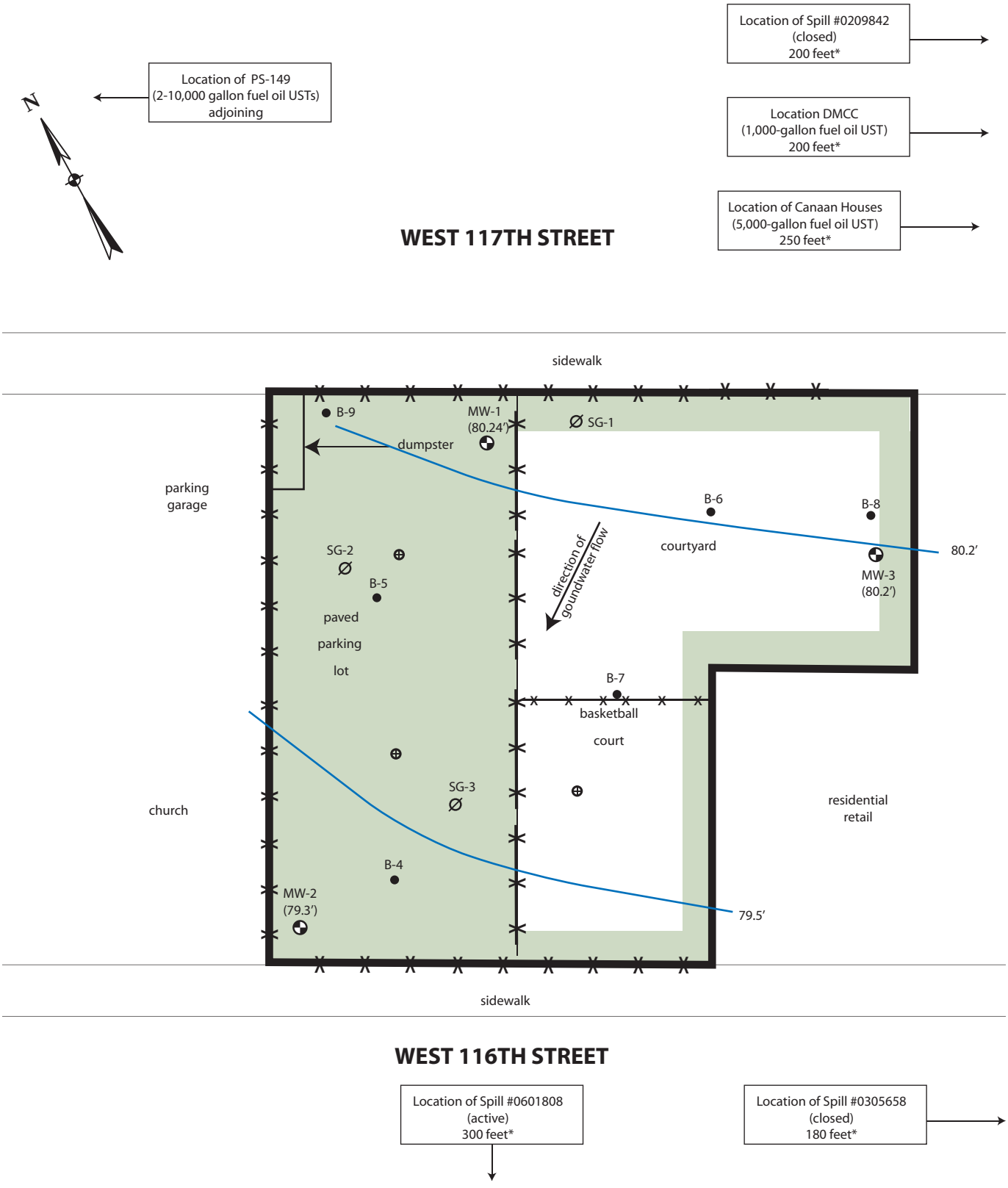
MONTROSE
SURVEYING CO., LLP.
CITY & LAND SURVEYORS
116 20 METROPOLITAN AVE. * RICHMOND HILL NY 11418-1090 * (718) 849-0600

ESTABLISHED 1876 * SUCCESSOR TO:
B.G. MEINKHEIM C.S.*C.U. POWELL C.E.,C.S.*L.C.L. SMITH C.S.*NATHAN CAMPBELL C.E.,C.S.*A.U. WHITSON C.E.,C.S.*
WILLIAM L. SAVACOOL C.E.,L.S.,C.S.*A.U. WHITSON INC. C.E.,C.S.*G. WEBER L.S.,C.S.*C. STOOLPH R.A.,L.S.*WHITSON & POWELL INC. P.E.,L.S.,C.S.*KELLER & POWELL P.E.,L.S.,C.S.*LOUIS MONTROSE C.E.,L.S.,C.S.*FRED J. POWELL P.E.,L.S.,C.S.*

CITY OF NEW YORK
COUNTY OF NEW YORK
TAX BLOCK 1600
TAX LOT 20 & 21

SCALE: 1" = 20'

Ecosystems Strategies, Inc.



All feature locations are approximate. This map is intended as a schematic to be used in conjunction with the associated report, and it should not be relied upon as a survey for planning or other activities.

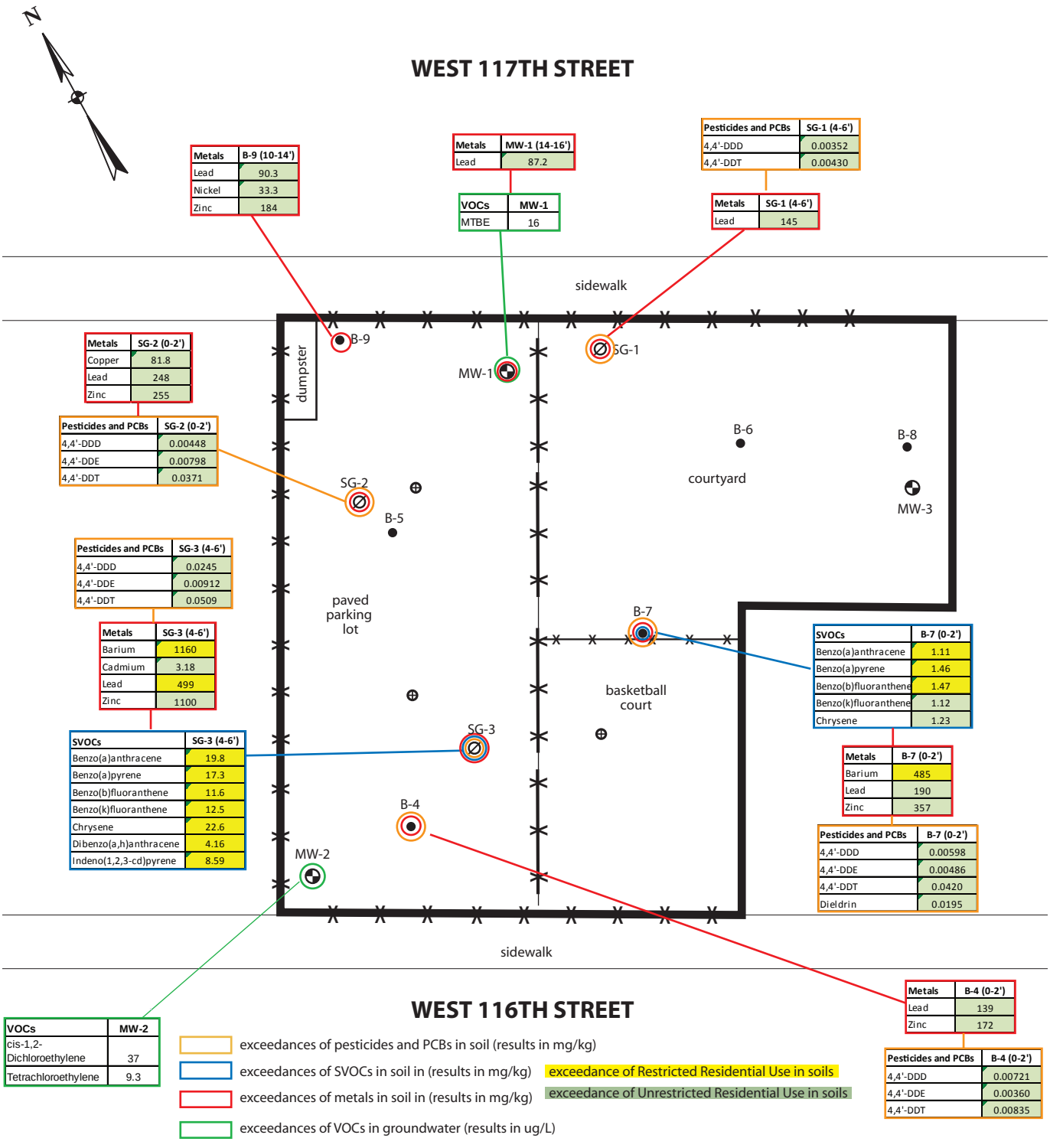
Figure 4: Areas of Concern

23 West 116th Street
Borough of Manhattan, New York

Legend:
- subject property border
- chain link fence
- exterior drains
- boring location
- groundwater contours
- borings completed as monitoring wells (soil and groundwater sample locations)
- soil gas sample locations
- area of concern

*Distances are from the nearest Site border.

ESI File: LM09015.50
December 2011
Scale: 1" = 50'
Figures



All feature locations are approximate. This map is intended as a schematic to be used in conjunction with the associated report, and it should not be relied upon as a survey for planning or other activities.

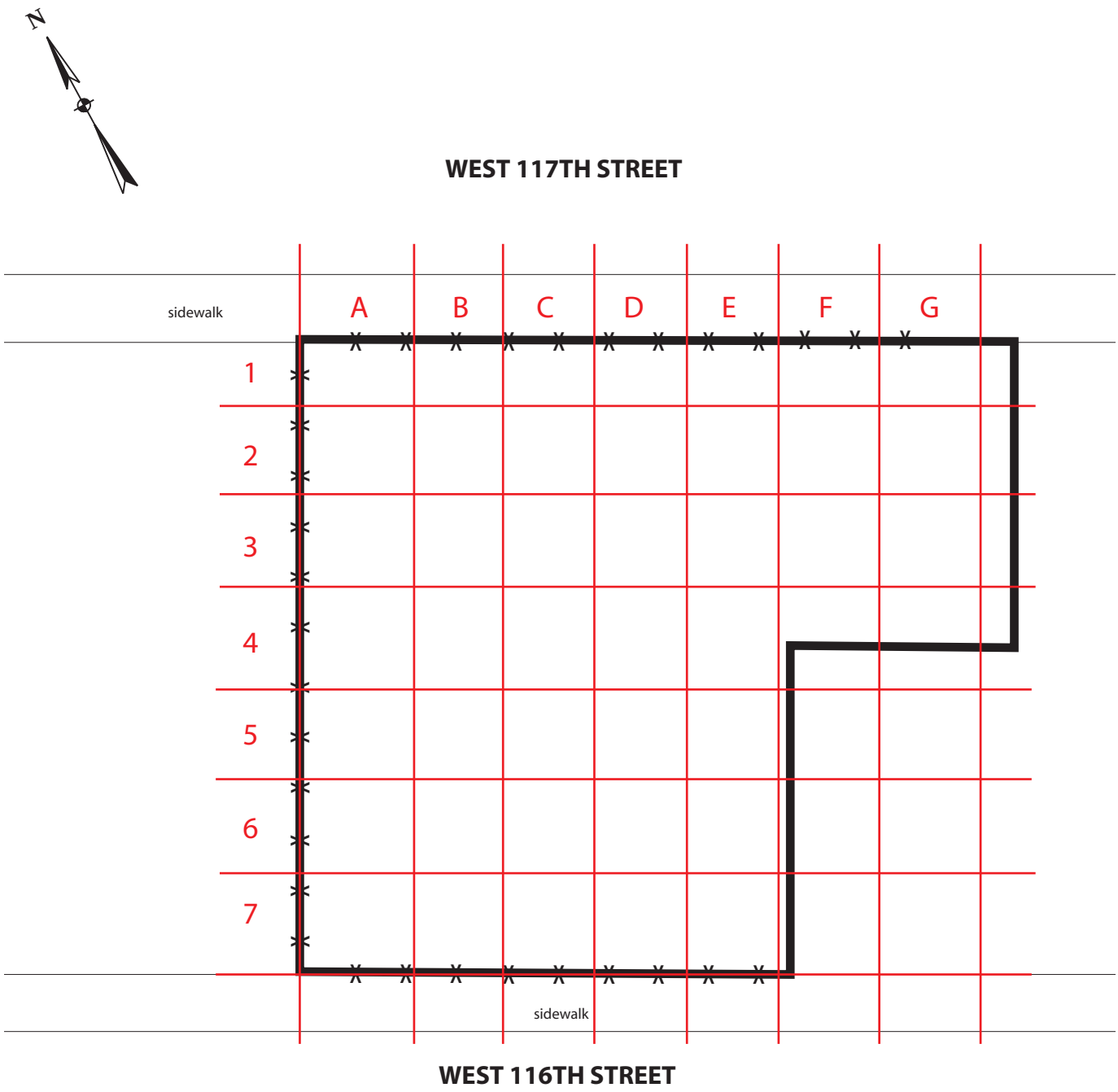
Figure 5: Exceedances in Soils and Groundwater Map

23 West 116th Street
Borough of Manhattan, New York

Legend:
- subject property border
- chain link fence
- exterior drains
- boring location
- borings completed as monitoring wells (soil and groundwater sample locations)
- soil gas sample locations

*Distances are from the nearest Site border.

ESI File: LM09015.50
December 2011
Scale: 1" = 50'
Figures



All feature locations are approximate. This map is intended as a schematic to be used in conjunction with the associated report, and it should not be relied upon as a survey for planning or other activities.

Figure 6: Alphanumeric Site Map

1428 Fifth Avenue (rear portion)
Borough of Manhattan, New York

Legend:

subject property border

chain link fence

ESI File: LM09015.50

December 2011

Scale: 1" = 50'

Figures

TABLES

Table 1: Construction Details for Soil Borings and Monitoring Wells

	Identification Number	Date of construction	Total Depth	Diameter	Ground surface elevation	Screened interval (Elevation Range)	Construction Material (PVC, steel, etc)
Soil Borings	SG-1 SG-2 SG-3 B-4 B-5 B-6 B-7 B-8 B-9 MW-1	7/18/2011 7/18/2011 7/18/2011 7/18/2011 7/18/2011 7/18/2011 7/18/2011 7/19/2011 7/19/2011 7/19/2011	15 feet 15 feet 15 feet 15 feet 15 feet 15 feet 15 feet 15 feet 15 feet 22.3 feet			NA	NA
Monitor Wells	MW-1 MW-2 MW-3	7/19/2011 Unknown unknown	22.3 feet 24.4 feet 25.5 feet	2 inch 2 inch 2 inch	* 80.24 feet * 79.3 feet * 80.2 feet	12-22 feet Unknown unknown	PVC PVC PVC

*** Indicates an arbitrary elevation that was calculated relative to an artificial benchmark elevation of 100 feet.**

Table 2: Groundwater Level Data

Monitoring Well ID No.	Date	Water Depth
MW-1	8/9/2011	15.2’ bsg
MW-2	8/9/2011	15.3’ bsg
MW-3	8/9/2011	15.0’ bsg

Table 3: Groundwater Sampling Data

Well ID Number	Date & Time	Weather Condition (°F)	Headspace PID (ppm)	Purge volume (gallons)	pH	Dissolved Oxygen (mg/L)	Temperature (°C)	Total depth of the well from the top of casing or surveyors mark (feet)	Depth from the top of the casing to the water (feet)	Estimated water volume in the well (gallons)
MW-1	8/9/2011	85°F	0.0	7.5	6.59	0.88	19.55	22.3	15.2	1.16
MW-2	8/9/2011	85°F	0.0	6.2	6.69	0.55	20.73	24.4	15.3	1.48
MW-3	8/9/2011	85°F	0.0	6.5	6.61	0.67	20.35	25.5	15.0	2.53

Table 4: Groundwater Sampling Logs

Well ID Number	Purge Time (min) 8/9/2011	Purge Method	purge Rate (gallons/min)	Total Volume Purged (gallons)	pH	Dissolved Oxygen (mg/L)	Temperature (°C)	Depth from the top of the casing to the water after purging
MW-1	30	Peristaltic	0.25	7.5	6.61	0.74	19.93	10.1
MW-2	18	Peristaltic	0.25	4.5	6.71	0.63	19.42	11.2
MW-3	18	Peristaltic	0.25	4.5	6.61	0.69	19.38	12.1

Table 5: Calculation of BaP equivalent values:

cPAHs	Equivalent Factor	SG-1	SG-2	SG-3	B-4	B-5	B-6	B-7	B-8	B-9	MW-1
Benzo(a)pyrene	**1.0**	0.561	0.0547	17.3	0.287	0.0903	ND	1.46	NT	0.483	0.0570
Benzo(a)anthracene	**0.1**	ND	.0483	1.98	.0340	.00808	ND	.111	NT	.0445	ND
Benzo(b)fluoranthene	**0.1**	ND	.0445	1.16	0.0288	ND	ND	.0147	NT	.0270	ND
Benzo(k)fluoranthene	**0.01**	ND	.00461	.125	.00257	ND	ND	0112	NT	.0036	ND
Chrysene	**0.01**	.000857	0.00277	.226	.00409	ND	ND	.0123	NT	.00459	ND
Dibenzo(a,h)anthracene	**1.0**	ND	.122	4.16	ND	ND	ND	ND	NT	.0619	ND
Indeno(123-cd)pyrene	**0.1**	ND	.0226	.859	.0108	ND	ND	.0392	NT	.0133	ND

Table 6 (1 of 4): VOCs in Soil
All results in mg/kg

Compound	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives - Restricted Residential	Sample Identification									
			SG-1 (4-6')	SG-2 (0-2')	SG-3 (4-6')	B-4 (0-2')	B-5 (14-16')	B-6 (10-14')	B-7 (0-2')	B-8 (14-16')	B-9 (10-14')	MW-1 (14-16')
			7/18/2011	7/18/2011	7/18/2011	7/18/2011	7/18/2011	7/18/2011	7/18/2011	7/19/2011	7/19/2011	7/19/2011
1,1,1,2-Tetrachloroethane	~	~	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	0.68	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	~	~	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)		~	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	~	~	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	0.27	26	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethylene	0.33	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloropropylene	~	~	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3-Trichlorobenzene	~	~	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3-Trichloropropane	~	~	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	~	~	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	3.6	52	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dibromo-3-chloropropane	~	~	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dibromoethane	~	~	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	1.1	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	0.02	3.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	~	~	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3,5-Trimethylbenzene	8.4	52	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	2.4	49	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichloropropane	~	~	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.8	13	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,2-Dichloropropane	~	~	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Chlorotoluene	~	~	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-Chlorotoluene	~	~	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	0.06	4.8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromobenzene	~	~	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromochloromethane	~	~	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	~	~	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromoform	~	~	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromomethane	~	~	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	0.76	2.4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	1.1	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane	~	~	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	~	49	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloromethane	~	~	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethylene	0.25	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,3-Dichloropropylene	~	~	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane	~	~	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibromomethane	~	~	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dichlorodifluoromethane	~	~	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethyl Benzene	1	41	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hexachlorobutadiene	~	~	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Isopropylbenzene	~	~	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methyl tert-butyl ether (MTBE)	0.93	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene chloride	0.05	100	0.022 B	0.027 B	0.033 B	0.026 B	0.028 B	0.029 B	0.019 B, J	0.025 B	0.021 B	0.025 J, B
n-Butylbenzene	12	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
n-Propylbenzene	3.9	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	12	100	ND	ND	0.0069 J	ND	ND	ND	ND	ND	0.0075 J	ND
o-Xylene	0.26	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
p- & m- Xylenes	~	~	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
p-Isopropyltoluene	~	~	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
sec-Butylbenzene	11	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Styrene	~	~	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
tert-Butylbenzene	5.9	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethylene	1.3	19	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	0.7	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethylene	0.19	~	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropylene	~	~	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethylene	0.47	21	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane	~	~	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride	0.2	0.9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylenes, Total	0.26	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

NOTES:
B=analyte found in the analysis batch blank
J=analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit) - data is estimated
NT=this indicates the analyte was not a target for this sample
~=this indicates that no regulatory limit has been established for this analyte
ND = Not Detected
Blue shade indicates detectable concentrations
Bold and yellow shade indicates exceedance of Restricted Use "Restricted Residential" SCOs
Bold and green shade indicates exceedance of Unrestricted Use SCOs
ESI File: LM09015.20

Ecosystems Strategies, Inc.

Table 6 (2 of 4): SVOCs in Soil

All results in mg/kg

Compound	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives - Restricted Residential	Sample Identification									
			SG-1 (4-6')	SG-2 (0-2')	SG-3 (4-6')	B-4 (0-2')	B-5 (14-16')	B-6 (10-14')	B-7 (0-2')	B-8 (14-16')	B-9 (10-14')	MW-1 (14-16')
			7/18/2011	7/18/2011	7/18/2011	7/18/2011	7/18/2011	7/18/2011	7/18/2011	7/19/2011	7/19/2011	7/19/2011
			Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
1,2,4-Trichlorobenzene	~	~	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
1,2-Dichlorobenzene	1.1	100	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
1,3-Dichlorobenzene	2.4	49	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
1,4-Dichlorobenzene	1.8	13	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
2,4,5-Trichlorophenol	~	~	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
2,4,6-Trichlorophenol	~	~	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
2,4-Dichlorophenol	~	~	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
2,4-Dimethylphenol	~	~	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
2,4-Dinitrophenol	~	~	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
2,4-Dinitrotoluene	~	~	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
2,6-Dinitrotoluene	~	~	ND	ND	ND	ND	ND	ND	2.59	NT	ND	ND
2-Chloronaphthalene	~	~	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
2-Chlorophenol	~	~	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
2-Methylnaphthalene	~	~	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
2-Methylphenol	~	~	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
2-Nitrophenol	~	~	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
3,3'-Dichlorobenzidine	~	~	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
3- & 4-Methylphenols	~	~	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
3-Nitroaniline	~	~	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
4,6-Dinitro-2-methylphenol	~	~	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
4-Bromophenyl phenyl ether	~	~	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
4-Chloro-3-methylphenol	~	~	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
4-Chloroaniline	~	~	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
4-Chlorophenyl phenyl ether	~	~	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
4-Nitroaniline	~	~	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
4-Nitrophenol	~	~	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
Acenaphthene	20	100	ND	ND	3.02 J	ND	ND	ND	ND	NT	ND	ND
Acenaphthylene	100	100	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
Aniline	~	~	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
Anthracene	100	100	0.0742 J	0.111 J	10.9	0.0688 J	ND	ND	0.229 J	NT	0.215	ND
Benzo(a)anthracene	1	1	ND	0.483	**19.8**	0.340	0.0808 J	ND	**1.11**	NT	0.445	ND
Benzo(a)pyrene	1	1	0.0561 J	0.547	**17.3**	0.287	0.0903 J	ND	**1.46**	NT	0.483	0.0570 J
Benzo(b)fluoranthene	1	1	ND	0.445	**11.6**	0.288	ND	ND	**1.47**	NT	0.270	ND
Benzo(g,h,i)perylene	100	100	ND	0.200	8.46	0.0899 J	ND	ND	0.353 J	NT	0.0791 J	ND
Benzo(k)fluoranthene	0.8	3.9	ND	0.461	**12.5**	0.257	ND	ND	1.12	NT	0.360	ND
Benzyl alcohol	~	~	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
Benzyl butyl phthalate	~	~	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
Bis(2-chloroethoxy)methane	~	~	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
Bis(2-chloroethyl)ether	~	~	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
Bis(2-chloroisopropyl)ether	~	~	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
Bis(2-ethylhexyl)phthalate	~	~	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
Chrysene	1	3.9	0.0857 J	0.777	**22.6**	0.409	ND	ND	1.23	NT	0.459	ND
Di-n-butyl phthalate	~	~	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
Di-n-octyl phthalate	~	~	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
Dibenzo(a,h)anthracene	0.33	0.33	ND	0.122 J	**4.16 J**	ND	ND	ND	ND	NT	0.0619 J	ND
Dibenzofuran	~	~	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
Diethyl phthalate	~	~	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
Dimethyl phthalate	~	~	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
Fluoranthene	100	100	0.167 J	0.953	36.2	0.619	ND	ND	2.49	NT	1.08	ND
Fluorene	30	100	ND	ND	5.31	ND	ND	ND	ND	NT	0.0705 J	ND
Hexachlorobenzene	0.33	1.2	ND	ND	ND	ND	ND	ND	0.148 J	NT	ND	ND
Hexachlorobutadiene	~	~	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
Hexachlorocyclopentadiene	~	~	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
Hexachloroethane	~	~	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
Indeno(1,2,3-cd)pyrene	0.5	0.5	ND	0.226	**8.59**	0.108 J	ND	ND	0.392 J	NT	0.133 J	ND
Isophorone	~	~	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
N-nitroso-di-n-propylamine	~	~	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
N-Nitrosodimethylamine	~	~	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
N-Nitrosodiphenylamine	~	~	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
Naphthalene	12	100	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
Nitrobenzene	~	~	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
Pentachlorophenol	0.8	6.7	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
Phenanthrene	100	100	0.0808 J	0.426	ND	0.246	ND	ND	1.00	NT	0.779	ND
Phenol	0.33	100	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
Pyrene	100	100	0.154 J	0.897	31.9	0.564	0.113 J	0.0906 J	2.16	NT	0.872	0.0916 J
Pyridine	~	~	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND

NOTES:
B=analyte found in the analysis batch blank
J=analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit) - data is estimated
NT=this indicates the analyte was not a target for this sample
~=this indicates that no regulatory limit has been established for this analyte
ND = Not Detected
Blue shade indicates detectable concentrations
Bold and yellow shade indicates exceedance of Restricted Use "Restricted Residential" SCOs
Bold and green shade indicates exceedance of Unrestricted Use SCOs

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Ecosystems Strategies, Inc.

Table 6 (3 of 4): Pesticides and PCBs in Soil
All results in mg/kg

Compound	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use SCOs - Restricted Residential	Sample Identification									
			SG-1 (4-6') 7/18/2011	SG-2 (0-2') 7/18/2011	SG-3 (4-6') 7/18/2011	B-4 (0-2') 7/18/2011	B-5 (14-16') 7/18/2011	B-6 (10-14') 7/18/2011	B-7 (0-2') 7/18/2011	B-8 (14-16') 7/19/2011	B-9 (10-14') 7/19/2011	MW-1 (14-16') 7/19/2011
4,4'-DDD	**0.0033**	**13**	0.00352	0.0448	0.0245	0.00721	ND	ND	0.00598	NT	ND	ND
4,4'-DDE	**0.0033**	**8.9**	ND	0.00798	0.00912	0.00360	ND	ND	0.00486	NT	ND	ND
4,4'-DDT	**0.0033**	**7.9**	0.00430	0.0371	0.0509	0.00835	ND	ND	0.0420	NT	ND	ND
Aldrin	**0.005**	**0.097**	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
alpha-BHC	**0.02**	**0.48**	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
Aroclor 1016	**~**	**~**	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
Aroclor 1221	**~**	**~**	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
Aroclor 1232	**~**	**~**	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
Aroclor 1242	**~**	**~**	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
Aroclor 1248	**~**	**~**	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
Aroclor 1254	**~**	**~**	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
Aroclor 1260	**~**	**~**	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
beta-BHC	**0.036**	**0.36**	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
Chlordane, total	**~**	**~**	ND	ND	ND	ND	ND	ND	0.0809	NT	ND	ND
delta-BHC	**0.04**	**100**	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
Dieldrin	**0.005**	**0.2**	ND	ND	ND	ND	ND	ND	0.0195	NT	ND	ND
Endosulfan I	**2.4**	**24**	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
Endosulfan II	**2.4**	**24**	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
Endosulfan sulfate	**2.4**	**24**	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
Endrin	**0.014**	**11**	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
Endrin aldehyde	**~**	**~**	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
Endrin ketone	**~**	**~**	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
gamma-BHC (Lindane)	**0.1**	**1.3**	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
Heptachlor	**0.042**	**2.1**	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
Heptachlor epoxide	**~**	**~**	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
Methoxychlor	**~**	**~**	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
Total PCBs	**0.1**	**1**	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
Toxaphene	**~**	**~**	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND

NOTES:
B=analyte found in the analysis batch blank
J=analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit) - data is estimated
NT=this indicates the analyte was not a target for this sample
~=this indicates that no regulatory limit has been established for this analyte
** Background lead concentrations in urban settings typically range from 200 to 500 ppm.
ND = Not Detected
Blue shade indicates detectable concentrations

Bold and yellow shade indicates exceedance of Restricted Use "Restricted Residential" SCOs
Bold and green shade indicates exceedance of Unrestricted Use SCOs
ESI File: LM09015.20

Table 6 (4 of 4): Metals in Soil

All results in mg/kg

Compound	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Restricted Use SCOs - Restricted Residential	Regional Background	Sample Identification									
				SG-1 (4-6') 7/18/2011	SG-2 (0-2') 7/18/2011	SG-3 (4-6') 7/18/2011	B-4 (0-2') 7/18/2011	B-5 (14-16') 7/18/2011	B-6 (10-14') 7/18/2011	B-7 (0-2') 7/18/2011	B-8 (14-16') 7/19/2011	B-9 (10-14') 7/19/2011	MW-1 (14-16') 7/19/2011
Aluminum	**~**	**~**	**33000**	11100	10700	9870	9490	12000	13400	11500	NT	17200	14000
Antimony	**~**	**~**	**NP**	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
Arsenic	**13**	**16**	**3-12**	5.12	4.64	8.46	5.20	4.80	3.66	7.59	NT	2.52	4.59
Barium	**350**	**400**	**15-600**	132	298	**1160**	147	68.0	88.0	**485**	NT	207	106
Beryllium	**7.2**	**72**	**0-1.75**	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
Cadmium	**2.5**	**4.3**	**0.1-1**	ND	ND	3.18	ND	ND	ND	ND	NT	ND	ND
Calcium	**~**	**~**	**130-35,000**	19500	34300	34600	21900	2350	3720	18900	NT	9300	3050
Chromium	**~**	**~**	**1.5-40**	19.5	22.0	19.8	19.9	17.1	21.2	22.4	NT	34.8	18.2
Cobalt	**~**	**~**	**2.5-60**	11.0	10.1	9.03	6.67	10.1	8.02	8.02	NT	17.2	7.48
Copper	**50**	**270**	**1-50**	30.5	81.8	43.7	33.1	22.4	20.2	34.7	NT	24.3	18.7
Iron	**~**	**~**	**2,000-550,000**	21700	19800	24300	15700	18700	18000	20000	NT	34100	18300
Lead	**63**	**400**	**4-500****	145	248	**499**	139	40.5	59.1	190	NT	90.3	87.2
Magnesium	**~**	**~**	**100-5,000**	4820	7570	6660	5440	3780	3310	5060	NT	7470	3720
Manganese	**1600**	**2000**	**50-5,000**	346	277	413	378	464	309	272	NT	307	232
Nickel	**30**	**310**	**0.5-25**	20.2	26.6	21.0	17.6	20.4	18.9	21.8	NT	33.3	17.7
Potassium	**~**	**~**	**8,500-43,000**	3370	3710	2860	2050	1380	1260	2260	NT	9880	1260
Selenium	**3.9**	**180**	**0.1-3.9**	2.23	2.64	2.55	1.99	2.28	2.24	2.50	NT	1.82	2.95
Silver	**2**	**180**	**NP**	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
Sodium	**~**	**~**	**6,000-8,000**	372 B	572 B	463 B	640 B	280 B	248 B	383 B	NT	407 B	321 B
Thallium	**~**	**~**	**NP**	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND
Vanadium	**~**	**~**	**1-300**	30.6	44.1	33.3	30.4	27.0	30.1	32.6	NT	49.4	21.1
Zinc	**109**	**10000**	**9-50**	110	255	1100	172	63.4	41.5	357	NT	184	106
Mercury	**0.18**	**0.81**	**0.001-0.2**	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND

NOTES:

B=analyte found in the analysis batch blank

J=analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit) - data is estimated

NT=this indicates the analyte was not a target for this sample

~=this indicates that no regulatory limit has been established for this analyte

** Background lead concentrations in urban settings typically range from 200 to 500 ppm.

ND = Not Detected

Blue shade indicates detectable concentrations

Bold and yellow shade indicates exceedance of Restricted Use "Restricted Residential" SCOs

Bold and green shade indicates exceedance of Unrestricted Use SCOs

ESI File: LM09015.20

Table 7 (1 of 5): VOCs in Water

All results provided in μg/L. Results in **bold** exceed designated guidance levels.

Compound (USEPA Method 8260)	Guidance Level	Sample Location		
		MW-1	MW-2	MW-3
1,1,1,2-Tetrachloroethane	5	ND	ND	ND
1,1,1-Trichloroethane	5	ND	ND	ND
1,1,2,2-Tetrachloroethane	5	ND	ND	ND
1,1,2-Trichloro-1,2,2-trifluoroethane	5	ND	ND	ND
1,1,2-Trichloroethane	1	ND	ND	ND
1,1-Dichloroethane	5	ND	ND	ND
1,1-Dichloroethylene	5	ND	ND	ND
1,1-Dichloropropylene	5	ND	ND	ND
1,2,3-Trichlorobenzene	5	ND	ND	ND
1,2,3-Trichloropropane	0.04	ND	ND	ND
1,2,3-Trimethylbenzene	5	ND	ND	ND
1,2,4-Trichlorobenzene	5	ND	ND	ND
1,2,4-Trimethylbenzene	5	ND	ND	ND
1,2-Dibromo-3-chloropropane	0.04	ND	ND	ND
1,2-Dibromoethane	5	ND	ND	ND
1,2-Dichlorobenzene	3	ND	ND	ND
1,2-Dichloroethane	0.6	ND	ND	ND
cis-1,2-Dichloroethylene	5	ND	**37**	ND
trans-1,2-Dichloroethylene	5	ND	ND	ND
1,2-Dichloroethylene (total)	5	ND	ND	ND
1,2-Dichloropropane	1	ND	ND	ND
1,3,5-Trimethylbenzene	5	ND	ND	ND
1,3-Dichlorobenzene	3	ND	ND	ND
1,3-Dichloropropane	5	ND	ND	ND
1,4-Dichlorobenzene	3	ND	ND	ND
1-Chlorohexane	5	ND	ND	ND
2,2-Dichloropropane	5	ND	ND	ND
2-Chlorotoluene	5	ND	ND	ND
4-Chlorotoluene	5	ND	ND	ND
Benzene	1	ND	ND	ND
Bromobenzene	5	ND	ND	ND
Bromochloromethane	5	ND	ND	ND
Bromodichloromethane	50	ND	ND	ND
Bromoform	50	ND	ND	ND
Bromomethane	5	ND	ND	ND
Carbon tetrachloride	5	ND	ND	ND
Chlorobenzene	5	ND	ND	ND
Chloroethane	5	ND	ND	ND
Chloroform	7	ND	ND	ND
Chloromethane	5	ND	ND	ND
Cis-1,3-Dichloropropylene	0.4	ND	ND	ND
Dibromochloromethane	5	ND	ND	ND
Dibromomethane	5	ND	ND	ND
Dichlorodifluoromethane	5	ND	ND	ND
Ethylbenzene	5	ND	ND	ND
Hexachlorobutadiene	0.5	ND	ND	ND
Isopropylbenzene	5	ND	ND	ND
Methylene chloride	5	ND	ND	ND
Methyl tert-butyl ether (MTBE)	10	16	ND	ND
Naphthalene	10	2.3 J, B	2.3 J, B	1.9 J, B
n-Butylbenzene	5	ND	ND	ND
n-Propylbenzene	5	ND	ND	ND
o-Xylene	5	ND	ND	ND
p-&m-Xylenes	5	ND	ND	ND
p-Isopropyltoluene	5	ND	ND	ND
sec-Butylbenzene	5	ND	ND	ND
Styrene	5	ND	ND	ND
tert-Butylbenzene	5	ND	ND	ND
Tetrachloroethylene	5	ND	**9.3**	ND
Toluene	5	ND	ND	ND
trans-1,3-Dichloropropylene	0.4	ND	ND	ND
Trichloroethylene	5	ND	ND	4.4 J
Trichlorofluoromethane	5	ND	ND	ND
Vinyl chloride	2	ND	ND	ND

Notes:
Guidance levels based on NYSDEC Division of Water TOGS 1.1.1 (June 1998) and subsequent NYSDEC Memoranda
ND = Not Detected
J = Data indicate the presence of a compound that meets the identification criteria.
The result is less than the quantitation limit but greater than zero. The concentration given is an approximate value.
B = Analyte is found in the associated analysis batch blank
Blue shade indicates detectable concentrations
Bold and yellow shade indicates exceedance of applicable regulatory criteria
ESI File: LM09015.20

Table 7 (2 of 5): Target Analyte List (TAL) Metals in Water

All results provided in μg/L.

TAL METAL	Guidance Level	Sample Location		
		MW-1	MW-2	MW-3
Aluminum	**100**	0.149	ND	0.054
Antimony	**3**	ND	ND	ND
Arsenic	**25**	ND	ND	ND
Barium	**1,000**	0.131	0.084	0.099
Beryllium	**3**	ND	ND	ND
Cadmium	**5**	ND	ND	ND
Calcium	**NE**	335	86.5	128
Chromium	**50**	ND	ND	ND
Cobalt	**5**	ND	ND	ND
Copper	**200**	ND	ND	ND
Iron	**300***	19.7	0.041	8.24
Lead	**25**	ND	ND	ND
Magnesium	**35,000**	295	31.7	73.5
Manganese	**300***	6.2	1.82	1.6
Mercury	**0.7**	ND	ND	ND
Nickel	**100**	ND	ND	ND
Potassium	**NE**	26.3	9	17.3
Selenium	**10**	0.013	ND	ND
Silver	**50**	ND	ND	ND
Sodium	**20,000**	105	40.4	69
Thallium	**0.5**	ND	ND	ND
Vanadium	**14**	ND	ND	ND
Zinc	**2,000**	ND	ND	ND

Notes:

Guidance levels based on NYSDEC Division of Water TOGS 1.1.1 (June 1998) and subsequent NYSDEC Memoranda

ND = Not Detected NE = Not Established * = Guidance level for total of iron and manganese is 500

Blue shade indicates detectable concentrations

ESI File: LM09015.20

Table 7 (3 of 5): SVOCs (PAHs only) in Water

All results provided in μg/L.

Compound (USEPA Method 8270)	Guidance Level	Sample Location		
		MW-1	MW-2	MW-3
Acenaphthene	20	ND	ND	ND
Acenaphthylene	50	ND	ND	ND
Anthracene	50	ND	ND	ND
Benzo(a)anthracene	0.002	ND	ND	ND
Benzo(a)pyrene	0.002	ND	ND	ND
Benzo(b)fluoranthene	0.002	ND	ND	ND
Benzo(g,h,i)perylene	5	ND	ND	ND
Benzo(k)fluoranthene	0.002	ND	ND	ND
Chrysene	0.002	ND	ND	ND
Dibenzo(a,h)anthracene	50	ND	ND	ND
Fluoranthene	50	ND	ND	ND
Fluorene	50	ND	ND	ND
Indeno(1,2,3-cd)pyrene	0.002	ND	ND	ND
Naphthalene	10	ND	ND	ND
Phenanthrene	50	ND	ND	ND
Pyrene	50	ND	ND	ND

Notes:

Guidance levels based on NYSDEC Division of Water TOGS 1.1.1 (June 1998) and subsequent NYSDEC Memoranda

ND = Not Detected

ESI File: LM09015.20

Table 7 (4 of 5): PCBs in Groundwater

Results provided in µg/L.

Compound (USEPA Method 8082)	Guidance Level	Sample Identification		
		MW-1	MW-2	MW-3
PCB 1016	NE	ND	ND	ND
PCB 1221	NE	ND	ND	ND
PCB 1232	NE	ND	ND	ND
PCB 1242	NE	ND	ND	ND
PCB 1248	NE	ND	ND	ND
PCB 1254	NE	ND	ND	ND
PCB 1260	NE	ND	ND	ND
PCB 1268	NE	ND	ND	ND
PCB, Total	0.09	ND	ND	ND

Notes:
Guidance levels based on NYSDEC TOGS 1.1.1.
ND = Not Detected NE = Not Established
ESI File: LM09015.20

Table 7 (5 of 5): Pesticides in Groundwater

Results provided in µg/L.

Compound (USEPA Method 8081)	Guidance Level	Sample Location		
		MW-1	MW-2	MW-3
4,4'-DDD	0.30	ND	ND	ND
4,4'-DDE	0.20	ND	ND	ND
4,4'-DDT	0.20	ND	ND	ND
Aldrin	NE	ND	ND	ND
alpha-BHC	0.01	ND	ND	ND
beta-BHC	0.04	ND	ND	ND
Chlordane	0.05	ND	ND	ND
delta-BHC	0.04	ND	ND	ND
Dieldrin	0.004	ND	ND	ND
Endosulfan I	NE	ND	ND	ND
Endosulfan II	NE	ND	ND	ND
Endosulfan sulfate	NE	ND	ND	ND
Endrin	NE	ND	ND	ND
Endrin aldehyde	5	ND	ND	ND
gamma-BHC (Lindane)	0.05	ND	ND	ND
Heptachlor	0.04	ND	ND	ND
Heptachlor Epoxide	0.03	ND	ND	ND
Toxaphene	0.06	ND	ND	ND

Notes:

Guidance levels based on NYSDEC TOGS 1.1.1.

ND = Not Detected NE = Not Established

ESI File: LM09015.20

Table 8: Summary of Detetected VOCs in Soil Gas Samples

Results provided in ug/m^3

Compound	Guideline Values	Sample ID		
		SG-1	SG-2	SG-3
1,1,1-Trichloroethane	NE	ND	ND	ND
1,1,2,2-Tetrachloroethane	NE	ND	ND	ND
1,1,2-Trichloroethane	NE	4.0	3.3	ND
1,1-Dichloroethane	NE	ND	ND	ND
1,1-Dichloroethylene	NE	ND	ND	ND
1,2,4-Trichlorobenzene	NE	ND	ND	ND
1,2,4-Trimethylbenzene	NE	19.0	20.0	39.0
1,2-Dibromoethane	NE	ND	ND	ND
1,2-Dichlorobenzene	NE	ND	ND	ND
1,2-Dichloroethane	NE	ND	ND	ND
1,2-Dichloropropane	NE	ND	8.3	17.0
1,2-Dichlorotetrafluroethane	NE	ND	2.2	ND
1,3,5-Trimethylbenzene	NE	7.2	6.6	ND
1,3-Butadiene	NE	ND	4.8	63.0
1,3-Dichlorobenzene	NE	ND	ND	ND
1,4-Dichlorobenzene	NE	ND	ND	ND
1,4-Dioxane	NE	ND	ND	ND
2,2,4-Trimethylpentane	NE	1.3	1.6	82.0
2-Butanone	NE	67.0	34.0	47.0
2-Hexanone	NE	2.6	3.6	ND
3-Chloropropene	NE	ND	ND	ND
4-Methyl-2-pentanone	NE	7.2	41.0	ND
Acetone	NE	200.0	160.0	260.0
Benzene	NE	8.1	8.1	28.0
Benzyl Chloride	NE	ND	ND	ND
Bromodichloromethane	NE	ND	ND	ND
Bromoform	NE	ND	ND	ND
Bromomethane	NE	ND	ND	ND
Carbon Disulfide	NE	30.0	19.0	40.0
Carbon Tetrachloride	NE	ND	ND	ND
Chlorobenzene	NE	ND	4.1	ND
Chloroethane	NE	ND	ND	ND
Chloroform	NE	5.8	32.0	9.0
Chloromethane	NE	0.89	0.75	41.0
cis-1,2-Dichloroethylene	NE	ND	17.0	ND
cis-1,3-Dichloropropylene	NE	ND	ND	ND
Cyclohexane	NE	2.0	2.8	11.0
Dichlorodifluoromethane	NE	3.4	3.0	ND
Ethyl acetate	NE	75.0	39.0	53.0
Ethylbenzene	NE	4.4	5.5	14.0
Freon-113	NE	ND	ND	ND
Isopropanol	NE	1.1	2.6	ND
Methylene Chloride	60	ND	ND	ND
MTBE	NE	ND	ND	ND
n-Heptane	NE	3.8	13.0	500.0
n-Hexane	NE	5.9	10.0	850.0
o-Xylene	NE	4.8	6.2	ND
p- & m-Xylenes	NE	18.0	21.0	18.0
p-Ethytoluene	NE	12.0	13.0	11.0
Propylene	NE	29.0	42.0	490.0
Styrene	NE	4.8	ND	ND
Tetrachloroethylene	100	8.0	54.0	90.0
Tetrahydrofuran	NE	53.0	7.9	190.0
Toluene	NE	11.0	20.0	20.0
trans-1,2-Dichloroethylene	NE	ND	ND	ND
trans-1,3-Dichloropropylene	NE	ND	ND	ND
Trichloroethylene	5	ND	4.1	ND
Trichlorofluoromethane	NE	1.9	1.9	ND
Vinyl acetate	NE	ND	5.8	470.0
Vinyl Bromide	NE	ND	ND	ND
Vinyl Chloride	NE	ND	ND	ND

Notes

Guideline values based on the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York, dated October 2006.
Blue shade indicates detectable concentrations
Bold and yellow shade indicates exceedance of applicable regulatory criteria
ND = Non detect
NE = Not established
ESI File: LM09015.20

APPENDIX 1

CITIZEN PARTICIPATION PLAN

The NYC Office of Environmental Remediation and West 116 Residential LLC have established this Citizen Participation Plan because the opportunity for citizen participation is an important component of the NYC Brownfield Cleanup Program. This Citizen Participation Plan describes how information about the project will be disseminated to the Community during the remedial process. As part of its obligations under the NYC BCP, West 116 Residential LLC will maintain a repository for project documents and provide public notice at specified times throughout the remedial program. This Plan also takes into account potential environmental justice concerns in the community that surrounds the project Site. Under this Citizen Participation Plan, project documents and work plans are made available to the public in a timely manner. Public comment on work plans is strongly encouraged during public comment periods. Work plans are not approved by the NYC Office of Environmental Remediation (OER) until public comment periods have expired and all comments are formally reviewed. An explanation of cleanup plans in the form of a public meeting or informational session is available upon request to OER's project manager assigned to this Site, William Wong , who can be contacted about these issues or any others questions, comments or concerns that arise during the remedial process at (212) 788-8841

Project Contact List. OER has established a Site Contact List for this project to provide public notices in the form of fact sheets to interested members of the Community. Communications will include updates on important information relating to the progress of the cleanup program at the Site as well as to request public comments on the cleanup plan. The Project Contact List includes owners and occupants of adjacent buildings and homes, principal administrators of nearby schools, hospitals and day care centers, the public water supplier that serves the area, established document repositories, the representative Community Board, City Council members, other elected representatives and any local Brownfield Opportunity Area (BOA) grantee organizations. Any member of the public or organization will be added to the Site Contact List on request. A copy of the Site Contact List is maintained by OER's project manager. If you would like to be added to the Project Contact List, contact NYC OER at (212) 788-8841 or by email at brownfields@cityhall.nyc.gov.

Repositories. A document repository is maintained in the nearest public library that maintains evening and weekend hours. This document repository is intended to house, for community review, all principal documents generated during the cleanup program including Remedial Investigation plans and reports, Remedial Action work plans and reports, and all public notices and fact sheets produced during the lifetime of the remedial project. West 116 Residential LLC will inspect the repositories to ensure that they are fully populated with project information. The repository for this project is:

Harlem Public Library Greenpoint Branch

9 West 124th Street

New York, New York 10027-5699

(212) 348-5620

Monday & Wednesday 11 am to 6 pm

Tuesday & Thursday 12 pm to 7 pm

Friday & Saturday 10 am to 5 pm

Sunday - Closed

Digital Documentation. NYC OER strongly encourages the use of digital documents in repositories as a means of minimizing paper use while also increasing convenience in access and ease of use.

Identify Issues of Public Concern. West 116 Residential LLC is required to identify whether there are specific issues of concern to stakeholders proximate to the project site. Such issues include but are not limited to interests of Environmental Justice communities. West 116 Residential LLC should list any site-specific issues of public concern and the method that they will be used resolved them. If needed, contact OER for additional guidance on how to identify issues of public concern.

Public Notice and Public Comment. Public notice to all members of the Project Contact List is required at three major steps during the performance of the cleanup program (listed below) and at other points that may be required by OER. Notices will include Fact Sheets with descriptive project summaries, updates on recent and upcoming project activities, repository

information, and important phone and email contact information. All notices will be prepared by West 116 Residential LLC, reviewed and approved by OER prior to distribution and mailed by West 116 Residential LLC. Public comment is solicited in public notices for all work plans developed under the NYC Brownfield Cleanup Program. Final review of all work plans by OER will consider all public comments. Approval will not be granted until the public comment period has been completed.

Citizen Participation Milestones. Public notice and public comment activities occur at several steps during a typical NYC BCP project. See flow chart on the following page, which identifies when during the NYC BCP public notices are issued: These steps include:

- Public Notice of the availability of the Remedial Investigation Report and Remedial Action Work Plan and a 30-day public comment period on the Remedial Action Work Plan.

  Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the availability of the Remedial Investigation Report and Remedial Action Work Plan and the initiation of a 30-day public comment period on the Remedial Action Work Plan. The Fact Sheet summarizes the findings of the RIR and provides details of the RAWP. The public comment period will be extended an additional 15 days upon public request. A public meeting or informational session will be conducted by OER upon request.

- Public Notice announcing the approval of the RAWP and the start of remediation

  Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the approval of the RAWP and the start of remediation.

- Public Notice announcing the completion of remediation, designation of Institutional and Engineering Controls and issuance of the Notice of Completion

  Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the completion of remediation, providing a list of all Institutional and Engineering Controls implemented for to the Site and announcing the issuance of the Notice of Completion.

Flow Chart For NYC Brownfield Cleanup Program (NYC BCP)
Application Process
Cleanup Process
Applicant submits NYC BCP Application Including:
Remedial Investigation Report,
Draft Remedial Action Work Plan
Fact Sheet announcing Receipt of Application (for 30 days comment period)
Application completeness review by OER
No
Application returned to applicant for modification
Yes
Site Eligibility Determination by OER
Yes
OER notifies Applicant of acceptance to NYC BCP
OER notifies NYSDEC
OER Executes Agreement
OER approves RAWP
(Optional)
NYC BCP Enrollee Applies For BIG Program Cleanup Grant
No
OER Notifies Applicant of Rejection from LBCP
30 Day Comment Period
Fact Sheet announcing the approval of RAWP and start of cleanup
Cleanup is performed
Enrollee submits cleanup report to OER
Track 1
Track 2 to 4
Register deed restrictions
Fact Sheet announcing completion of remedy, Remedial Action Report and the Notice of Completion
Notice of Completion
Green Property Certification

APPENDIX 2

SUSTAINABILITY STATEMENT

This Sustainability Statement documents sustainable activities and green remediation efforts planned under this remedial action.

Reuse of Clean, Recyclable Materials. Reuse of clean, locally-derived recyclable materials reduces consumption of non-renewable virgin resources and can provide energy savings and greenhouse gas reduction.

The Project will reuse clean soils t the extent feasible. Approximately 4,100 cubic yards of unregulated soil is anticipated to be available for re-use on-site.

An estimate of the quantity (in tons) of clean, non-virgin materials (reported by type of material) reused under this plan will be quantified and reported in the RAR.

Reduce Consumption of Virgin and Non-Renewable Resources. Reduced consumption of virgin and non-renewable resources lowers the overall environmental impact of the project on the region by conserving these resources.

The Project will utilize on-Site clean soils (approximately 4,100 cubic yards anticipated) for filling requirements, reducing the need for importation.

An estimate of the quantity (in tons) of virgin and non-renewable resources, the use of which will be avoided under this plan, will be quantified and reported in the RAR.

Reduced Energy Consumption and Promotion of Greater Energy Efficiency. Reduced energy consumption lowers greenhouse gas emissions, improves local air quality, lessens in-city power generation requirements, can lower traffic congestion, and provides substantial cost savings.

Best efforts will be made to quantify energy efficiencies achieved during the remediation and will be reported in the Remedial Action Report (RAR). Where energy savings cannot be easily quantified, a gross indicator of the amount of energy saved or the means by which energy savings was achieved will be reported.

Conversion to Clean Fuels. Use of clean fuel improves NYC's air quality by reducing harmful emissions.

An estimate of the volume of clean fuels used during remedial activities will be quantified and reported in the RAR.

Recontamination Control. Recontamination after cleanup and redevelopment is completed undermines the value of work performed, may result in a property that is less protective of public health or the environment, and may necessitate additional cleanup work later or impede future redevelopment. Recontamination can arise from future releases that occur within the property or by influx of contamination from off-Site.

An estimate of the area of the Site that utilizes recontamination controls under this plan will be reported in the RAR in square feet.

Storm-water Retention. Storm-water retention improves water quality by lowering the rate of combined storm-water and sewer discharges to NYC's sewage treatment plants during periods of precipitation, and reduces the volume of untreated influent to local surface waters.

An estimate of the enhanced storm-water retention capability of the redevelopment project will be included in the RAR.

Linkage with Green Building. Green buildings provide a multitude of benefits to the city across a broad range of areas, such as reduction of energy consumption, conservation of resources, and reduction in toxic materials use.

The number of Green Buildings that are associated with this Brownfield redevelopment property will be reported in the RAR. The total square footage of green building space created as a function of this Brownfield redevelopment will be quantified for residential, commercial and industrial/manufacturing uses.

Paperless Brownfield Cleanup Program. West 116 Residential LLC is participating in OER's Paperless Brownfield Cleanup Program. Under this program, submission of electronic documents will replace submission of hard copies for the review of project documents, communications and milestone reports.

Low-Energy Project Management Program. West 116 Residential LLC is participating in OER's low-energy project management program. Under this program, whenever possible, meetings are held using remote communication technologies, such as videoconferencing and teleconferencing to reduce energy consumption and traffic congestion associated with personal transportation.

Trees and Plantings. Trees and other plantings provide habitat and add to NYC's environmental quality in a wide variety of ways. Native plant species and native habitat provide optimal support to local fauna, promote local biodiversity, and require less maintenance.

An estimate of the land area that will be vegetated, including the number of trees planted or preserved, will be reported in square feet in the RAR.

APPENDIX 3

SOIL/MATERIALS MANAGEMENT PLAN

1.1 SOIL SCREENING METHODS

Visual, olfactory and PID soil screening and assessment will be performed under the supervision of a Qualified Environmental Professional and will be reported in the RAR. Soil screening will be performed during invasive work performed during the remedy and development phases prior to issuance of the Notice of Completion.

1.2 STOCKPILE METHODS

Excavated soil from suspected areas of contamination (e.g., hot spots, USTs, drains, etc.) will be stockpiled separately and will be segregated from clean soil and construction materials. Stockpiles will be used only when necessary and will be removed as soon as practicable. While stockpiles are in place, they will be inspected daily, and before and after every storm event. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by OER. Excavated soils will be stockpiled on, at minimum, double layers of 8-mil minimum sheeting, will be kept covered at all times with appropriately anchored plastic tarps, and will be routinely inspected. Broken or ripped tarps will be promptly replaced.

All stockpile activities will be compliant with applicable laws and regulations. Soil stockpile areas will be appropriately graded to control run-off in accordance with applicable laws and regulations. Stockpiles of excavated soils and other materials shall be located at least of 50 feet from the property boundaries, where possible. Hay bales or equivalent will surround soil stockpiles except for areas where access by equipment is required. Silt fencing and hay bales will be used as needed near catch basins, surface waters and other discharge points.

1.3 CHARACTERIZATION OF EXCAVATED MATERIALS

Soil/fill or other excavated media that is transported off-Site for disposal will be sampled in a manner required by the receiving facility, and in compliance with applicable laws and regulations. Soils proposed for reuse on-Site will be managed as defined in this plan.

1.4 MATERIALS EXCAVATION, LOAD-OUT AND DEPARTURE

The PE/QEP overseeing the remedial action will:

- oversee remedial work and the excavation and load-out of excavated material;
- ensure that there is a party responsible for the safe execution of invasive and other work performed under this work plan;
- ensure that Site development activities and development-related grading cuts will not interfere with, or otherwise impair or compromise the remedial activities proposed in this RAWP;
- ensure that the presence of utilities and easements on the Site has been investigated and that any identified risks from work proposed under this plan are properly addressed by appropriate parties;
- ensure that all loaded outbound trucks are inspected and cleaned if necessary before leaving the Site during remediation;
- ensure that all egress points for truck and equipment transport from the Site will be kept clean of Site-derived materials during Site remediation.

Locations where vehicles exit the Site shall be inspected daily for evidence of soil tracking off premises. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to Site-derived materials.

Open and uncontrolled mechanical processing of historical fill and contaminated soil on-Site will not be performed without prior OER approval.

1.5 OFF-SITE MATERIALS TRANSPORT

Loaded vehicles leaving the Site will comply with all applicable materials transportation requirements (including appropriate covering, manifests, and placards) in accordance with applicable laws and regulations, including use of licensed haulers in accordance with 6 NYCRR Part 364. If loads contain wet material capable of causing leakage from trucks, truck liners will be used. Queuing of trucks will be performed on-Site, when possible in order to minimize off Site disturbance. Off-Site queuing will be minimized.

Outbound truck transport routes are the following:

- West to Lenox Avenue
- North to 125th Street
- Onto the RFK Bridge and north on I87 (Major Deegan Expressway)

This routing takes into account the following factors: (a) limiting transport through residential areas and past sensitive sites; (b) use of mapped truck routes; (c) minimizing off-Site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport. To the extent possible, all trucks loaded with Site materials will travel from the Site using these truck routes. Trucks will not stop or idle in the neighborhood after leaving the project Site.

1.6 MATERIALS DISPOSAL OFF-SITE

The following documentation will be established and reported by the PE/QEP for each disposal destination used in this project to document that the disposal of regulated material exported from the Site conforms with applicable laws and regulations: (1) a letter from the PE/QEP or Enrollee to each disposal facility describing the material to be disposed and requesting written acceptance of the material. This letter will state that material to be disposed is regulated material generated at an environmental remediation Site in Manhattan, New York under a governmental remediation program. The letter will provide the project identity and the name and phone number of the PE/QEP or Enrollee. The letter will include as an attachment a summary of all chemical data for the material being transported; and (2) a letter from each disposal facility stating it is in receipt of the correspondence (1, above) and is approved to accept the material. These documents will be included in the RAR.

The Remedial Action Report will include an itemized account of the destination of all material removed from the Site during this remedial action. Documentation associated with disposal of all material will include records and approvals for receipt of the material. This information will be presented in the RAR.

All impacted soil/fill or other waste excavated and removed from the Site will be managed as regulated material and will be disposed in accordance with applicable laws and regulations.

Historic fill and contaminated soils taken off-Site will be handled as solid waste and will not be disposed at a Part 360-16 Registration Facility (also known as a Soil Recycling Facility).

Waste characterization will be performed for off-Site disposal in a manner required by the receiving facility and in conformance with its applicable permits. Waste characterization sampling and analytical methods, sampling frequency, analytical results and QA/QC will be reported in the RAR. A manifest system for off-Site transportation of exported materials will be employed. Manifest information will be reported in the RAR. Hazardous wastes derived from on-Site will be stored, transported, and disposed of in compliance with applicable laws and regulations.

If disposal of soil/fill from this Site is proposed for unregulated disposal (i.e., clean soil removed for development purposes), including transport to a Part 360-16 Registration Facility, a formal request will be made for approval by OER with an associated plan compliant with 6NYCRR Part 360-16. This request and plan will include the location, volume and a description of the material to be recycled, including verification that the material is not impacted by site uses and that the material complies with receipt requirements for recycling under 6NYCRR Part 360. This material will be appropriately handled on-Site to prevent mixing with impacted material.

1.7 MATERIALS REUSE ON-SITE

Soil and fill that is derived from the property that meets the soil cleanup objectives established in this plan may be reused on-Site. The soil cleanup objectives for on-Site reuse are listed in **Table 6**. 'Reuse on-Site' means material that is excavated during the remedy or development, does not leave the property, and is relocated within the same property and on comparable soil/fill material, and addressed pursuant to the NYC BCP agreement subject to Engineering and Institutional Controls. The PE/QEP will ensure that reused materials are segregated from other materials to be exported from the Site and that procedures defined for material reuse in this RAWP are followed. The expected location for placement of reused material is yet to be determined and will be reported promptly to the OER Project Manager.

Organic matter (wood, roots, stumps, etc.) or other waste derived from clearing and grubbing of the Site will not be buried on-Site. Soil or fill excavated from the site for grading or other purposes will not be reused within a cover soil layer or within landscaping berms.

1.8 DEMARCATION

If Track 1 cleanup is not achieved after completion of hotspot removal and any other invasive remedial activities, and prior to backfilling, the top of the residual soil/fill will be defined by one of three methods: (1) placement of a demarcation layer. The demarcation layer will consist of geosynthetic fencing or equivalent material to be placed on the surface of residual soil/fill to provide an observable reference layer. A description or map of the approximate depth of the demarcation layer will be provided in the SMP; or (2) a land survey of the top elevation of residual soil/fill before the placement of cover soils, pavement and associated sub-soils, or other materials or structures or, (3) all materials beneath the approved cover will be considered impacted and subject to site management after the remedy is complete. Demarcation may be established by one or any combination of these three methods. As appropriate, a map showing the method of demarcation for the Site and all associated documentation will be presented in the RAR.

This demarcation will constitute the top of the site management horizon. Materials within this horizon require adherence to special conditions during future invasive activities as defined in the Site Management Plan.

1.9 IMPORT OF BACKFILL SOIL FROM OFF-SITE SOURCES

No additional soils are anticipated to be imported as part of this project. In the event that soils importation occurs, the actions specified in this Section will be implemented. This Section presents the requirements for imported fill materials to be used below the cover layer and within the clean soil cover layer. All imported soils will meet OER-approved backfill and cover soil quality objectives for this Site.

A process will be established to evaluate sources of backfill and cover soil to be imported to the Site, and will include an examination of source location, current and historical use(s), and any applicable documentation. Material from industrial sites, spill sites, environmental remediation sites or other potentially contaminated sites will not be imported to the Site.

The following potential sources may be used pending attainment of backfill and cover soil quality objectives:

- Clean soil from construction projects at non-industrial sites in compliance with applicable laws and regulations;
- Clean soil from roadway or other transportation-related projects in compliance with applicable laws and regulations;
- Clean recycled concrete aggregate (RCA) from facilities permitted or registered by the regulations of NYS DEC.

All materials received for import to the Site will be approved by a PE/QEP and will be in compliance with provisions in this RAWP. The RAR will report the source of the fill, evidence that an inspection was performed on the source, chemical sampling results, frequency of testing, and a Site map indicating the locations where backfill or soil cover was placed.

Source Screening and Testing

Inspection of imported fill material will include visual, olfactory and PID screening for evidence of contamination. Materials imported to the Site will be subject to inspection, as follows:

- Trucks with imported fill material will be in compliance with applicable laws and regulations and will enter the Site at designated locations;
- The PE/QEP is responsible to ensure that every truck load of imported material is inspected for evidence of contamination; and
- Fill material will be free of solid waste including pavement materials, debris, stumps, roots, and other organic matter, as well as ashes, oil, perishables or foreign matter.

Composite samples of imported material will be taken at a minimum frequency of one sample for every 500 cubic yards of material. Once it is determined that the fill material meets imported backfill or cover soil chemical requirements and is non-hazardous, and lacks petroleum contamination, the material will be loaded onto trucks for delivery to the Site.

Recycled concrete aggregate (RCA) will be imported from facilities permitted or registered by NYSDEC. Facilities will be identified in the RAR. A PE/QEP is responsible to ensure that the facility is compliant with 6NYCRR Part 360 registration and permitting requirements for the

period of acquisition of RCA. RCA imported from compliant facilities will not require additional testing, unless required by NYSDEC under its terms for operation of the facility. RCA imported to the Site must be derived from recognizable and uncontaminated concrete. RCA material is not acceptable for, and will not be used as cover material.

1.10 FLUIDS MANAGEMENT

All liquids to be removed from the Site, including dewatering fluids, will be handled, transported and disposed in accordance with applicable laws and regulations. Liquids discharged into the New York City sewer system will receive prior approval by New York City Department of Environmental Protection (NYC DEP). The NYC DEP regulates discharges to the New York City sewers under Title 15, Rules of the City of New York Chapter 19. Discharge to the New York City sewer system will require an authorization and sampling data demonstrating that the groundwater meets the City's discharge criteria. The dewatering fluid will be pretreated as necessary to meet the NYC DEP discharge criteria. If discharge to the City sewer system is not appropriate, the dewatering fluids will be managed by transportation and disposal at an off-Site treatment facility.

Discharge of water generated during remedial construction to surface waters (i.e. a stream or river) is prohibited without a SPDES permit issued by New York State Department of Environmental Conservation.

1.11 STORM-WATER POLLUTION PREVENTION

Applicable laws and regulations pertaining to storm-water pollution prevention will be addressed during the remedial program. Erosion and sediment control measures identified in this RAWP (silt fences and barriers, and hay bale checks) will be installed around the entire perimeter of the remedial construction area and inspected once a week and after every storm event to ensure that they are operating appropriately. Discharge locations will be inspected to determine whether erosion control measures are effective in preventing significant impacts to receptors. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by OER. All necessary repairs shall be made immediately. Accumulated sediments will be removed as required to keep the barrier and hay bale check functional. Undercutting or erosion of the silt fence toe anchor will be repaired immediately with

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

1.12 CONTINGENCY PLAN

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

1.13 ODOR, DUST AND NUISANCE CONTROL

Odor Control

All necessary means will be employed to prevent on- and off-Site odor nuisances. At a minimum, procedures will include: (a) limiting the area of open excavations; (b) shrouding open excavations with tarps and other covers; and (c) use of foams to cover exposed odorous soils. If odors develop and cannot otherwise be controlled, additional means to eliminate odor nuisances will include: (d) direct load-out of soils to trucks for off-Site disposal; and (e) use of chemical odorants in spray or misting systems.

This odor control plan is capable of controlling emissions of nuisance odors. If nuisance odors are identified, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. OER will be notified of all odor complaint events. Implementation of all odor controls, including halt of work, will be the responsibility of the PE/QEP's certifying the Remedial Action Report.

Dust Control

Dust management during invasive on-Site work will include, at a minimum:

- Use of a dedicated water spray methodology for roads, excavation areas and stockpiles.
- Use of properly anchored tarps to cover stockpiles.
- Exercise extra care during dry and high-wind periods.
- Use of gravel or recycled concrete aggregate on egress and other roadways to provide a clean and dust-free road surface.

This dust control plan is capable of controlling emissions of dust. If nuisance dust emissions are identified, work will be halted and the source of dusts will be identified and corrected. Work will not resume until all nuisance dust emissions have been abated. OER will be notified of all dust complaint events. Implementation of all dust controls, including halt of work, will be the responsibility of the PE/QEP's responsible for certifying the Remedial Action Report.

Other Nuisances

Noise control will be exercised during the remedial program. All remedial work will conform, at a minimum, to NYC noise control standards.

Rodent control will be provided, during Site clearing and grubbing, and during the remedial program, as necessary, to prevent nuisances.

APPENDIX 4

Health and Safety Plan

HEALTH AND SAFETY PLAN

FOR

SITE REMEDIATION

(INCORPORATING COMMUNITY HEALTH AND SAFETY PLAN)

23 West 116th Street
Borough of Manhattan, New York

December 2011

ESI File: LM09015.50

11DEPTECH0035M

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1.0 INTRODUCTION

1.1 Purpose

This Health and Safety Plan for Site Remediation (HASP) has been developed to provide the requirements and general procedures to be followed by Ecosystems Strategies, Inc. (ESI) and on-site subcontractors while performing investigative services at the property known as 23 West 116th Street, located between 116th and 117th Street, to the immediate west of the building known as 1428 Fifth Avenue, Borough of Manhattan, New York. This document supersedes all other health and safety plans prepared by ESI for this Site.

This HASP incorporates policies, guidelines, and procedures that have the objective of protecting the public health of the community during the performance of fieldwork activities, and therefore serves as a Community Health and Safety Plan (CHASP). The objectives of the CHASP are met by establishing guidelines to minimize community exposure to hazards during fieldwork, and by planning for and responding to emergencies affecting the public.

This HASP describes the responsibilities, training requirements, protective equipment, and standard operating procedures to be utilized by all personnel while on the Site. All on-site personnel and visitors shall follow the guidelines, rules, and procedures contained in this safety plan. The Project Manager or Site Health and Safety Officer (SHSO, see Table 1, below) may impose any other procedures or prohibitions believed to be necessary for safe operations. This HASP incorporates by reference the applicable Occupational Safety and Health Administration (OSHA) requirements in 29 CFR 1910 and 29 CFR 1926.

The requirements and guidelines in this HASP are based on a review of available information and evaluation of potential on-site hazards. This HASP will be discussed with Site personnel and will be available on-site for review while work is underway. On-site personnel will report to the Site Health and Safety Officer (SHSO) in matters of health and safety. The on-site project supervisor(s) are responsible for enforcement and implementation of this HASP, which is applicable to all field personnel, including contractors and subcontractors.

This HASP is specifically intended for the conduct of activities within the defined scope of work in specified areas of the Site. Changes in site conditions and future actions that may be conducted at the Site may necessitate the modification of the requirements of the HASP. Although this HASP can be made available to interested persons for informational purposes, ESI has no responsibility over the interpretations or activities of any other persons or entities other than employees of ESI or ESI's subcontractors.

1.2 Site Location and Description

The Site as defined in this HASP is located at 23 West 116th Street (rear portion), Manhattan, New York. A Site Location Map is included in the Attachments of this HASP.

1.3 Work Activities

All remedial activities are detailed in the Remedial Action Work Plan (RAWP) prepared by ESI and dated December 2011.

2.0 HEALTH AND SAFETY HAZARDS

2.1 Hazard Overview for On-Site Personnel

Urban fill soils containing elevated metals are known to be present on the Site. The possibility exists for on-site personnel to have contact with contaminated soils and/or construction debris during site investigative work. Contact with contaminated substances may present a skin contact, inhalation, and/or ingestion hazard. These potential hazards are addressed in Sections 3.0 through 11.0, below. Several material safety data (MSDS) sheets have been provided as attachments to this HASP.

2.2 Potential Hazards to the Public from Fieldwork Activities

To a lesser extent, the potential exists for the public to be exposed to these urban fill sols which may present a skin contact, inhalation, and/or ingestion hazard. Additional potential hazards to the public that are associated with fieldwork activities include mechanical/physical hazards, traffic hazards from fieldwork vehicles, and noise impacts associated with operation of mechanical equipment.

Impacts to public health and safety are expected to be limited to hazards that could directly affect on-site visitors and/or trespassers. These effects will be mitigated through site access and control measures (see Section 6.0, below). Specific actions taken to protect the public health (presented in Sections 3.0 through 11, below, and in the Community Air Monitoring Plan) are anticipated to minimize any potential off-site impacts from contaminant migration, noise, and traffic hazards.

3.0 PERSONAL PROTECTIVE EQUIPMENT

The levels of protection identified for the services specified in the RAWP represent a best estimate of exposure potential and protective equipment needed for that exposure. Determination of levels was based on data provided by previous studies of the Site and information reviewed on current and past Site usage. The SHSO may recommend revisions to these levels based on an assessment of actual exposures and may at any time require Site workers, supervisors, and/or visitors to use specific safety equipment.

The level of protective clothing and equipment selected for this project is Level D. Level D PPE provides minimal skin protection and no respiratory protection, and is used when the atmosphere contains no known hazard, oxygen concentrations are not less than 19.5%, and work activities exclude splashes, immersion, or the potential for unexpected inhalation or contact with hazardous levels of chemicals. Workers will wear Level D protective clothing including, but not limited to, a hard hat, steel-toed boots, nitrile gloves (when handling soils and/or groundwater), hearing protection (foam ear plugs or ear muffs, as required), and safety goggles (in areas of exposed groundwater and when decontaminating equipment). Personal protective equipment (PPE) will be worn at all times, as designated by this HASP. Disposable gloves will be changed immediately following the handling of contaminated soils, water, or equipment. Tyvek suits will be worn during activities likely to excessively expose work clothing to contaminated dust or soil (chemically-resistant over garments will be required in situations where exposures could lead to penetration of clothing and direct dermal contact by contaminants).

The requirement for the use of PPE by official on-site visitors shall be determined by the SHSO, based on the most restrictive PPE requirement for a particular Work Zones (see Section 6.0 for Work Zone definitions). All on-site visitors shall, at a minimum, be required to wear an approved hardhat and be provided with appropriate hearing protection as necessary.

The need for an upgrade in PPE will be determined based upon encountered Site conditions, including measurements taken in the breathing zone of the work area using a photo-ionization detector (PID). An upgrade to a higher level of protection (Level C) will begin when specific action levels are reached (see Section 5.0, below), or as otherwise required by the SHSO. Level C PPE includes a full-face or half-mask air-purifying respirator (NIOSH approved for the compound[s] of concern), hooded chemical-resistant clothing, outer and inner chemical-resistant gloves, and (as needed) coveralls, outer boots/boot covers, escape mask, and face shield. Level C PPE may be used only when: oxygen concentrations are not less than 19.5%; contaminant contact will not adversely affect any exposed skin; types of air contaminants have been identified, concentrations measured, and a cartridge or canister is available that can remove the contaminant; atmospheric contaminant concentrations do not exceed immediately dangerous to life or health (IDLH) levels; and job functions do not require self-contained breathing apparatus (SCBAs). The need for Level B or Level A PPE is not anticipated for the planned investigative activities at this Site.

If any equipment fails and/or any employee experiences a failure or other alteration of their protective equipment that may affect its protective ability, that person will immediately leave the work area. The Project Manager and the SHSO will be notified and, after reviewing the situation, determine the effect of the failure on the continuation of on-going operations. If the failure affects the safety of personnel, the work site, or the surrounding environment, personnel will be evacuated until appropriate corrective actions have been taken.

4.0 CONTAMINANT CONTROL

Precautions will be taken during dry weather (e.g., wetting or covering exposed soils) to avoid generating and breathing dust-generated from soils. A PID and digital dust indicator (or equivalent equipment) will be used to monitor potential contaminant levels. Response to the monitoring will be in accordance with the action levels provided in Section 5.0.

5.0 MONITORING AND ACTION LEVELS

Concentrations of organic compounds in the air are expected to be below the OSHA Permissible Exposure Limits (PELs). A Community Air Monitoring Plan (CAMP) will be implemented for all fieldwork (a copy of the CAMP is provided in the RAWP). Air monitoring will be conducted for VOCs and dust. Monitoring will be conducted at all times that fieldwork activities which are likely to generate emissions are occurring. PID readings consistently in excess of 5 ppm, and dust levels in excess of 100 $\mu g/m^3$ of the background level (150 $\mu g/m^3$ after mitigation techniques have been instituted), will be used as an indication of the need to initiate personnel monitoring, increase worker protective measures, and/or modify or cease on-site operations in order to mitigate off-site community exposure.

PID and/or dust readings that consistently exceed background in the breathing zone (during any of the proposed tasks) will necessitate moving away from the source or implementing a higher PPE level.

6.0 SITE CONTROL/WORK ZONES

Site control procedures will be established to reduce the possibility of worker/visitor contact with compounds present in the soil, to protect the public in the area surrounding the Site and to limit access to the Site to only those persons required to be in the work zone. Notices will be placed near the Site warning the public not to enter fieldwork areas and directing visitors to report to the Project Manager or SHSO. Measures will be taken to limit the entry of unauthorized personnel into the specific areas of field activity and to safely direct and control all vehicular traffic in and near the Site (e.g., placement of traffic cones and warning tape).

The following Work Zone will be established:

Exclusion Zone ("Hot Zone") - The exclusion zone will be that area immediately surrounding the work being performed for remediation purposes (i.e. the area where contaminated media are being handled). It is anticipated that much of the work will be accomplished with heavy equipment in the exclusion zone. Only individuals with appropriate PPE and training are allowed into this zone. It is the responsibility of the Site Health and Safety Officer to prevent unauthorized personnel from entering the exclusion zone. When necessary, such as in high traffic areas, the exclusion zone will be delineated with barricade tape, cones, and/or barricades.

Decontamination Area - A decontamination area for personnel and equipment is not anticipated being required during completion of the RAWP; however, care will be taken to remove gloves, excess soil from boots, and soiled clothing (if necessary) before entering the Intermediate Zone.

Contamination Reduction Zone and Support Zone - Not anticipated being required during the completion of the RAWP.

Intermediate Zone (Decontamination Zone) - The intermediate zone, also known as the decontamination zone, is where patient decontamination should take place, if necessary. A degree of contamination still is found in this zone; thus, some PPE is required, although it is usually of a lesser degree than that required for the hot zone.

Command Zone - The command zone is located outside the decontamination zone. All exposed individuals and equipment from the "hot zone" and decontamination zone should be decontaminated before entering the command zone. Access to all zones must be controlled. Keeping the media and onlookers well away from the Site is critical and will be the responsibility of both the SHSO and the Project Manager, and other Site personnel as appropriate.

7.0 NOISE CONTROL

All fieldwork activities will be conducted in a manner designed to reduce unnecessary noise generation, and to minimize the potential for both on-site and off-site harmful noise levels. The Project Manager and SHSO will establish noise reduction procedures (as appropriate to the Site and the work) to meet these requirements.

8.0 PERSONNEL TRAINING

Work zones that will accomplish the general objective stated above will be established by the Project Manager and the SHSO. Site access will be monitored by the SHSO, who will maintain a log-in sheet for personnel that will include, at the minimum, personnel on the Site, their arrival and departure times, and their destination on the Site. All workers will be properly trained in accordance with OSHA requirements (29 CFR 1910). Personnel exiting the work zone(s) will be decontaminated prior to exiting the Site. Site-specific training will be provided to each employee. Personnel will be briefed by the SHSO as to the potential hazards to be encountered. Topics will include:

- Availability of this HASP;
- General site hazards and specific hazards in the work areas, including those attributable to known of suspect on-site contaminants;
- Selection, use, testing, and care of the body, eye, hand, and foot protection being worn, with the limitations of each;
- Decontamination procedures for personnel, their personal protective equipment, and other equipment used on the Site;
- Emergency response procedures and requirements;
- Emergency alarm systems and other forms of notification, and evacuation routes to be followed; and,
- Methods to obtain emergency assistance and medical attention.

9.0 DECONTAMINATION

The SHSO will establish a decontamination system and decontamination procedures (appropriate to the Site and the work) that will prevent potentially hazardous materials from leaving the Site. Trucks will be brushed to remove materials adhering to their surfaces. Sampling equipment will be segregated and, after decontamination, stored separately from splash protection equipment. Decontaminated or clean sampling equipment not in use will be covered with plastic and stored in a designated storage area in the work zone.

10.0 EMERGENCY RESPONSE

10.1 Notification of Site Emergencies

In the event of an emergency, the SHSO will be immediately notified of the nature and extent of the emergency (the names and contact information for key site safety and management personnel, as well as other site safety contact telephone numbers, shall be posted at the Site).

Table 1 in this HASP contains Emergency Response Telephone Numbers, and immediately following is a map detailing the directions to the nearest hospital emergency room. This information will be maintained at the work Site by the SHSO. The location of the nearest telephone will be determined prior to the initiation of on-site activities. In addition to any permanent phone lines, a cellular phone will be in the possession of the SHSO, or an authorized designee, at all times.

10.2 Responsibilities

Prior to the initiation of on-site work activities, the SHSO will:

- Notify individuals, authorities, and/or health care facilities of the potentially hazardous activities and potential wastes that may develop as a result of the investigation.
- Confirm that first aid supplies and a fire extinguisher are available on-site.
- Have a working knowledge of safety equipment available.
- Confirm that a map detailing the most direct route to the hospital is prominently posted with the emergency telephone numbers.

The SHSO will be responsible for directing notification, response, and follow-up actions and for contacting outside response personnel (ambulance, fire department, or others). In the case of an evacuation, the SHSO will account for personnel. A log of individuals entering and leaving the Site will be kept so that everyone can be accounted for in an emergency.

Upon notification of an exposure incident, the SHSO will contact the appropriate emergency response personnel for recommended medical diagnosis and, if necessary, treatment. The SHSO will determine whether and at what levels exposure actually occurred, the cause of such exposure, and the means to prevent similar incidents from occurring.

10.3 Accidents and Injuries

In the event of an accident or injury, measures will be taken to assist those who have been injured or exposed and to protect others from hazards. If an individual is transported to a hospital or doctor, a copy of the HASP will accompany the individual.

The SHSO will be notified and will respond according to the severity of the incident. The SHSO will perform an investigation of the incident and prepare a signed and dated report documenting the investigation. An exposure-incident report will also be completed by the SHSO and the exposed individual. The form will be filed with the employee's medical and safety records to serve as documentation of the incident and the actions taken.

10.4 Communication

No special hand signals will be utilized within the work zone. Field personnel will utilize standard hand signals during the operation of heavy equipment.

10.5 Safe Refuge

Vehicles and on-site structures will serve as the immediate place of refuge in the event of an emergency. If evacuation from the area is necessary, project vehicles will be used to transport on-site personnel to safety.

10.6 Site Security and Control

Site security and control during emergencies, accidents, and incidents will be monitored by the SHSO. The SHSO is responsible for limiting access to the Site to authorized personnel and for oversight of reaction activities.

10.7 Emergency Evacuation

In case of an emergency, personnel will evacuate to the safe refuge identified by the SHSO, both for their personal safety and to prevent the hampering of response/rescue efforts.

10.8 Resuming Work

A determination that it is safe to return to work will be made by the SHSO and/or any personnel assisting in the emergency, e.g., fire department, police department, utility company, etc. No personnel will be allowed to return to the work areas until a full determination has been made by the above-identified personnel that all field activities can continue unobstructed. Such a determination will depend upon the nature of the emergency (e.g., downed power lines -- removal of all lines from the property; fire -- extinguished fire; injury -- safe transport of the injured party to a medical facility with either assurance of acceptable medical care present or completion of medical care; etc.).

Before on-site work is resumed following an emergency, necessary emergency equipment will be recharged, refilled, or replaced. Government agencies will be notified as appropriate. An Incident Report Form will be filed.

10.9 Fire Fighting Procedures

A fire extinguisher will be available in the work zone during on-site activities. This extinguisher is intended for small fires. When a fire cannot be controlled with the extinguisher, the area will be evacuated immediately. The SHSO will be responsible for directing notification, response, and follow-up actions and for contacting ambulance and fire department personnel.

10.10 Emergency Decontamination Procedure

The extent of emergency decontamination depends on the severity of the injury or illness and the nature of the contamination. Whenever possible, minimum decontamination will consist of washing, rinsing, and/or removal of contaminated outer clothing and equipment. If time does not permit decontamination, the person will be given first aid treatment and then wrapped in plastic or a blanket prior to transport.

10.11 Emergency Equipment

The following on-site equipment for safety and emergency response will be maintained in the on-site vehicle of the SHSO:

- Fire extinguisher;
- First-aid kit; and,
- Extra copy of this Health and Safety Plan.

11.0 SPECIAL PRECAUTIONS AND PROCEDURES

The activities associated with this investigation may involve potential risks of exposure to both chemical and physical hazards. The potential for chemical exposure to hazardous or regulated substances will be significantly reduced through the use of monitoring, personal protective clothing, engineering controls, and implementation of safe work practices.

11.1 Heat/Cold Stress

Training in prevention of heat/cold stress will be provided as part of the site-specific training. The timing of this project is such that heat/cold stress may pose a threat to the health and safety of personnel. Work/rest regimens will be employed, as necessary, so that personnel do not suffer adverse effects from heat/cold stress. Special clothing and appropriate diet and fluid intake regimens will be recommended to personnel to further reduce this temperature-related hazard. Rest periods will be recommended in the event of high/low temperatures and/or humidity to counter the negative effects of heat/cold stress.

11.2 Heavy Equipment

Working in the vicinity of heavy equipment is the primary safety hazard at the Site. Physical hazards in working near heavy construction equipment include the following: overhead hazards, slips/trip/falls, hand and foot injuries, moving part hazards, improper lifting/back injuries, and noise. All workers will be properly trained in accordance with OSHA requirements (29 CFR 1910). No workers will be permitted within any excavated areas without proper personal protective equipment (PPE), including, as warranted, any necessary Level C equipment (e.g., respirators and protective suits). Air monitoring in excavation areas will be conducted for VOCs in accordance with Section 5.0 and the Community Air Monitoring Plan.

11.3 Additional Safety Practices

The following are important safety precautions which will be enforced during this investigation:

- Medicine and alcohol can aggravate the effect of exposure to certain compounds. Controlled substances and alcoholic beverages will not be consumed during investigation activities. Consumption of prescribed drugs will only be at the discretion of a physician familiar with the person's work.
- Eating, drinking, chewing gum or tobacco, smoking, or other practices that increase the probability of hand-to-mouth transfer and ingestion of material is prohibited except in areas designated by the SHSO.
- Contact with potentially contaminated surfaces will be avoided whenever possible. Workers will not unnecessarily walk through puddles, mud, or other discolored surfaces; kneel on the ground; or lean, sit, or place equipment on drums, containers, vehicles, or the ground.
- Personnel and equipment in the work areas will be minimized, consistent with effective site operations.
- Unsafe equipment left unattended will be identified by a "DANGER, DO NOT OPERATE" tag.
- Work areas for various operational activities will be established.

11.4 Daily Log Contents

The SHSO will establish a system appropriate to the Site, the work, and the work zones that will record, at a minimum, the following information:

- Personnel on the Site, their arrival and departure times, and their destination on the Site.
- Incidents and unusual activities that occur on the Site such as, but not limited to, accidents, spills, breaches of security, injuries, equipment failures, and weather-related problems.
- Changes to the HASP.
- Daily information generated such as: changes to work and health and safety plans; work accomplished and the current Site status; and monitoring results.

12.0 TABLE AND FIGURES

Table 1: Emergency Response Telephone Numbers

Emergency Agencies	Phone Numbers
EMERGENCY	**911**
Mount Sinai Medical Center 1 Gustave L. Levy Place	(212) 241-6500
New York Police Department	(212) 678-2432 or 911
NYC Mayor's Office	(212) 788-1400
New York City Fire Department	(212) 570-4293 or 911
NY Water & Sewer	(212) 442-1904
Site Health and Safety Officer – Paul Ciminello and/or on-site ESI personnel	(845) 452-1658

Figure 1: Directions to Hospital

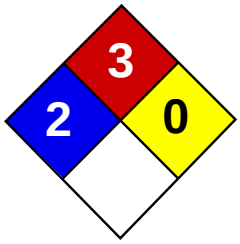
		Dist	Turn		Road	Exit	Total Time	Total Dist
			Start	at	1428 5th Ave		00:00:00	0.00 mi
			Go straight (SSW)	on	5th Ave		00:00:00	0.00 mi
	in	0.82 mi	Go straight (ESE)	on to	Gustave L Levy Pl		00:02:13	0.82 mi
			Finish	at	1-5 Gustave L Levy Pl		00:02:13	0.82 mi

Total Time: 00:02:13 Total Distance: 0.82 mi

Figure 2: Map to Hospital (overview)

Ecosystems Strategies, Inc.

Site Location Map 23 West 116th Street Borough of Manhattan, New York	N	ESI File: LM09015.50 December 2011 Attachment



Material Safety Data Sheet
Toluene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Toluene

Catalog Codes: SLT2857, SLT3277

CAS#: 108-88-3

RTECS: XS5250000

TSCA: TSCA 8(b) inventory: Toluene

CI#: Not available.

Synonym: Toluol, Tolu-Sol; Methylbenzene; Methacide; Phenylmethane; Methylbenzol

Chemical Name: Toluene

Chemical Formula: C6-H5-CH3 or C7-H8

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Toluene	108-88-3	100

Toxicological Data on Ingredients: Toluene: ORAL (LD50): Acute: 636 mg/kg [Rat]. DERMAL (LD50): Acute: 14100 mg/kg [Rabbit]. VAPOR (LC50): Acute: 49000 mg/m 4 hours [Rat]. 440 ppm 24 hours [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to blood, kidneys, the nervous system, liver, brain, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.

Skin Contact:
In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 480°C (896°F)

Flash Points: CLOSED CUP: 4.4444°C (40°F). (Setaflash) OPEN CUP: 16°C (60.8°F).

Flammable Limits: LOWER: 1.1% UPPER: 7.1%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances:
Flammable in presence of open flames and sparks, of heat. Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Flammable liquid, insoluble in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray or fog.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards:
Toluene forms explosive reaction with 1,3-dichloro-5,5-dimethyl-2,4-imidazolididione; dinitrogen tetraoxide; concentrated nitric acid, sulfuric acid + nitric acid; N2O4; AgClO4; BrF3; Uranium hexafluoride; sulfur dichloride. Also forms an explosive mixture with tetranitromethane.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Toxic flammable liquid, insoluble or very slightly soluble in water. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents.

Storage:
Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 200 STEL: 500 CEIL: 300 (ppm) from OSHA (PEL) [United States] TWA: 50 (ppm) from ACGIH (TLV) [United States] SKIN TWA: 100 STEL: 150 from NIOSH [United States] TWA: 375 STEL: 560 (mg/m3) from NIOSH [United States] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Sweet, pungent, Benzene-like.

Taste: Not available.

Molecular Weight: 92.14 g/mole

Color: Colorless.

pH (1% soln/water): Not applicable.

Boiling Point: 110.6°C (231.1°F)

Melting Point: -95°C (-139°F)

Critical Temperature: 318.6°C (605.5°F)

Specific Gravity: 0.8636 (Water = 1)

Vapor Pressure: 3.8 kPa (@ 25°C)

Vapor Density: 3.1 (Air = 1)

Volatility: Not available.

Odor Threshold: 1.6 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 2.7

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether, acetone.

Solubility:
Soluble in diethyl ether, acetone. Practically insoluble in cold water. Soluble in ethanol, benzene, chloroform, glacial acetic acid, carbon disulfide. Solubility in water: 0.561 g/l @ 25 deg. C.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ignition sources (flames, sparks, static), incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Incompatible with strong oxidizers, silver perchlorate, sodium difluoride, Tetranitromethane, Uranium Hexafluoride. Frozen Bromine Trifluoride reacts violently with Toluene at -80 deg. C. Reacts chemically with nitrogen oxides, or halogens to form nitrotoluene, nitrobenzene, and nitrophenol and halogenated products, respectively.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 636 mg/kg [Rat]. Acute dermal toxicity (LD50): 14100 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 440 24 hours [Mouse].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC. May cause damage to the following organs: blood, kidneys, the nervous system, liver, brain, central nervous system (CNS).

Other Toxic Effects on Humans:
Hazardous in case of skin contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals:
Lowest Published Lethal Dose: LDL [Human] - Route: Oral; Dose: 50 mg/kg LCL [Rabbit] - Route: Inhalation; Dose: 55000 ppm/40min

Special Remarks on Chronic Effects on Humans:
Detected in maternal milk in human. Passes through the placental barrier in human. Embryotoxic and/or foetotoxic in animal. May cause adverse reproductive effects and birth defects (teratogenic). May affect genetic material (mutagenic)

Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects: Skin: Causes mild to moderate skin irritation. It can be absorbed to some extent through the skin. Eyes: Cauess mild to moderate eye irritation with a burning sensation. Splash contact with eyes also causes conjunctivitis, blepharospasm, corneal edema, corneal abraisons. This usually resolves in 2 days. Inhalation: Inhalation of vapor may cause respiratory tract irritation causing coughing and wheezing, and nasal discharge. Inhalation of high concentrations may affect behavior and cause central nervous system effects characterized by nausea, headache, dizziness, tremors, restlessness, lightheadedness, exhilaration, memory loss, insomnia, impaired reaction time, drowsiness, ataxia, hallucinations, somnolence, muscle contraction or spasticity, unconsciousness and coma. Inhalation of high concentration of vapor may also affect the cardiovascular system (rapid heart beat, heart palpitations, increased or decreased blood pressure, dysrhythmia,), respiration (acute pulmonary edema, respiratory depression, apnea, asphyxia), cause vision disturbances and dilated pupils, and cause loss of appetite. Ingestion: Aspiration hazard. Aspiration of Toluene into the lungs may cause chemical pneumonitis. May cause irritation of the digestive tract with nausea, vomiting, pain. May have effects similar to that of acute inhalation. Chronic Potential Health Effects: Inhalation and Ingestion: Prolonged or repeated exposure via inhalation may cause central nervous system and cardiovascular symptoms similar to that of acute inhalation and ingestion as well liver damage/failure, kidney damage/failure (with hematuria, proteinuria, oliguria, renal tubular acidosis), brain damage, weight loss, blood (pigmented or nucleated red blood cells, changes in white blood cell count), bone marrow changes, electrolyte imbalances (Hypokalemia, Hypophostatemia), severe, muscle weakness and Rhabdomyolysis. Skin: Repeated or prolonged skin contact may cause defatting dermatitis.

Section 12: Ecological Information

Ecotoxicity:
Ecotoxicity in water (LC50): 313 mg/l 48 hours [Daphnia (daphnia)]. 17 mg/l 24 hours [Fish (Blue Gill)]. 13 mg/l 96 hours [Fish (Blue Gill)]. 56 mg/l 24 hours [Fish (Fathead minnow)]. 34 mg/l 96 hours [Fish (Fathead minnow)]. 56.8 ppm any hours [Fish (Goldfish)].

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Toluene UNNA: 1294 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Toluene California prop. 65 (no significant risk level): Toluene: 7 mg/day (value) California prop. 65 (acceptable daily intake level): Toluene: 7 mg/day (value) California prop. 65: This product contains the following ingredients for which the State of California has found to cause birth defects which would require a warning under the statute: Toluene Connecticut hazardous material survey.: Toluene Illinois

toxic substances disclosure to employee act: Toluene Illinois chemical safety act: Toluene New York release reporting list: Toluene Rhode Island RTK hazardous substances: Toluene Pennsylvania RTK: Toluene Florida: Toluene Minnesota: Toluene Michigan critical material: Toluene Massachusetts RTK: Toluene Massachusetts spill list: Toluene New Jersey: Toluene New Jersey spill list: Toluene Louisiana spill reporting: Toluene California Director's List of Hazardous Substances.: Toluene TSCA 8(b) inventory: Toluene TSCA 8(d) H and S data reporting: Toluene: Effective date: 10/04/82; Sunset Date: 10/0/92 SARA 313 toxic chemical notification and release reporting: Toluene CERCLA: Hazardous substances.: Toluene: 1000 lbs. (453.6 kg)

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R11- Highly flammable. R20- Harmful by inhalation. S16- Keep away from sources of ignition - No smoking. S25- Avoid contact with eyes. S29- Do not empty into drains. S33- Take precautionary measures against static discharges.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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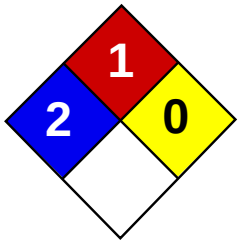
Last Updated: 11/01/2010 12:00 PM



Material Safety Data Sheet
Silver MSDS

Section 1: Chemical Product and Company Identification

Product Name: Silver

Catalog Codes: SLS4222, SLS2005, SLS3427, SLS1210, SLS2632, SLS4054, SLS1837

CAS#: 7440-22-4

RTECS: VW3500000

TSCA: TSCA 8(b) inventory: Silver

CI#: Not applicable.

Synonym:

Chemical Formula: Ag

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Silver	7440-22-4	100

Toxicological Data on Ingredients: Silver: ORAL (LD50): Acute: 100 mg/kg [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of eye contact (irritant), of ingestion, of inhalation. Severe over-exposure can result in death. Inflammation of the eye is characterized by redness, watering, and itching.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. Repeated exposure to an highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact: Check for and remove any contact lenses. Do not use an eye ointment. Seek medical attention.

Skin Contact: No known effect on skin contact, rinse with water for a few minutes.

Serious Skin Contact: Not available.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do not induce vomiting. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Not available.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Avoid contact with eyes In case of insufficient ventilation, wear suitable respiratory equipment If ingested, seek medical advice immediately and show the container or the label.

Storage:
Keep container dry. Keep in a cool place. Ground all equipment containing material. Keep container tightly closed. Keep in a cool, well-ventilated place. Highly toxic or infectious materials should be stored in a separate locked safety storage cabinet or room.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Splash goggles. Lab coat.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Boots. Gloves. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 0.01 (mg/m3) from OSHA (PEL) TWA: 0.01 (mg/m3) from OSHA NIOSH Australia: TWA: 0.1 (mg/m3)Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Solid metallic powder. Metal solid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 107.87 g/mole

Color: Not available.

pH (1% soln/water): Not applicable.

Boiling Point: 2212°C (4013.6°F)

Melting Point: 961°C (1761.8°F)

Critical Temperature: Not available.

Specific Gravity: 10.4 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Is not dispersed in cold water, hot water.

Solubility: Insoluble in cold water, hot water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Eye contact. Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 100 mg/kg [Mouse].

Chronic Effects on Humans: Not available.

Other Toxic Effects on Humans: Very hazardous in case of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are as toxic as the original product.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification:

Identification:

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Rhode Island RTK hazardous substances: Silver Pennsylvania RTK: Silver Minnesota: Silver Massachusetts RTK: Silver New Jersey: Silver TSCA 8(b) inventory: Silver TSCA 8(a) PAIR: Silver TSCA 8(d) H and S data reporting: Silver SARA 313 toxic chemical notification and release reporting: Silver: 1% CERCLA: Hazardous substances.: Silver: 1000 lbs. (453.6 kg)

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC). CLASS D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC): R41- Risk of serious damage to eyes.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: j

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:
Not applicable. Lab coat. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

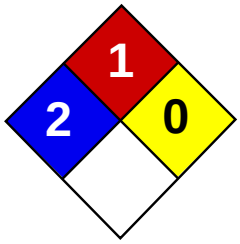
References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:26 PM

Last Updated: 11/01/2010 12:00 PM

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall ScienceLab.com be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if ScienceLab.com has been advised of the possibility of such damages.



Material Safety Data Sheet
Selenium MSDS

Section 1: Chemical Product and Company Identification

Product Name: Selenium

Catalog Codes: SLS2629

CAS#: 7782-49-2

RTECS: VS7700000

TSCA: TSCA 8(b) inventory: Selenium

CI#: Not available.

Synonym:

Chemical Name: Not available.

Chemical Formula: Se

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Selenium	7782-49-2	100

Toxicological Data on Ingredients: Selenium: ORAL (LD50): Acute: 6700 mg/kg [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant).

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. Repeated or prolonged exposure is not known to aggravate medical condition.

Section 4: First Aid Measures

Eye Contact: Check for and remove any contact lenses. Do not use an eye ointment. Seek medical attention.

Skin Contact:
After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact: Not available.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not available.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: Material in powder form, capable of creating a dust explosion.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Avoid contact with eyes Wear suitable protective clothing In case of insufficient ventilation, wear suitable respiratory equipment If ingested, seek medical advice immediately and show the container or the label.

Storage:
Keep container dry. Keep in a cool place. Ground all equipment containing material. Keep container tightly closed. Keep in a cool, well-ventilated place. Combustible materials should be stored away from extreme heat and away from strong oxidizing agents.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:
Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 0.2 (mg/m3) Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Solid metallic powder.)

Odor: Odorless.

Taste: Not available.

Molecular Weight: 78.96 g/mole

Color: Not available.

pH (1% soln/water): Not applicable.

Boiling Point: 684.9°C (1264.8°F)

Melting Point: 217°C (422.6°F)

Critical Temperature: Not available.

Specific Gravity: 4.81 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Eye contact. Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 6700 mg/kg [Rat].

Chronic Effects on Humans: Not available.

Other Toxic Effects on Humans:
Hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Passes through the placental barrier in animal. Excreted in maternal milk in human.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: : Selenium powder : UN2658 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Pennsylvania RTK: Selenium Massachusetts RTK: Selenium TSCA 8(b) inventory: Selenium SARA 313 toxic chemical notification and release reporting: Selenium CERCLA: Hazardous substances.: Selenium

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada): CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC).

DSCL (EEC): R36- Irritating to eyes.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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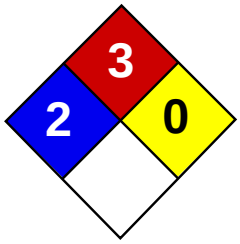

Material Safety Data Sheet
Ethylbenzene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Ethylbenzene

Catalog Codes: SLE2044

CAS#: 100-41-4

RTECS: DA0700000

TSCA: TSCA 8(b) inventory: Ethylbenzene

CI#: Not available.

Synonym: Ethyl Benzene; Ethylbenzol; Phenylethane

Chemical Name: Ethylbenzene

Chemical Formula: C8H10

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Ethylbenzene	100-41-4	100

Toxicological Data on Ingredients: Ethylbenzene: ORAL (LD50): Acute: 3500 mg/kg [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant, permeator).

Potential Chronic Health Effects:
Slightly hazardous in case of skin contact (irritant, sensitizer). CARCINOGENIC EFFECTS: Classified 2B (Possible for human.) by IARC. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. WARM water MUST be used. Get medical attention.

Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 432°C (809.6°F)

Flash Points:
CLOSED CUP: 15°C (59°F). (Tagliabue.) OPEN CUP: 26.667°C (80°F) (Cleveland) (CHRIS, 2001) CLOSED CUP: 12.8 C (55 F) (Bingham et al, 2001; NIOSH, 2001) CLOSED CUP: 21 C (70 F) (NFPA)

Flammable Limits: LOWER: 0.8% - 1.6%UPPER: 6.7% - 7%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances: Highly flammable in presence of open flames and sparks, of heat.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available. Slightly explosive in presence of heat.

Fire Fighting Media and Instructions:
Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog.

Special Remarks on Fire Hazards:
Vapor may travel considerable distance to source of ignition and flash back. Vapors may form explosive mixtures with air. When heated to decomposition it emits acrid smoke and irritating fumes.

Special Remarks on Explosion Hazards: Vapors may form explosive mixtures in air.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Flammable liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Avoid contact with eyes. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents.

Storage:
Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame). Sensitive to light. Store in light-resistant containers.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 100 STEL: 125 (ppm) from OSHA (PEL) [United States] TWA: 435 STEL: 545 from OSHA (PEL) [United States] TWA: 435 STEL: 545 (mg/m3) from NIOSH [United States] TWA: 100 STEL: 125 (ppm) from NIOSH [United States] TWA: 100 STEL: 125 (ppm) from ACGIH (TLV) [United States] TWA: 100 STEL: 125 (ppm) [United Kingdom (UK)] TWA: 100 STEL: 125 (ppm) [Belgium] TWA: 100 STEL: 125 (ppm) [Finland] TWA: 50 (ppm) [Norway] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Sweetish. Gasoline-like. Aromatic.

Taste: Not available.

Molecular Weight: 106.16 g/mole

Color: Colorless.

pH (1% soln/water): Not available.

Boiling Point: 136°C (276.8°F)

Melting Point: -94.9 (-138.8°F)

Critical Temperature: 617.15°C (1142.9°F)

Specific Gravity: 0.867 (Water = 1)

Vapor Pressure: 0.9 kPa (@ 20°C)

Vapor Density: 3.66 (Air = 1)

Volatility: 100% (v/v).

Odor Threshold: 140 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 3.1

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether.

Solubility:
Easily soluble in diethyl ether. Very slightly soluble in cold water or practically insoluble in water. Soluble in all proportions in Ethyl alcohol. Soluble in Carbon tetrachloride, Benzene. Insoluble in Ammonia. Slightly soluble in Chloroform. Solubility in Water: 169 mg/l @ 25 deg. C.; 0.014 g/100 ml @ 15 deg. C.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ingnition sources (flames, sparks, static), incompatible materials, light

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Not considered to be corrosive for metals and glass.

Special Remarks on Reactivity:
Can react vigorously with oxidizing materials. Sensitive to light.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Inhalation.

Toxicity to Animals: Acute oral toxicity (LD50): 3500 mg/kg [Rat].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified 2B (Possible for human.) by IARC. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. May cause damage to the following organs: central nervous system (CNS).

Other Toxic Effects on Humans:
Hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant, permeator).

Special Remarks on Toxicity to Animals:
Lethal Dose/Conc 50% Kill: LD50 [Rabbit] - Route: Skin; Dose: 17800 ul/kg Lowest Published Lethal Dose/Conc: LDL[Rat] - Route: Inhalation (vapor); Dose: 4000 ppm/4 H

Special Remarks on Chronic Effects on Humans:
May cause adverse reproductive effects and birth defects (teratogenic) based on animal test data. May cause cancer based on animals data. IARC evidence for carcinogenicity in animals is sufficient. IARC evidence of carcinogenicity in humans inadequate. May affect genetic material (mutagenic).

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: Can cause mild skin irritation. It can be absorbed through intact skin. Eyes: Contact with vapor or liquid can cause severe eye irritation depending on concentration. It may also cause conjunctivitis. At a vapor exposure level of 85 - 200 ppm , it is mildly and transiently irritating to the eyes; 1000 ppm causes further irritation and tearing; 2000 ppm results in immediate and severe irritation and tearing; 5,000 ppm is intolerable (ACGIH, 1991; Clayton and Clayton, 1994). Standard draize test for eye irritation using 500 mg resulted in severe irritation (RTECS) Inhalation: Exposure to high concentrations can cause nasal, mucous membrane and respiratory tract irritation and can also result in chest constriction and, trouble breathing, respiratory failure, and even death. It can also affect behavior/Central Nervous System. The effective dose for CNS depression in experimental animals was 10,000 ppm (ACGIH, 1991). Symptoms of CNS depression include

headache, nausea, weakness, dizziness, vertigo, irritability, fatigue, lightheadedness, sleepiness, tremor, loss of coordination, judgement and conciousness, coma, and death. It can also cause pulmonary edema. Inhalation of 85 ppm can produce fatigue, insomnia, headache, and mild irritation of the respiratory tract (Haley & Berndt, 1987). Ingestion: Do not drink, pipet or siphon by mouth. May cause gastroinestinal/digestive tract irritation with Abdominal pain, nausea, vomiting. Ethylbenzene is a pulmonary aspiration hazard. Pulmonary aspiration of even small amounts of the liquid may cause fatal pneumonitis. It may also affect behavior/central nervous system with

Section 12: Ecological Information

Ecotoxicity:
Ecotoxicity in water (LC50): 14 mg/l 96 hours [Fish (Trout)] (static). 12.1 mg/l 96 hours [Fish (Fathead Minnow)] (flow-through)]. 150 mg/l 96 hours [Fish (Blue Gill/Sunfish)] (static). 275 mg/l 96 hours [Fish (Sheepshead Minnow)]. 42.3 mg/l 96 hours [Fish (Fathead Minnow)](soft water). 87.6mg/l 96 hours [Shrimp].

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Ethylbenzene UNNA: 1175 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Connecticut hazardous material survey.: Ethylbenzene Illinois toxic substances disclosure to employee act: Ethylbenzene Illinois chemical safety act: Ethylbenzene New York release reporting list: Ethylbenzene Rhode Island RTK hazardous substances: Ethylbenzene Pennsylvania RTK: Ethylbenzene Minnesota: Ethylbenzene Massachusetts RTK: Ethylbenzene Massachusetts spill list: Ethylbenzene New Jersey: Ethylbenzene New Jersey spill list: Ethylbenzene Louisiana spill reporting: Ethylbenzene California Director's List of Hazardous Substances: Ethylbenzene TSCA 8(b) inventory: Ethylbenzene TSCA 4(a) proposed test rules: Ethylbenzene TSCA 8(d) H and S data reporting: Ethylbenzene: Effective Date: 6/19/87; Sunset Date: 6/19/97 SARA 313 toxic chemical notification and release reporting: Ethylbenzene

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-2A: Material causing other toxic effects (VERY TOXIC). CLASSE D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):
R11- Highly flammable. R20- Harmful by inhalation. S16- Keep away from sources of ignition - No smoking. S24/25- Avoid contact with skin and eyes. S29- Do not empty into drains.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References:
-Manufacturer's Material Safety Data Sheet. -Fire Protection Guide to Hazardous Materials, 13th ed., National Fire Protection Association (NFPA) -Registry of Toxic Effects of Chemical Substances (RTECS) -Chemical Hazard Response Information System (CHRIS) -Hazardous Substance Data Bank (HSDB) -New Jersey Hazardous Substance Fact Sheet -Ariel Global View -Reprotext System

Other Special Considerations: Not available.

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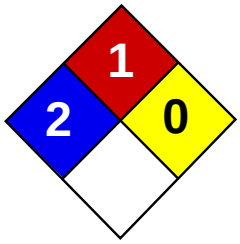

Material Safety Data Sheet
Copper MSDS

Section 1: Chemical Product and Company Identification

Product Name: Copper

Catalog Codes: SLC4939, SLC2152, SLC3943, SLC1150, SLC2941, SLC4729, SLC1936, SLC3727, SLC5515

CAS#: 7440-50-8

RTECS: GL5325000

TSCA: TSCA 8(b) inventory: Copper

CI#: Not available.

Synonym:

Chemical Name: Not available.

Chemical Formula: Cu

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Copper	7440-50-8	100

Toxicological Data on Ingredients: Copper LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of ingestion. Hazardous in case of eye contact (irritant), of inhalation. Slightly hazardous in case of skin contact (irritant).

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to lungs, mucous membranes. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact: Check for and remove any contact lenses. Do not use an eye ointment. Seek medical attention.

Skin Contact:
After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact: Not available.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation: Not available.

Ingestion:
Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Not available.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not breathe dust. Avoid contact with eyes Wear suitable protective clothing In case of insufficient ventilation, wear suitable respiratory equipment If you feel unwell, seek medical attention and show the label when possible.

Storage:
Keep container dry. Keep in a cool place. Ground all equipment containing material. Keep container tightly closed. Keep in a cool, well-ventilated place. Combustible materials should be stored away from extreme heat and away from strong oxidizing agents.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:
Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 1 (mg/m3) from ACGIH [1990] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid.

Odor: Not available.

Taste: Not available.

Molecular Weight: 63.54 g/mole

Color: Not available.

pH (1% soln/water): Not applicable.

Boiling Point: 2595°C (4703°F)

Melting Point: 1083°C (1981.4°F)

Critical Temperature: Not available.

Specific Gravity: 8.94 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available. LC50: Not available.

Chronic Effects on Humans: The substance is toxic to lungs, mucous membranes.

Other Toxic Effects on Humans:
Very hazardous in case of ingestion. Hazardous in case of inhalation. Slightly hazardous in case of skin contact (irritant).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Human: passes through the placenta, excreted in maternal milk.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are as toxic as the original product.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Marine Pollutant

Section 15: Other Regulatory Information

Federal and State Regulations:
Pennsylvania RTK: Copper Massachusetts RTK: Copper TSCA 8(b) inventory: Copper CERCLA: Hazardous substances.: Copper

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada): CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC): R36- Irritating to eyes.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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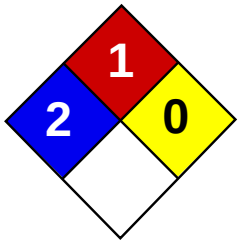

Material Safety Data Sheet
Cobalt MSDS

Section 1: Chemical Product and Company Identification

Product Name: Cobalt

Catalog Codes: SLC1684, SLC3475

CAS#: 7440-48-4

RTECS: GF8750000

TSCA: TSCA 8(b) inventory: Cobalt

CI#: Not available.

Synonym:

Chemical Formula: Co

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Cobalt	7440-48-4	100

Toxicological Data on Ingredients: Cobalt: ORAL (LD50): Acute: 6170 mg/kg [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects: Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation.

Potential Chronic Health Effects:
Hazardous in case of inhalation. CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to lungs. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact: Check for and remove any contact lenses. Do not use an eye ointment. Seek medical attention.

Skin Contact:
After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Not available.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Flammable solid. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:
Flammable solid. Stop leak if without risk. Do not touch spilled material. Use water spray curtain to divert vapor drift. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable protective clothing In case of insufficient ventilation, wear suitable respiratory equipment If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes

Storage:

Flammable materials should be stored in a separate safety storage cabinet or room. Keep away from heat. Keep away from sources of ignition. Keep container tightly closed. Keep in a cool, well-ventilated place. Ground all equipment containing material. Keep container dry. Keep in a cool place.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:
Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 0.05 (mg/m3) from OSHA Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid.

Odor: Not available.

Taste: Not available.

Molecular Weight: 58.93 g/mole

Color: Not available.

pH (1% soln/water): Not applicable.

Boiling Point: 3100°C (5612°F)

Melting Point: 1493°C (2719.4°F)

Critical Temperature: Not available.

Specific Gravity: 8.92 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Eye contact. Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 6170 mg/kg [Rat].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH. The substance is toxic to lungs.

Other Toxic Effects on Humans: Hazardous in case of skin contact (irritant), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are as toxic as the original product.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 4.1: Flammable solid.

Identification: : Metal powder, Flammable, n.o.s. (Cobalt metal, powder) : UN3089 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:

California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Cobalt California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Cobalt Pennsylvania RTK: Cobalt Massachusetts RTK: Cobalt TSCA 8(b) inventory: Cobalt

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada): CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R36/38- Irritating to eyes and skin. R40- Possible risks of irreversible effects.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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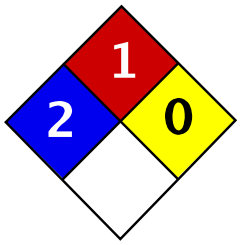

Health	2
Fire	1
Reactivity	0
Personal Protection	E

Material Safety Data Sheet
Chromium MSDS

Section 1: Chemical Product and Company Identification

Product Name: Chromium

Catalog Codes: SLC4711, SLC3709

CAS#: 7440-47-3

RTECS: GB4200000

TSCA: TSCA 8(b) inventory: Chromium

CI#: Not applicable.

Synonym: Chromium metal; Chrome; Chromium Metal Chips 2" and finer

Chemical Name: Chromium

Chemical Formula: Cr

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Chromium	7440-47-3	100

Toxicological Data on Ingredients: Chromium LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of skin contact (irritant), of eye contact (irritant), of inhalation. Slightly hazardous in case of ingestion.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.
The substance may be toxic to kidneys, lungs, liver, upper respiratory tract.
Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.

Skin Contact:
In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation: Not available.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: 580°C (1076°F)

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances:
Slightly flammable to flammable in presence of open flames and sparks, of heat.
Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder.
LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards:
Moderate fire hazard when it is in the form of a dust (powder) and burns rapidly when heated in flame.
Chromium is attacked vigorously by fused potassium chlorate producing vivid incandescence.
Pyrophoric chromium unites with nitric oxide with incandescence.
Incandescent reaction with nitrogen oxide or sulfur dioxide.

Special Remarks on Explosion Hazards:
Powdered Chromium metal +fused ammonium nitrate may react violently or explosively.
Powdered Chromium will explode spontaneously in air.

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, acids, alkalis.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:
Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 0.5 (mg/m3) from ACGIH (TLV) [United States]
TWA: 1 (mg/m3) from OSHA (PEL) [United States]
TWA: 0.5 (mg/m3) from NIOSH [United States]
TWA: 0.5 (mg/m3) [United Kingdom (UK)]
TWA: 0.5 (mg/m3) [Canada]Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Metal solid.)

Odor: Odorless.

Taste: Not available.

Molecular Weight: 52 g/mole

Color: Silver-white to Grey.

pH (1% soln/water): Not applicable.

Boiling Point: 2642°C (4787.6°F)

Melting Point: 1900°C (3452°F) +/- !0 deg. C

Critical Temperature: Not available.

Specific Gravity: 7.14 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility:
Insoluble in cold water, hot water.
Soluble in acids (except Nitric), and strong alkalies.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Excess heat, incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents, acids, alkalis.

Corrosivity: Not available.

Special Remarks on Reactivity:
Incompatible with molten Lithium at 180 deg. C, hydrogen peroxide, hydrochloric acid, sulfuric acid, most caustic alkalies and alkali carbonates, potassium chlorate, sulfur dioxide, nitrogen oxide, bromine pentafluoride.
It may react violently or ignite with bromine pentafluoride.
Chromium is rapidly attacked by fused sodium hydroxide + potassium nitrate.
Potentially hazardous incompatibility with strong oxidizers.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available.
LC50: Not available.

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for

human.) by IARC.
May cause damage to the following organs: kidneys, lungs, liver, upper respiratory tract.

Other Toxic Effects on Humans:
Hazardous in case of skin contact (irritant), of inhalation.
Slightly hazardous in case of ingestion.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:
May cause cancer based on animal data. There is no evidence that exposure to trivalent chromium causes cancer in man.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects:
May cause skin irritation.
Eyes: May cause mechanical eye irritation.
Inhalation: May cause irritation of the respiratory tract and mucous membranes of the respiratory tract.
Ingestion: May cause gastrointestinal tract irritation with nausea, vomiting, diarrhea.
Chronic Potential Health Effects:
Inhalation: The effects of chronic exposure include irritation , sneezing, reddness of the throat, bronchospasm, asthma, cough, polyps, chronic inflammation, emphysema, chronic bronchitis, pharyngitis, bronchopneumonia, pneumoconoisis. Effects on the nose from chronic chromium exposure include irritation, ulceration, and perforation of the nasal septum. Inflammation and ulceration of the larynx may also occur.
Ingestion or Inhalation: Chronic exposure may cause liver and kidney damage.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations:

Connecticut hazardous material survey.: Chromium
Illinois toxic substances disclosure to employee act: Chromium
Illinois chemical safety act: Chromium
New York release reporting list: Chromium
Rhode Island RTK hazardous substances: Chromium
Pennsylvania RTK: Chromium
Minnesota: Chromium
Michigan critical material: Chromium
Massachusetts RTK: Chromium
Massachusetts spill list: Chromium
New Jersey: Chromium
New Jersey spill list: Chromium
Louisiana spill reporting: Chromium
California Director's List of Hazardous Substances: Chromium
TSCA 8(b) inventory: Chromium
SARA 313 toxic chemical notification and release reporting: Chromium
CERCLA: Hazardous substances.: Chromium: 5000 lbs. (2268 kg)

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).
EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada): Not controlled under WHMIS (Canada).

DSCL (EEC):
R40- Limited evidence of carcinogenic effect
S36/37/39- Wear suitable protective clothing, gloves and eye/face protection.
S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves.
Lab coat.
Dust respirator. Be sure to use an approved/certified respirator or equivalent.
Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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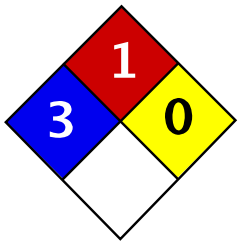

Health	3
Fire	1
Reactivity	0
Personal Protection	E

Material Safety Data Sheet
Cadmium MSDS

Section 1: Chemical Product and Company Identification

Product Name: Cadmium

Catalog Codes: SLC3484, SLC5272, SLC2482

CAS#: 7440-43-9

RTECS: EU9800000

TSCA: TSCA 8(b) inventory: Cadmium

CI#: Not applicable.

Synonym:

Chemical Name: Cadmium

Chemical Formula: Cd

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Cadmium	7440-43-9	100

Toxicological Data on Ingredients: Cadmium: ORAL (LD50): Acute: 2330 mg/kg [Rat.]. 890 mg/kg [Mouse]. DUST (LC50): Acute: 50 ppm 4 hour(s) [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant, sensitizer), of eye contact (irritant). Severe over-exposure can result in death.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Classified A2 (Suspected for human.) by ACGIH, 2 (Reasonably anticipated.) by NTP.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.
The substance is toxic to kidneys, lungs, liver.
Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure to an highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact: No known effect on eye contact, rinse with water for a few minutes.

Skin Contact:
After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact: Not available.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:
Do not induce vomiting. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: 570°C (1058°F)

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances:
Non-flammable in presence of open flames and sparks, of heat, of oxidizing materials, of reducing materials, of combustible materials, of moisture.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder.
LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards:
Material in powder form, capable of creating a dust explosion. When heated to decomposition it emits toxic fumes.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable protective clothing In case of insufficient ventilation, wear suitable respiratory equipment If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents.

Storage:
Keep container dry. Keep in a cool place. Ground all equipment containing material. Keep container tightly closed. Keep in a cool, well-ventilated place. Highly toxic or infectious materials should be stored in a separate locked safety storage cabinet or room.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 0.01 (ppm)
Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Lustrous solid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 112.4 g/mole

Color: Silvery.

pH (1% soln/water): Not applicable.

Boiling Point: 765°C (1409°F)

Melting Point: 320.9°C (609.6°F)

Critical Temperature: Not available.

Specific Gravity: 8.64 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water, hot water, methanol, diethyl ether, n-octanol.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Not considered to be corrosive for metals and glass.

Special Remarks on Reactivity: Reacts violently with potassium.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE.
Acute oral toxicity (LD50): 890 mg/kg [Mouse].
Acute toxicity of the dust (LC50): 229.9 mg/m3 4 hour(s) [Rat].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified A2 (Suspected for human.) by ACGIH, 2 (Reasonably anticipated.) by NTP.
The substance is toxic to kidneys, lungs, liver.

Other Toxic Effects on Humans:
Hazardous in case of ingestion, of inhalation.
Slightly hazardous in case of skin contact (irritant, sensitizer).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: An allergen. 0047 Animal: embryotoxic, passes through the placental barrier.

Special Remarks on other Toxic Effects on Humans: May cause allergic reactions, exzema and/or dehydration of the skin.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are as toxic as the original product.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification:

Identification:

Special Provisions for Transport:

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Cadmium
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Cadmium
Pennsylvania RTK: Cadmium
Massachusetts RTK: Cadmium
TSCA 8(b) inventory: Cadmium
SARA 313 toxic chemical notification and release reporting: Cadmium
CERCLA: Hazardous substances.: Cadmium

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):
CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC).
CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R26- Very toxic by inhalation.
R45- May cause cancer.

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 1

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 3

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves.
Lab coat.
Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.
Safety glasses.

Section 16: Other Information

References:
-Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987.
-Liste des produits purs tératogènes, mutagènes, cancérogènes. Répertoire toxicologique de la Commission de la Santé et de la Sécurité du Travail du Québec.
-Material safety data sheet emitted by: la Commission de la Santé et de la Sécurité du Travail du Québec.
-SAX, N.I. Dangerous Properties of Indutrial Materials. Toronto, Van Nostrand Reinold, 6e ed. 1984.
-The Sigma-Aldrich Library of Chemical Safety Data, Edition II.
-Guide de la loi et du règlement sur le transport des marchandises dangeureuses au canada. Centre de conformité internatinal Ltée. 1986.

Other Special Considerations: Not available.

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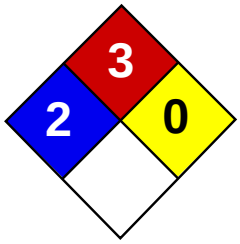

Material Safety Data Sheet
Benzene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Benzene

Catalog Codes: SLB1564, SLB3055, SLB2881

CAS#: 71-43-2

RTECS: CY1400000

TSCA: TSCA 8(b) inventory: Benzene

CI#: Not available.

Synonym: Benzol; Benzine

Chemical Name: Benzene

Chemical Formula: C6-H6

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Benzene	71-43-2	100

Toxicological Data on Ingredients: Benzene: ORAL (LD50): Acute: 930 mg/kg [Rat]. 4700 mg/kg [Mouse]. DERMAL (LD50): Acute: >9400 mg/kg [Rabbit]. VAPOR (LC50): Acute: 10000 ppm 7 hours [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of eye contact (irritant), of inhalation. Hazardous in case of skin contact (irritant, permeator), of ingestion. Inflammation of the eye is characterized by redness, watering, and itching.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH, 1 (Proven for human.) by IARC. MUTAGENIC EFFECTS: Classified POSSIBLE for human. Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female [POSSIBLE]. The substance is toxic to blood, bone marrow, central nervous system (CNS). The substance may be toxic to liver, Urinary System. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. WARM water MUST be used. Get medical attention immediately.

Skin Contact:
In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if symptoms appear.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 497.78°C (928°F)

Flash Points: CLOSED CUP: -11.1°C (12°F). (Setaflash)

Flammable Limits: LOWER: 1.2% UPPER: 7.8%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances:
Highly flammable in presence of open flames and sparks, of heat. Slightly flammable to flammable in presence of oxidizing materials. Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available. Explosive in presence of oxidizing materials, of acids.

Fire Fighting Media and Instructions:
Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog.

Special Remarks on Fire Hazards:
Extremely flammable liquid and vapor. Vapor may cause flash fire. Reacts on contact with iodine heptafluoride gas. Dioxygenyl tetrafluoroborate is as very powferful oxidant. The addition of a small particle to small samples of benzene, at ambient temperature, causes ignition. Contact with sodium peroxide with benzene causes ignition. Benzene ignites in contact with powdered chromic anhydride. Virgorous or incandescent reaction with hydrogen + Raney nickel (above 210 C) and bromine trifluoride.

Special Remarks on Explosion Hazards:
Benzene vapors + chlorine and light causes explosion. Reacts explosively with bromine pentafluoride, chlorine, chlorine trifluoride, diborane, nitric acid, nitryl perchlorate, liquid oxygen, ozone, silver perchlorate. Benzene + pentafluoride and methoxide (from arsenic pentafluoride and potassium methoxide) in trichlorotrifluoroethane causes explosion. Interaction

of nitryl perchlorate with benzene gave a slight explosion and flash. The solution of permanganic acid (or its explosive anhydride, dimaganese heptoxide) produced by interaction of permanganates and sulfuric acid will explode on contact with benzene. Peroxodisulfuric acid is a very powferful oxidant. Uncontrolled contact with benzene may cause explosion. Mixtures of peroxomonsulfuric acid with benzene explodes.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Flammable liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, acids.

Storage:
Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 0.5 STEL: 2.5 (ppm) from ACGIH (TLV) [United States] TWA: 1.6 STEL: 8 (mg/m3) from ACGIH (TLV) [United States] TWA: 0.1 STEL: 1 from NIOSH TWA: 1 STEL: 5 (ppm) from OSHA (PEL) [United States] TWA: 10 (ppm) from OSHA (PEL) [United States] TWA: 3 (ppm) [United Kingdom (UK)] TWA: 1.6 (mg/m3) [United Kingdom (UK)] TWA: 1 (ppm) [Canada] TWA: 3.2 (mg/m3) [Canada] TWA: 0.5 (ppm) [Canada]Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor:
Aromatic. Gasoline-like, rather pleasant. (Strong.)

Taste: Not available.

Molecular Weight: 78.11 g/mole

Color: Clear Colorless. Colorless to light yellow.

pH (1% soln/water): Not available.

Boiling Point: 80.1 (176.2°F)

Melting Point: 5.5°C (41.9°F)

Critical Temperature: 288.9°C (552°F)

Specific Gravity: 0.8787 @ 15 C (Water = 1)

Vapor Pressure: 10 kPa (@ 20°C)

Vapor Density: 2.8 (Air = 1)

Volatility: Not available.

Odor Threshold: 4.68 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 2.1

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether, acetone.

Solubility:
Miscible in alcohol, chloroform, carbon disulfide oils, carbon tetrachloride, glacial acetic acid, diethyl ether, acetone. Very slightly soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ignition sources, incompatibles.

Incompatibility with various substances: Highly reactive with oxidizing agents, acids.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Benzene vapors + chlorine and light causes explosion. Reacts explosively with bromine pentafluoride, chlorine, chlorine trifluoride, diborane, nitric acid, nitryl perchlorate, liquid oxygen, ozone, silver perchlorate. Benzene + pentafluoride and methoxide (from arsenic pentafluoride and potassium methoxide) in trichlorotrifluoroethane causes explosion. Interaction of nitryl perchlorate with benzene gave a slight explosion and flash. The solution of permanganic acid (or its explosive anhydride, dimaganese heptoxide) produced by interaction of permanganates and sulfuric acid will explode on contact with benzene. Peroxodisulfuric acid is a very powferful oxidant. Uncontrolled contact with benzene may cause explosion. Mixtures of peroxomonsulfuric acid with benzene explodes.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 930 mg/kg [Rat]. Acute dermal toxicity (LD50): >9400 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 10000 7 hours [Rat].

Chronic Effects on Humans:

CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH, 1 (Proven for human.) by IARC. MUTAGENIC EFFECTS: Classified POSSIBLE for human. Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female [POSSIBLE]. Causes damage to the following organs: blood, bone marrow, central nervous system (CNS). May cause damage to the following organs: liver, Urinary System.

Other Toxic Effects on Humans:
Very hazardous in case of inhalation. Hazardous in case of skin contact (irritant, permeator), of ingestion.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:
May cause adverse reproductive effects (female fertility, Embryotoxic and/or foetotoxic in animal) and birth defects. May affect genetic material (mutagenic). May cause cancer (tumorigenic, leukemia)) Human: passes the placental barrier, detected in maternal milk.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: Causes skin irritation. It can be absorbed through intact skin and affect the liver, blood, metabolism,and urinary system. Eyes: Causes eye irritation. Inhalation: Causes respiratory tract and mucous membrane irritation. Can be absorbed through the lungs. May affect behavior/Central and Peripheral nervous systems (somnolence, muscle weakness, general anesthetic, and other symptoms similar to ingestion), gastrointestinal tract (nausea), blood metabolism, urinary system. Ingestion: May be harmful if swallowed. May cause gastrointestinal tract irritation including vomiting. May affect behavior/Central and Peripheral nervous systems (convulsions, seizures, tremor, irritability, initial CNS stimulation followed by depression, loss of coordination, dizziness, headache, weakness, pallor, flushing), respiration (breathlessness and chest constriction), cardiovascular system, (shallow/rapid pulse), and blood.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Benzene UNNA: 1114 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Benzene California prop. 65 (no significant risk level): Benzene: 0.007 mg/day (value) California prop. 65: This product contains the following ingredients

for which the State of California has found to cause cancer which would require a warning under the statute: Benzene Connecticut carcinogen reporting list.: Benzene Connecticut hazardous material survey.: Benzene Illinois toxic substances disclosure to employee act: Benzene Illinois chemical safety act: Benzene New York release reporting list: Benzene Rhode Island RTK hazardous substances: Benzene Pennsylvania RTK: Benzene Minnesota: Benzene Michigan critical material: Benzene Massachusetts RTK: Benzene Massachusetts spill list: Benzene New Jersey: Benzene New Jersey spill list: Benzene Louisiana spill reporting: Benzene California Director's list of Hazardous Substances: Benzene TSCA 8(b) inventory: Benzene SARA 313 toxic chemical notification and release reporting: Benzene CERCLA: Hazardous substances.: Benzene: 10 lbs. (4.536 kg)

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R11- Highly flammable. R22- Harmful if swallowed. R38- Irritating to skin. R41- Risk of serious damage to eyes. R45- May cause cancer. R62- Possible risk of impaired fertility. S2- Keep out of the reach of children. S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S39- Wear eye/face protection. S46- If swallowed, seek medical advice immediately and show this container or label. S53- Avoid exposure - obtain special instructions before use.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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Material Safety Data Sheet

Vinyl Chloride (Chloroethylene)

Section 1. Chemical product and company identification

Product name : Vinyl Chloride (Chloroethylene)

Supplier : AIRGAS INC., on behalf of its subsidiaries
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253

Product use : Synthetic/Analytical chemistry.

Synonym : Ethylene, chloro-; Chloroethene; Chloroethylene; Monochloroethylene; Vinyl chloride; Vinyl chloride monomer; Vinyl C monomer; C2H3Cl; Ethylene monochloride; Monochloroethene; Chlorethene; Chlorethylene; Chlorure de vinyle; Cloruro di vinile; Rcra waste number U043; Trovidur; UN 1086; VC; VCM; Vinile; Vinylchlorid; Vinyl chloride, inhibited; Vinyle(chlorure de); Winylu chlorek; 1-Chloroethylene

MSDS # : 001067

Date of Preparation/Revision : **4/27/2010.**

In case of emergency : 1-866-734-3438

Section 2. Hazards identification

Physical state : Gas. [COLORLESS GAS OR LIQUID (BELOW 7 F) WITH A PLEASANT ODOR AT HIGH CONCENTRATIONS. [NOTE: SHIPPED AS A LIQUEFIED COMPRESSED GAS.]]

Emergency overview : WARNING!

FLAMMABLE GAS.
MAY CAUSE FLASH FIRE.
HARMFUL IF SWALLOWED.
MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.
CANCER HAZARD - CAN CAUSE CANCER.
CONTENTS UNDER PRESSURE.

Keep away from heat, sparks and flame. Do not puncture or incinerate container. Do not ingest. May cause target organ damage, based on animal data. Risk of cancer depends on duration and level of exposure. Use only with adequate ventilation. Wash thoroughly after handling. Keep container closed.

Contact with rapidly expanding gases can cause frostbite.

Target organs : May cause damage to the following organs: blood, kidneys, liver, mucous membranes, lymphatic system, upper respiratory tract, skin, eyes, central nervous system (CNS).

Routes of entry : Inhalation

Potential acute health effects

Eyes : Irritating to eyes.

Skin : Irritating to skin.

Inhalation : Acts as a simple asphyxiant.

Ingestion : Ingestion is not a normal route of exposure for gases

Potential chronic health effects : **CARCINOGENIC EFFECTS**: Classified A1 (Confirmed for humans.) by ACGIH, 1 (Proven for humans.) by IARC, 1 (Known to be human carcinogens.) by NTP, + (Proven.) by OSHA, + (Proven.) by NIOSH, 1 (Proven for humans.) by European Union.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.

Medical conditions aggravated by over-exposure : Pre-existing disorders involving any target organs mentioned in this MSDS as being at risk may be aggravated by over-exposure to this product.

See toxicological information (section 11)

Section 3. Composition, Information on Ingredients

Name	CAS number	% Volume	Exposure limits
Vinyl Chloride (Chloroethylene)	75-01-4	100	**ACGIH TLV (United States, 1/2009).** TWA: 1 ppm 8 hour(s). **OSHA PEL (United States, 11/2006).** STEL: 5 ppm 15 minute(s). TWA: 1 ppm 8 hour(s). **OSHA PEL 1989 (United States, 3/1989).** STEL: 5 ppm 15 minute(s). TWA: 1 ppm 8 hour(s).

Section 4. First aid measures

No action shall be taken involving any personal risk or without suitable training.If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus.It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

Eye contact : Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately.

Skin contact : In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. To avoid the risk of static discharges and gas ignition, soak contaminated clothing thoroughly with water before removing it. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.

Frostbite : Try to warm up the frozen tissues and seek medical attention.

Inhalation : Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Ingestion : As this product is a gas, refer to the inhalation section.

Section 5. Fire-fighting measures

Flammability of the product : Flammable.

Auto-ignition temperature : 471.85°C (881.3°F)

Flash point : Open cup: -79.15°C (-110.5°F).

Flammable limits : Lower: 4% Upper: 22%

Products of combustion : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
halogenated compounds

Fire-fighting media and instructions : In case of fire, use water spray (fog), foam or dry chemical.

In case of fire, allow gas to burn if flow cannot be shut off immediately. Apply water from a safe distance to cool container and protect surrounding area. If involved in fire, shut off flow immediately if it can be done without risk.

Contains gas under pressure. Flammable gas. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions : Immediately contact emergency personnel. Keep unnecessary personnel away. Use suitable protective equipment (section 8). Shut off gas supply if this can be done safely. Isolate area until gas has dispersed.

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Methods for cleaning up : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment. Note: see section 1 for emergency contact information and section 13 for waste disposal.

Section 7. Handling and storage

Handling : Use only with adequate ventilation. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Wash thoroughly after handling. High pressure gas. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Do not ingest. Keep container closed. Keep away from heat, sparks and flame. To avoid fire, eliminate ignition sources. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.

Storage : Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame). Segregate from oxidizing materials. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F).

Section 8. Exposure controls/personal protection

Engineering controls : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Personal protection

Eyes : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.

Skin : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

The applicable standards are (US) 29 CFR 1910.134 and (Canada) Z94.4-93

Hands : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

Personal protection in case of a large spill : Self-contained breathing apparatus (SCBA) should be used to avoid inhalation of the product.

Product name

vinyl chloride

ACGIH TLV (United States, 1/2009).
TWA: 1 ppm 8 hour(s).
OSHA PEL (United States, 11/2006).
STEL: 5 ppm 15 minute(s).
TWA: 1 ppm 8 hour(s).
OSHA PEL 1989 (United States, 3/1989).
STEL: 5 ppm 15 minute(s).
TWA: 1 ppm 8 hour(s).

Consult local authorities for acceptable exposure limits.

Section 9. Physical and chemical properties

Molecular weight : 62.5 g/mole

Molecular formula : C2-H3-Cl

Boiling/condensation point : -13.8°C (7.2°F)

Melting/freezing point : -160°C (-256°F)

Critical temperature : 158.5°C (317.3°F)

Vapor density : 2.21 (Air = 1)

Specific Volume (ft^3/lb) : 6.25

Gas Density (lb/ft^3) : 0.16

Section 10. Stability and reactivity

Stability and reactivity : The product is stable.

Incompatibility with various substances : Extremely reactive or incompatible with the following materials: oxidizing materials.

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Hazardous polymerization : Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 11. Toxicological information

Toxicity data

Product/ingredient name	Result	Species	Dose	Exposure
vinyl chloride	LD50 Oral	Rat	500 mg/kg	-
	LC50 Inhalation Gas.	Rat	18 pph	15 minutes
	LC50 Inhalation Gas.	Rat	5000 ppm	1 hours

Chronic effects on humans : **CARCINOGENIC EFFECTS**: Classified A1 (Confirmed for humans.) by ACGIH, 1 (Proven for humans.) by IARC, 1 (Known to be human carcinogens.) by NTP, + (Proven.) by OSHA, + (Proven.) by NIOSH, 1 (Proven for humans.) by European Union. May cause damage to the following organs: blood, kidneys, liver, mucous membranes, lymphatic system, upper respiratory tract, skin, eyes, central nervous system (CNS).

Other toxic effects on humans : No specific information is available in our database regarding the other toxic effects of this material to humans.

Specific effects

Carcinogenic effects : Can cause cancer. Risk of cancer depends on duration and level of exposure.

Mutagenic effects : No known significant effects or critical hazards.

Reproduction toxicity : No known significant effects or critical hazards.

Section 12. Ecological information

Aquatic ecotoxicity

Not available.

Products of degradation : Products of degradation: carbon oxides (CO, CO_2) and water, halogenated compounds.

Environmental fate : Not available.

Environmental hazards : No known significant effects or critical hazards.

Toxicity to the environment : Not available.

Section 13. Disposal considerations

Product removed from the cylinder must be disposed of in accordance with appropriate Federal, State, local regulation.Return cylinders with residual product to Airgas, Inc.Do not dispose of locally.

Section 14. Transport information

Regulatory information	UN number	Proper shipping name	Class	Packing group	Label	Additional information
DOT Classification	UN1086	VINYL CHLORIDE, STABILIZED	2.1	Not applicable (gas).		**Reportable quantity** 1 lb. (0.454 kg) **Limited quantity** Yes. **Packaging instruction** **Passenger aircraft** Quantity limitation: Forbidden. **Cargo aircraft** Quantity limitation: 150 kg **Special provisions** 21, B44, T50
TDG Classification	UN1086	VINYL CHLORIDE, STABILIZED	2.1	Not applicable (gas).		**Explosive Limit and Limited Quantity Index** 0.125 **ERAP Index** 3000 **Passenger Carrying Road or Rail Index** Forbidden
Mexico Classification	UN1086	VINYL CHLORIDE, STABILIZED	2.1	Not applicable (gas).		-

"Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product."

Section 15. Regulatory information

United States

U.S. Federal regulations : **United States inventory (TSCA 8b):** This material is listed or exempted.

SARA 302/304/311/312 extremely hazardous substances: No products were found.
SARA 302/304 emergency planning and notification: No products were found.
SARA 302/304/311/312 hazardous chemicals: vinyl chloride
SARA 311/312 MSDS distribution - chemical inventory - hazard identification: vinyl chloride: Fire hazard, reactive, Sudden release of pressure, Immediate (acute) health hazard, Delayed (chronic) health hazard

Clean Water Act (CWA) 307: vinyl chloride

Clean Water Act (CWA) 311: No products were found.

Clean Air Act (CAA) 112 accidental release prevention: vinyl chloride

Clean Air Act (CAA) 112 regulated flammable substances: vinyl chloride

Clean Air Act (CAA) 112 regulated toxic substances: No products were found.

SARA 313

		Product name	CAS number	Concentration
Form R - Reporting requirements	:	Vinyl Chloride (Chloroethylene)	75-01-4	100
Supplier notification	:	Vinyl Chloride (Chloroethylene)	75-01-4	100

SARA 313 notifications must not be detached from the MSDS and any copying and redistribution of the MSDS shall include copying and redistribution of the notice attached to copies of the MSDS subsequently redistributed.

State regulations : **Connecticut Carcinogen Reporting:** This material is not listed.
Connecticut Hazardous Material Survey: This material is not listed.
Florida substances: This material is not listed.
Illinois Chemical Safety Act: This material is not listed.
Illinois Toxic Substances Disclosure to Employee Act: This material is not listed.
Louisiana Reporting: This material is not listed.
Louisiana Spill: This material is not listed.
Massachusetts Spill: This material is not listed.
Massachusetts Substances: This material is listed.
Michigan Critical Material: This material is not listed.
Minnesota Hazardous Substances: This material is not listed.
New Jersey Hazardous Substances: This material is listed.
New Jersey Spill: This material is not listed.
New Jersey Toxic Catastrophe Prevention Act: This material is not listed.
New York Acutely Hazardous Substances: This material is listed.
New York Toxic Chemical Release Reporting: This material is not listed.
Pennsylvania RTK Hazardous Substances: This material is listed.
Rhode Island Hazardous Substances: This material is not listed.

California Prop. 65 : **WARNING:** This product contains a chemical known to the State of California to cause cancer.

Ingredient name	Cancer	Reproductive	No significant risk level	Maximum acceptable dosage level
Vinyl Chloride (Chloroethylene)	Yes.	No.	Yes.	No.

Canada

WHMIS (Canada) : Class A: Compressed gas.
Class B-1: Flammable gas.
Class D-2A: Material causing other toxic effects (Very toxic).
Class D-2B: Material causing other toxic effects (Toxic).
Class F: Dangerously reactive material.

CEPA Toxic substances: This material is listed.
Canadian ARET: This material is not listed.
Canadian NPRI: This material is listed.
Alberta Designated Substances: This material is not listed.
Ontario Designated Substances: This material is not listed.
Quebec Designated Substances: This material is not listed.

Section 16. Other information

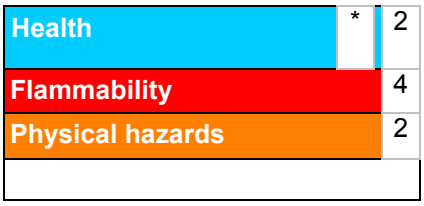
United States

Label requirements : FLAMMABLE GAS.
MAY CAUSE FLASH FIRE.
HARMFUL IF SWALLOWED.
MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.
CANCER HAZARD - CAN CAUSE CANCER.
CONTENTS UNDER PRESSURE.

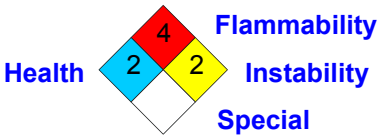
Canada

Label requirements : Class A: Compressed gas.
Class B-1: Flammable gas.
Class D-2A: Material causing other toxic effects (Very toxic).
Class D-2B: Material causing other toxic effects (Toxic).
Class F: Dangerously reactive material.

Hazardous Material Information System (U.S.A.) :



National Fire Protection Association (U.S.A.) :



Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

Material Safety Data Sheet

Genetron® 11

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: Genetron® 11
OTHER/GENERIC NAMES: CFC-11
PRODUCT USE: Refrigerant and blowing agent for insulating foam. See Section 15 for Regulatory Information
MANUFACTURER: Honeywell
101 Columbia Road
Box 1053
Morristown, New Jersey 07962-1053

FOR MORE INFORMATION CALL:
(Monday-Friday, 8:00am-5:00pm)
1-800-522-8001

IN CASE OF EMERGENCY CALL:
(24 Hours/Day, 7 Days/Week)
Chemtrec 1-800-424-9300 or 703-527-3887

2. COMPOSITION/INFORMATION ON INGREDIENTS

INGREDIENT NAME	CAS NUMBER	WEIGHT %
Trichlorofluoromethane	75-69-4	100

Trace impurities and additional material names not listed above may also appear in Section 15 toward the end of the MSDS. These materials may be listed for local "Right-To-Know" compliance and for other reasons.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: Colorless, volatile liquid with ethereal and faint sweetish odor. Non-flammable material. Overexposure may cause dizziness and loss of concentration. At higher levels, CNS depression and cardiac arrhythmia may result from exposure. Vapors displace air and can cause asphyxiation in confined spaces. At high temperatures (>250°C), decomposition products may include Hydrochloric Acid (HCl), Hydrofluoric Acid (HF) and carbonyl halides.

POTENTIAL HEALTH HAZARDS

SKIN: Prolonged and/or repeated contact with this solvent can cause irritation of the skin (defatting of skin).

EYES: Irritant. Liquid contact will irritate and may cause conjunctivitis.

INHALATION: Genetron 11 has a relatively low order of acute toxicity. When oxygen levels in air are reduced to 12-14% by displacement, symptoms of asphyxiation, loss of coordination, increased pulse rate and deeper respiration will occur. In repeated exposure tests with animals, changes were noted in liver functions and lipid production at levels above 100ppm. At higher levels, cardiac arrhythmia may occur.

INGESTION: Discomfort due to volatility would be expected. Some of the inhalation effects could be expected.

DELAYED EFFECTS: None identified.

MATERIAL SAFETY DATA SHEET

Genetron® 11

Ingredients found on one of the OSHA designated carcinogen lists are listed below.

INGREDIENT NAME	NTP STATUS	IARC STATUS	OSHA LIST
No ingredients listed in this section			

4. FIRST AID MEASURES

SKIN: Promptly flush skin with water until all chemical is removed. Remove clothing contaminated with liquid and wash before reuse.

EYES: Immediately flush eyes with large amounts of water for at least 15 minutes, lifting eyelids occasionally to facilitate irrigation. Get medical attention.

INHALATION: Immediately remove patient to fresh air. If breathing has stopped, give artificial respiration. Use oxygen as required, provided a qualified operator is available. DO NOT give epinephrine (adrenaline). Get medical attention immediately.

INGESTION: DO NOT induce vomiting unless instructed to do so by a physician. DO NOT give stimulants. Get medical attention immediately.

ADVICE TO PHYSICIAN: Because of possible disturbances of cardiac rhythm, catecholamine drugs such as epinephrine, should be used with special caution and only in situations of emergency life support. Treatment of overexposure should be directed at the control of symptoms and the clinical conditions.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

FLASH POINT: None
FLASH POINT METHOD: ASTM D-1310-67 and ASTM D-56-82
AUTOIGNITION TEMPERATURE: Unknown
UPPER FLAME LIMIT (volume % in air): None
LOWER FLAME LIMIT (volume % in air): None

FLAME PROPAGATION RATE (solids): Not applicable
OSHA FLAMMABILITY CLASS: Not applicable

EXTINGUISHING MEDIA:
Use any standard agent - choose the one most appropriate for type of surrounding fire (material itself in not flammable)

UNUSUAL FIRE AND EXPLOSION HAZARDS:
Contact with certain finely divided metals may cause exothermic reaction and/or explosive combinations under specific conditions (e.g. very high temperatures and/or appropriate pressures and in the presence of oxygen). Decomposition products include hydrochloric acid, hydrofluoric acid, and carbonyl halides.

SPECIAL FIRE FIGHTING PRECAUTIONS/INSTRUCTIONS:
Firefighters should wear self-contained, NIOSH-approved breathing apparatus for protection against suffocation and possible toxic decomposition products. Proper eye and skin protection should be provided. Use water spray to keep fire-exposed containers cool and to knock down vapors which may result from product decomposition.

6. ACCIDENTAL RELEASE MEASURES

IN CASE OF SPILL OR OTHER RELEASE: (Always wear recommended personal protective equipment.)
Immediately evacuate the area and provide maximum ventilation. Try to eliminate all ignition sources. Unprotected personnel should move upwind from spill. Only personnel equipped with proper respiratory and eye/skin protection should be permitted in the area. Dike area to contain the spill. Take precautions as necessary to prevent contamination of ground and surface waters. For large spills, pump material into appropriate containers. For small spills, recover or absorb spilled material using an absorbant designed for chemical spills such as Hazsorb® pillows. Place used absorbants into closed DOT approved containers for disposal. After all visible traces have been removed, thoroughly wet vacuum the area. DO NOT flush into sewer. If the area of the spill is porous, removal of contaminated earth/surface may be required.

Spills and releases may have to be reported to Federal and/or local authorities. See Section 15 regarding reporting requirements.

7. HANDLING AND STORAGE

NORMAL HANDLING: (Always wear recommended personal protective equipment.)
Genetron 11 boils at 74.5°F, hence contents may be under pressure. Exercise caution when opening container. If containers have been stored in direct sunlight or heated above the boiling point of the solvent, the container should be cooled to below the boiling point before opening.

Recommended Opening Prcedure
To open container, follow these procedures to avoid loss and contamination of the product.
1. Tear off protective cap over large bung opening.
2. Carefully remove the 3/4 inch plug from the center of the large bung. DO NOT puncture the inner seal.
3. Insert convenient length 3/4 inch nipple fitted with a closed valve. As nipple is inserted, the inner seal is broken and container is ready to unload through valve.

STORAGE RECOMMENDATIONS:
Keep container closed when not in use. DO NOT store in open, unlabeled or mislabeled containers. Store in a cool, well-ventilated area of low fire risk. Protect container and its fittings from physical damage. Storage in subsurface locations should be avoided. Close valve tightly and replace bung after use and when empty. If container temperature exceeds boiling point, cool the container before opening.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS:
Use local exhaust at filling zones and where leakage is probable. Use mechanical (general) ventilation for storage areas. All ventilation should be designed in accordance with OSHA standard (29 CFR 1910.94).

PERSONAL PROTECTIVE EQUIPMENT

SKIN PROTECTION:
Use protective, impervious gloves such as PVA or neoprene. Also, use full protective clothing if there is prolonged or repeated contact of liquid with skin. Any non-impervious clothing should be promptly removed when contaminated and washed before reuse.

EYE PROTECTION:

For normal conditions, wear safety glasses. Where there is reasonable probability of liquid contact, wear splash-proof goggles.

RESPIRATORY PROTECTION:

None required for normal work situations where adequate ventilation is provided. Use NIOSH approved self-contained, positive pressure respirators for emergencies and in situations where air may be displaced by vapors.

ADDITIONAL RECOMMENDATIONS:

High dose-level warning signs are recommended for areas of principle exposure. Provide eyewash stations and quick drench shower facilities at convenient locations. For tank cleaning operations, see OSHA regulations, 29 CFR 1910.132 and 29 CFR 1910.133.

EXPOSURE GUIDELINES

INGREDIENT NAME	ACGIH TLV	OSHA PEL	OTHER LIMIT
Trichlorofluoromethane	1000 ppm Ceiling	1000 ppm TWA - 8	None

* = Limit established by Honeywell.
** = Workplace Environmental Exposure Level (AIHA).
*** = Biological Exposure Index (ACGIH).

OTHER EXPOSURE LIMITS FOR POTENTIAL DECOMPOSITION PRODUCTS:

Hydrogen Fluoride: ACGIH TLV: 3 ppm ceiling

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Colorless liquid
PHYSICAL STATE: Liquid
MOLECULAR WEIGHT: 137.35
CHEMICAL FORMULA: CCl_3F
ODOR: Faint ethereal and sweetish odor
SPECIFIC GRAVITY (water = 1.0): 1.47 @ 70°F (21.1°C)
SOLUBILITY IN WATER (weight %): 0.21% @ 70°F (21.1°C)
pH: Neutral
BOILING POINT: 23.6°F (74.5°C)
MELTING POINT: -167.8°F (-111°C)
VAPOR PRESSURE: 12.8 psia at 68°F
VAPOR DENSITY (air = 1.0): 4.8
EVAPORATION RATE: >1 **COMPARED TO:** Ether = 1
% VOLATILES: 100
FLASH POINT: None

(Flash point method and additional flammability data are found in Section 5.)

10. STABILITY AND REACTIVITY

NORMALLY STABLE? (CONDITIONS TO AVOID):

Product is normally stable.

Avoid sources of ignition such as sparks, hot spots, welding flames and lighted cigarettes. At all concentration ranges, exposure of the product to high energy sources may yield toxic and/or corrosive decomposition products.

INCOMPATIBILITIES:

Strong acids and alkalis, reactive metals e.g., powdered or freshly abraded aluminum (may cause strong exothermic reaction), sodium, potassium, calcium, magnesium, zinc, molten aluminum, barium and lithium shavings. Strong oxidizing agents.

HAZARDOUS DECOMPOSITION PRODUCTS:

Hydrochloric and hydrofluoric acids; and carbonyl halides, such as phosgene.

HAZARDOUS POLYMERIZATION:

Will not occur.

11. TOXICOLOGICAL INFORMATION

IMMEDIATE (ACUTE) EFFECTS:

Acute Inahlation:

4 hr LC_{50}.(rat)....26,000 ppm

Cardiac Sensitization Threshold (dog).....5,000 ppm

Anesthetic Concentration 35,000 ppm (10 min.)

DELAYED (SUBCHRONIC AND CHRONIC) EFFECTS:

Subchronic NOEL - 10,000 ppm

OTHER DATA:

Not a teratogen

12. ECOLOGICAL INFORMATION

Biodegradability - Minimal

Octanol Water Partition Coefficient: Not Determined

13. DISPOSAL CONSIDERATIONS

RCRA

Is the unused product a RCRA hazardous waste if discarded? Yes

If yes, the RCRA ID number is: U121

OTHER DISPOSAL CONSIDERATIONS:

Disposal of waste material may be subject to federal regulations. Users should review their operations, then consult with appropriate regulatory agencies before discharging or disposing of waste material. Genetron 11 is subject to U.S. Environmental Protection Agency Clean Air Act Regulations, Section 608 in 40 CFR Part 82 regarding refrigerant recycling.

The information offered here is for the product as shipped. Use and/or alterations to the product such as mixing with other materials may significantly change the characteristics of the material and alter the RCRA classification and the proper disposal method.

14. TRANSPORT INFORMATION

US DOT HAZARD CLASS: For individual packages that contain LESS THAN the Reportable Quantity (5000 lbs.),- Not Regulated.
For individual packages that contain MORE THAN the Reportable Quantity (5000 lbs.), - RQ, Environmentally Hazardous Substances, Liquid, n.o.s. (Trichlorofluoromethane) 9, PG III, UN3082

US DOT ID NUMBER: For individual packages that contain LESS THAN the Reportable Quantity (5000 lbs.),- Not Applicable.
For individual packages that contain MORE THAN the Reportable Quantity (5000 lbs.), - RQ, Environmentally Hazardous Substances, Liquid, n.o.s. (Trichlorofluoromethane) 9, PG III, UN3082

For additional information on shipping regulations affecting this material, contact the information number found in Section 1.

15. REGULATORY INFORMATION

TOXIC SUBSTANCES CONTROL ACT (TSCA)

TSCA INVENTORY STATUS: Listed on the TSCA Inventory

OTHER TSCA ISSUES: None

SARA TITLE III/CERCLA

"Reportable Quantities" (RQs) and/or "Threshold Planning Quantities" (TPQs) exist for the following ingredients.

INGREDIENT NAME	SARA/CERCLA RQ (lb)	SARA EHS TPQ (lb)
Trichlorofluoromethane	5000	None

Spills or releases resulting in the loss of any ingredient at or above its RQ requires immediate notification to the National Response Center [(800) 424-8802] and to your Local Emergency Planning Committee.

SECTION 311 HAZARD CLASS: IMMEDIATE
DELAYED

SARA 313 TOXIC CHEMICALS:
The following ingredients are SARA 313 "Toxic Chemicals". CAS numbers and weight percents are found in Section 2.

INGREDIENT NAME	COMMENT
Trichlorofluoromethane	None

STATE RIGHT-TO-KNOW

In addition to the ingredients found in Section 2, the following are listed for state right-to-know purposes.

INGREDIENT NAME	WEIGHT %	COMMENT
No ingredients listed in this section		

ADDITIONAL REGULATORY INFORMATION:

Genetron 11 is subject to U.S. Environmental Protection Agency Clean Air Act Regulations Sections 610, 611 at 40 CFR Part 82. Section 611 requires the following label text on all shipments of this product:

WARNING:
DO NOT VENT TO THE ATMOSPHERE. TO COMPLY WITH PROVISIONS OF THE U.S. CLEAN AIR ACT, ANY RESIDUAL MUST BE RECOVERED.
CONTAINS TRICHLOROFLUOROMETHANE (CFC-11), A SUBSTANCE WHICH HARMS PUBLIC HEALTH AND ENVIRONMENT BY DESTROYING OZONE IN THE UPPER ATMOSHPERE.

WHMIS CLASSIFICATION (CANADA):

This product has been evaluated in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

FOREIGN INVENTORY STATUS:

EINECS Number:2008925

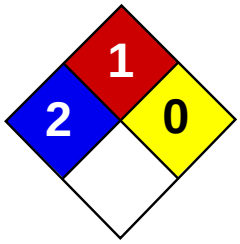
16. OTHER INFORMATION

CURRENT ISSUE DATE: January, 2004
PREVIOUS ISSUE DATE: February, 2003

CHANGES TO MSDS FROM PREVIOUS ISSUE DATE ARE DUE TO THE FOLLOWING:

Section 3: Revised decomposition products
Section 5: Revised decomposition products

OTHER INFORMATION: HMIS Classification: Health - 1, Flammability - 0, Reactivity – 0
NFPA Classification: Health - 2, Flammability - 0, Reactivity - 0



Material Safety Data Sheet
Trichloroethylene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Trichloroethylene

Catalog Codes: SLT3310, SLT2590

CAS#: 79-01-6

RTECS: KX4560000

TSCA: TSCA 8(b) inventory: Trichloroethylene

CI#: Not available.

Synonym:

Chemical Formula: C2HCl3

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Trichloroethylene	79-01-6	100

Toxicological Data on Ingredients: Trichloroethylene: ORAL (LD50): Acute: 5650 mg/kg [Rat]. 2402 mg/kg [Mouse]. DERMAL (LD50): Acute: 20001 mg/kg [Rabbit].

Section 3: Hazards Identification

Potential Acute Health Effects: Hazardous in case of skin contact (irritant, permeator), of eye contact (irritant), of ingestion, of inhalation.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Classified + (PROVEN) by OSHA. Classified A5 (Not suspected for human.) by ACGIH. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to kidneys, the nervous system, liver, heart, upper respiratory tract. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.

Skin Contact:
After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: 420°C (788°F)

Flash Points: Not available.

Flammable Limits: LOWER: 8% UPPER: 10.5%

Products of Combustion: These products are carbon oxides (CO, CO2), halogenated compounds.

Fire Hazards in Presence of Various Substances: Not available.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Absorb with an inert material and put the spilled material in an appropriate waste disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapour/

spray. Wear suitable protective clothing In case of insufficient ventilation, wear suitable respiratory equipment If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes

Storage:
Keep container dry. Keep in a cool place. Ground all equipment containing material. Carcinogenic, teratogenic or mutagenic materials should be stored in a separate locked safety storage cabinet or room.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 50 STEL: 200 (ppm) from ACGIH (TLV) TWA: 269 STEL: 1070 (mg/m3) from ACGIH Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Not available.

Taste: Not available.

Molecular Weight: 131.39 g/mole

Color: Clear Colorless.

pH (1% soln/water): Not available.

Boiling Point: 86.7°C (188.1°F)

Melting Point: -87.1°C (-124.8°F)

Critical Temperature: Not available.

Specific Gravity: 1.4649 (Water = 1)

Vapor Pressure: 58 mm of Hg (@ 20°C)

Vapor Density: 4.53 (Air = 1)

Volatility: Not available.

Odor Threshold: 20 ppm

Water/Oil Dist. Coeff.: The product is equally soluble in oil and water; log(oil/water) = 0

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, methanol, diethyl ether, acetone.

Solubility:
Easily soluble in methanol, diethyl ether, acetone. Very slightly soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity:
Extremely corrosive in presence of aluminum. Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
Acute oral toxicity (LD50): 2402 mg/kg [Mouse]. Acute dermal toxicity (LD50): 20001 mg/kg [Rabbit].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified + (PROVEN) by OSHA. Classified A5 (Not suspected for human.) by ACGIH. The substance is toxic to kidneys, the nervous system, liver, heart, upper respiratory tract.

Other Toxic Effects on Humans: Hazardous in case of skin contact (irritant, permeator), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Passes through the placental barrier in human. Detected in maternal milk in human.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: : Trichloroethylene : UN1710 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Trichloroethylene California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Trichloroethylene Pennsylvania RTK: Trichloroethylene Florida: Trichloroethylene Minnesota: Trichloroethylene Massachusetts RTK: Trichloroethylene New Jersey: Trichloroethylene TSCA 8(b) inventory: Trichloroethylene CERCLA: Hazardous substances.: Trichloroethylene

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):
CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC). CLASS D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):
R36/38- Irritating to eyes and skin. R45- May cause cancer.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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Last Updated: 11/01/2010 12:00 PM

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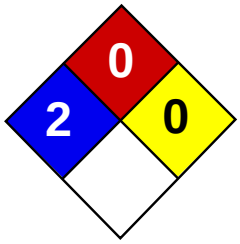

Health	2
Fire	0
Reactivity	0
Personal Protection	G

Material Safety Data Sheet
Tetrachloroethylene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Tetrachloroethylene

Catalog Codes: SLT3220

CAS#: 127-18-4

RTECS: KX3850000

TSCA: TSCA 8(b) inventory: Tetrachloroethylene

CI#: Not available.

Synonym: Perchloroethylene; 1,1,2,2-Tetrachloroethylene; Carbon bichloride; Carbon dichloride; Ankilostin; Didakene; Dilatin PT; Ethene, tetrachloro-; Ethylene tetrachloride; Perawin; Perchlor; Perclene; Perclene D; Percosolvel; Tetrachloroethene; Tetraleno; Tetralex; Tetravec; Tetroguer; Tetropil

Chemical Name: Ethylene, tetrachloro-

Chemical Formula: C2-Cl4

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Tetrachloroethylene	127-18-4	100

Toxicological Data on Ingredients: Tetrachloroethylene: ORAL (LD50): Acute: 2629 mg/kg [Rat]. DERMAL (LD): Acute: >3228 mg/kg [Rabbit]. MIST(LC50): Acute: 34200 mg/m 8 hours [Rat]. VAPOR (LC50): Acute: 5200 ppm 4 hours [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of skin contact (irritant), of inhalation. Slightly hazardous in case of skin contact (permeator), of eye contact (irritant), of ingestion.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH. Classified 2A (Probable for human.) by IARC, 2 (anticipated carcinogen) by NTP. MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to kidneys, liver, peripheral nervous system, respiratory tract, skin, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

Skin Contact:
In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if symptoms appear.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not applicable.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Absorb with an inert material and put the spilled material in an appropriate waste disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Do not ingest. Do not breathe gas/fumes/ vapor/spray. Avoid contact with skin. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents, metals, acids, alkalis.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value.

Personal Protection:
Safety glasses. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 25 (ppm) from OSHA (PEL) [United States] TWA: 25 STEL: 100 (ppm) from ACGIH (TLV) [United States] TWA: 170 (mg/m3) from OSHA (PEL) [United States] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Ethereal.

Taste: Not available.

Molecular Weight: 165.83 g/mole

Color: Clear Colorless.

pH (1% soln/water): Not available.

Boiling Point: 121.3°C (250.3°F)

Melting Point: -22.3°C (-8.1°F)

Critical Temperature: 347.1°C (656.8°F)

Specific Gravity: 1.6227 (Water = 1)

Vapor Pressure: 1.7 kPa (@ 20°C)

Vapor Density: 5.7 (Air = 1)

Volatility: Not available.

Odor Threshold: 5 - 50 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 3.4

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility:
Miscible with alcohol, ether, chloroform, benzene, hexane. It dissolves in most of the fixed and volatile oils. Solubility in water: 0.015 g/100 ml @ 25 deg. C It slowly decomposes in water to yield Trichloroacetic and Hydrochloric acids.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents, metals, acids, alkalis.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Oxidized by strong oxidizing agents. Incompatible with sodium hydroxide, finely divided or powdered metals such as zinc, aluminum, magnesium, potassium, chemically active metals such as lithium, beryllium , barium. Protect from light.

Special Remarks on Corrosivity: Slowly corrodes aluminum, iron, and zinc.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 2629 mg/kg [Rat]. Acute dermal toxicity (LD50): >3228 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 5200 4 hours [Mouse].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH. Classified 2A (Probable for human.) by IARC, 2 (Some evidence.) by NTP. MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast. May cause damage to the following organs: kidneys, liver, peripheral nervous system, upper respiratory tract, skin, central nervous system (CNS).

Other Toxic Effects on Humans:
Hazardous in case of skin contact (irritant), of inhalation. Slightly hazardous in case of skin contact (permeator), of ingestion.

Special Remarks on Toxicity to Animals:
Lowest Publishe Lethal Dose/Conc: LDL [Rabbit] - Route: Oral; Dose: 5000 mg/kg LDL [Dog] - Route: Oral; Dose: 4000 mg/kg LDL [Cat] - Route: Oral; Dose: 4000 mg/kg

Special Remarks on Chronic Effects on Humans:
May cause adverse reproductive effects and birth defects(teratogenic). May affect genetic material (mutagenic). May cause cancer.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: Causes skin irritation with possible dermal blistering or burns. Symtoms may include redness, itching, pain, and possible dermal blistering or burns. It may be absorbed through the skin with possible systemic effects. A single prolonged skin exposure is not likely to result in the material being absorbed in harmful amounts. Eyes: Contact causes transient eye irritation, lacrimation. Vapors cause eye/conjunctival irritation. Symptoms may include redness and pain. Inhalation: The main route to occupational exposure is by inhalation since it is readily absorbed through the lungs. It causes respiratory tract irritation, . It can affect behavior/central nervous system (CNS depressant and anesthesia ranging from slight inebriation to death, vertigo, somnolence, anxiety, headache, excitement, hallucinations, muscle incoordination, dizziness, lightheadness, disorentiation, seizures, enotional instability, stupor, coma). It may cause pulmonary edema Ingestion: It can cause nausea, vomiting, anorexia, diarrhea, bloody stool. It may affect the liver, urinary system (proteinuria, hematuria, renal failure, renal tubular disorder), heart (arrhythmias). It may affect behavior/central nervous system with symptoms similar to that of inhalation. Chronic Potential Health Effects: Skin: Prolonged or repeated skin contact may result in excessive drying of the skin, and irritation. Ingestion/Inhalation: Chronic exposure can affect the liver(hepatitis,fatty liver degeneration), kidneys, spleen, and heart (irregular heartbeat/arrhythmias, cardiomyopathy, abnormal EEG), brain, behavior/ central nervous system/peripheral nervous system (impaired memory, numbness of extremeties, peripheral neuropathy and other

Section 12: Ecological Information

Ecotoxicity:
Ecotoxicity in water (LC50): 18.4 mg/l 96 hours [Fish (Fatthead Minnow)]. 18 mg/l 48 hours [Daphnia (daphnia)]. 5 mg/l 96 hours [Fish (Rainbow Trout)]. 13 mg/l 96 hours [Fish (Bluegill sunfish)].

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: : Tetrachloroethylene UNNA: 1897 PG: III

Special Provisions for Transport: Marine Pollutant

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Tetrachloroethylene California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Tetrachloroethylene Connecticut hazardous material survey.: Tetrachloroethylene Illinois toxic substances disclosure to employee act: Tetrachloroethylene Illinois chemical safety act: Tetrachloroethylene New York release reporting list: Tetrachloroethylene Rhode Island RTK hazardous substances: Tetrachloroethylene Pennsylvania RTK: Tetrachloroethylene Minnesota: Tetrachloroethylene Michigan critical material: Tetrachloroethylene Massachusetts RTK: Tetrachloroethylene Massachusetts spill list: Tetrachloroethylene New Jersey: Tetrachloroethylene New Jersey spill list: Tetrachloroethylene Louisiana spill reporting: Tetrachloroethylene California Director's List of Hazardous Substances: Tetrachloroethylene TSCA 8(b) inventory: Tetrachloroethylene TSCA 8(d) H and S data reporting: Tetrachloroethylene: Effective date: 6/1/87; Sunset date: 6/1/97 SARA 313 toxic chemical notification and release reporting: Tetrachloroethylene CERCLA: Hazardous substances.: Tetrachloroethylene: 100 lbs. (45.36 kg)

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R40- Possible risks of irreversible effects. R51/53- Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. S23- Do not breathe gas/fumes/vapour/spray S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S37- Wear suitable gloves. S61- Avoid release to the environment. Refer to special instructions/Safety data sheets.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 0

Reactivity: 0

Personal Protection: g

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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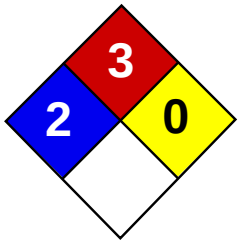
Last Updated: 11/01/2010 12:00 PM



Health	2
Fire	3
Reactivity	0
Personal Protection	H

Material Safety Data Sheet
Chlorobenzene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Chlorobenzene

Catalog Codes: SLC1654

CAS#: 108-90-7

RTECS: CZ0175000

TSCA: TSCA 8(b) inventory: Chlorobenzene

CI#: Not available.

Synonym: Monochlorobenzene

Chemical Name: Not available.

Chemical Formula: C6H5Cl

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Chlorobenzene	108-90-7	100

Toxicological Data on Ingredients: Chlorobenzene: ORAL (LD50): Acute: 1110 mg/kg [Rat]. 2300 mg/kg [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Hazardous in case of skin contact (corrosive, sensitizer, permeator). Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:
Very hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Hazardous in case of skin contact (corrosive, sensitizer, permeator). CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to kidneys, lungs, the nervous system, liver, mucous membranes. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged inhalation of vapors may lead to chronic respiratory irritation.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.

Skin Contact:
If the chemical got onto the clothed portion of the body, remove the contaminated clothes as quickly as possible, protecting your own hands and body. Place the victim under a deluge shower. If the chemical got on the victim's exposed skin, such as the hands : Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation: Not available.

Ingestion:
Do not induce vomiting. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 638°C (1180.4°F)

Flash Points: CLOSED CUP: 29.44°C (85°F).

Flammable Limits: LOWER: 1.3% UPPER: 7.1%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances: Flammable in presence of open flames and sparks.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Flammable liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep container dry. Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapour/spray. Never add water to this product In case of insufficient ventilation, wear suitable respiratory equipment If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes

Storage:
Flammable materials should be stored in a separate safety storage cabinet or room. Keep away from heat. Keep away from sources of ignition. Keep container tightly closed. Keep in a cool, well-ventilated place. Ground all equipment containing material. A refrigerated room would be preferable for materials with a flash point lower than 37.8°C (100°F).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 10 (ppm) TWA: 46 (mg/m3) Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Almond-like.

Taste: Not available.

Molecular Weight: 112.56 g/mole

Color: Colorless.

pH (1% soln/water): Not available.

Boiling Point: 132°C (269.6°F)

Melting Point: -45.6°C (-50.1°F)

Critical Temperature: Not available.

Specific Gravity: 1.1058 (Water = 1)

Vapor Pressure: 8.8 mm of Hg (@ 20°C)

Vapor Density: 3.88 (Air = 1)

Volatility: Not available.

Odor Threshold: 0.2 ppm

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, methanol, diethyl ether.

Solubility:
Soluble in methanol, diethyl ether. Very slightly soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity: Not available.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 1110 mg/kg [Rat].

Chronic Effects on Humans: The substance is toxic to kidneys, lungs, the nervous system, liver, mucous membranes.

Other Toxic Effects on Humans:
Very hazardous in case of skin contact (irritant), of ingestion, of inhalation. Hazardous in case of skin contact (corrosive, sensitizer, permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: Class 3: Flammable liquid.

Identification: : Chlorobenzene : UN1134 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Pennsylvania RTK: Chlorobenzene Massachusetts RTK: Chlorobenzene TSCA 8(b) inventory: Chlorobenzene SARA 313 toxic chemical notification and release reporting: Chlorobenzene CERCLA: Hazardous substances.: Chlorobenzene

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):
CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):
R10- Flammable. R22- Harmful if swallowed. R38- Irritating to skin. R41- Risk of serious damage to eyes. R43- May cause sensitization by skin contact.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:16 PM

Last Updated: 11/01/2010 12:00 PM

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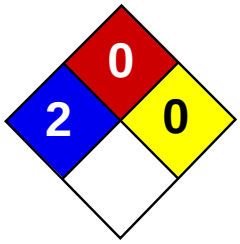

Health	2
Fire	0
Reactivity	0
Personal Protection	E

Material Safety Data Sheet
Nickel metal MSDS

Section 1: Chemical Product and Company Identification

Product Name: Nickel metal

Catalog Codes: SLN2296, SLN1342, SLN1954

CAS#: 7440-02-0

RTECS: QR5950000

TSCA: TSCA 8(b) inventory: Nickel metal

CI#: Not applicable.

Synonym: Nickel Metal shot; Nickel metal foil.

Chemical Name: Nickel

Chemical Formula: Ni

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Nickel metal	7440-02-0	100

Toxicological Data on Ingredients: Nickel metal LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of inhalation. Slightly hazardous in case of skin contact (irritant, sensitizer), of eye contact (irritant), of ingestion.

Potential Chronic Health Effects:
Slightly hazardous in case of skin contact (sensitizer), of ingestion, of inhalation (lung sensitizer). CARCINOGENIC EFFECTS: Classified 2B (Possible for human.) by IARC. Classified 2 (Some evidence.) by NTP. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to skin. The substance may be toxic to kidneys, lungs, liver, upper respiratory tract. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact: Not available.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation: Not available.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not applicable.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Flammable solid. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards: Material in powder form, capable of creating a dust explosion. This material is flammable in powder form only.

Special Remarks on Explosion Hazards:
Material in powder form, capable of creating a dust explosion. Mixtures containing Potassium Perchlorate with Nickel & Titanium powders & infusorial earth can explode. Adding 2 or 3 drops of approximately 90% peroxyformic acid to powdered nickel will result in explosion. Powdered nickel reacts explosively upon contact with fused ammonium nitrate at temperatures below 200 deg. C.

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Do not breathe dust. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If you feel unwell, seek medical attention and show the label when possible. Keep away from incompatibles such as oxidizing agents, combustible materials, metals, acids.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 1 (mg/m3) from ACGIH (TLV) [United States] Inhalation Respirable. TWA: 0.5 (mg/m3) [United Kingdom (UK)] TWA: 1 (mg/m3) from OSHA (PEL) [United States] InhalationConsult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Metal solid. Lustrous solid.)

Odor: Odorless.

Taste: Not available.

Molecular Weight: 58.71 g/mole

Color: Silvery.

pH (1% soln/water): Not applicable.

Boiling Point: 2730°C (4946°F)

Melting Point: 1455°C (2651°F)

Critical Temperature: Not available.

Specific Gravity: Density: 8.908 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility:

Insoluble in cold water, hot water. Insoluble in Ammonia. Soluble in dilute Nitric Acid. Slightly soluble in Hydrochloric Acid, Sulfuric Acid.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents, combustible materials, metals, acids.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Incompatible with strong acids, selenium, sulfur, wood and other combustibles, nickel nitrate, aluminum, aluminum trichloride, ethylene, p-dioxan, hydrogen, methanol, non-metals, oxidants, sulfur compounds, aniline, hydrogen sulfide, flammable solvents, hydrazine, and metal powders (especially zinc, aluminum, and magnesium), ammonium nitrate, nitryl fluoride, bromine pentafluoride, potassium perchlorate + titanium powder + indusorial earth.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available. LC50: Not available.

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified 2B (Possible for human.) by IARC. Classified 2 (Some evidence.) by NTP. Causes damage to the following organs: skin. May cause damage to the following organs: kidneys, lungs, liver, upper respiratory tract.

Other Toxic Effects on Humans:
Hazardous in case of inhalation. Slightly hazardous in case of skin contact (irritant, sensitizer), of ingestion.

Special Remarks on Toxicity to Animals:
Lowest Published Lethal Dose/Conc: LDL [Rat] - Route: Oral; Dose: 5000 mg/kg LDL [Guinea Pig] - Route: Oral; Dose: 5000 mg/kg

Special Remarks on Chronic Effects on Humans: May cause cancer based on animal test data

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: Nickel dust and fume can irritate skin. Eyes: Nickel dust and fume can irritate eyes. Inhalation: Inhalation of dust or fume may cause respiratory tract irritation with non-productive cough, hoarseness, sore throat, headache, vertigo, weakness, chest pain, followed by delayed effects, including tachypnea, dyspnea, and ARDS. Death due to ARDS has been reported following inhalation of high concentrations of respirable metallic nickel dust. Later effects may include pulmonary edema and fibrosis. Ingestion: Metallic nickel is generally considered not to be acutely toxic if ingested. Ingestion may cause nausea, vomiting, abdominal , and diarrhea. Nickel may damage the kidneys(proteinuria), and may affect liver function. It may also affect behavior (somnolence), and cardiovascular system (increased cornary artery resistance, decreased myocardial contractility, myocardial damage, regional or general arteriolar or venus dilation). Chronic Potential Health Effects: Skin: May cause skin allergy. Nickel and nickel compounds are among the most common sensitizers inducing allergic contact dermatitis. Inhalation: Chronic inhalation nickel dust or fume can cause chronic hypertrophic rhinitis, sinusitis, nasal polyps, perforation of the nasal septum, chronic pulmonary irritation, fibrosis, pulmonary edema, pulmonary eosinophilia, Pneumoconiosis, allergies (asthma-like allergy), and cancer of the nasal sinus cavities, lungs, and possibly other organs. Future exposures can cause asthma attacks with shortness of breath, wheezing, cough, and/or chest tightness. Chronic inhalation of nickel dust or fume may also affect the liver (impaired liver function tests), and blood (changes in red blood cell count). Ingestion: Prolonged or repeated ingestion of nickel can be a source chronic urticaria and other signs of allergy.

Chronic ingestion of NIckel may also affect respiration and cause pneumoconiosis or fibrosis. Note: In the general population, sensitization occurs from exposure to nickel-containing coins, jewelry, watches,

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are as toxic as the original product.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Nickel metal California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Nickel metal Connecticut hazardous material survey.: Nickel metal Illinois toxic substances disclosure to employee act: Nickel metal Illinois chemical safety act: Nickel metal New York release reporting list: Nickel metal Rhode Island RTK hazardous substances: Nickel metal Pennsylvania RTK: Nickel metal Michigan critical material: Nickel metal Massachusetts RTK: Nickel metal Massachusetts spill list: Nickel metal New Jersey: Nickel metal New Jersey spill list: Nickel metal Louisiana spill reporting: Nickel metal California Director's List of Hazardous Substances: Nickel metal TSCA 8(b) inventory: Nickel metal

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada): CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R40- Possible risks of irreversible effects. R43- May cause sensitization by skin contact. S22- Do not breathe dust. S36- Wear suitable protective clothing.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 0

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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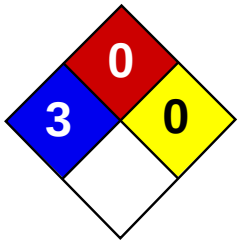

Material Safety Data Sheet
Mercury MSDS

Section 1: Chemical Product and Company Identification

Product Name: Mercury

Catalog Codes: SLM3505, SLM1363

CAS#: 7439-97-6

RTECS: OV4550000

TSCA: TSCA 8(b) inventory: Mercury

CI#: Not applicable.

Synonym: Quick Silver; Colloidal Mercury; Metallic Mercury; Liquid Silver; Hydragyrum

Chemical Name: Mercury

Chemical Formula: Hg

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Mercury	7439-97-6	100

Toxicological Data on Ingredients: Mercury LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Hazardous in case of skin contact (corrosive, permeator). Liquid or spray mist may produce tissue damage particularly on mucous membranes of eyes, mouth and respiratory tract. Skin contact may produce burns. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Severe over-exposure can result in death. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:
Hazardous in case of skin contact (permeator). CARCINOGENIC EFFECTS: Classified A5 (Not suspected for human.) by ACGIH. 3 (Not classifiable for human.) by IARC. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to blood, kidneys, liver, brain, peripheral nervous system, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged contact with spray mist may produce chronic eye irritation and severe skin irritation.

Repeated or prolonged exposure to spray mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. WARM water MUST be used. Get medical attention immediately.

Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not applicable.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards:
When thrown into mercury vapor, boron phosphodiiodide ignites at once. Flame forms with chlorine jet over mercury surface at 200 deg to 300 deg C. Mercury undergoes hazardous reactions in the presence of heat and sparks or ignition.

Special Remarks on Explosion Hazards:
A violent exothermic reaction or possible explosion occurs when mercury comes in contact with lithium and rubidium. CHLORINE DIOXIDE & LIQUID HG, WHEN MIXED, EXPLODE VIOLENTLY. Mercury and Ammonia can produce an

explosive compound. A mixture of the dry carbonyl and oxygen will explode on vigorous shaking with mercury. Methyl azide in the presence of mercury was shown to be potentially explosive.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Corrosive liquid. Poisonous liquid. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Use water spray curtain to divert vapor drift. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Keep container dry. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Never add water to this product. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, metals.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area. Do not store above 25°C (77°F).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Face shield. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves. Boots.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 0.025 from ACGIH (TLV) [United States] SKIN TWA: 0.05 CEIL: 0.1 (mg/m3) from OSHA (PEL) [United States] Inhalation TWA: 0.025 (mg/m3) [United Kingdom (UK)] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid. (Heavy liquid)

Odor: Odorless.

Taste: Not available.

Molecular Weight: 200.59 g/mole

Color: Silver-white

pH (1% soln/water): Not available.

Boiling Point: 356.73°C (674.1°F)

Melting Point: -38.87°C (-38°F)

Critical Temperature: 1462°C (2663.6°F)

Specific Gravity: 13.55 (Water = 1)

Vapor Pressure: Not available.

Vapor Density: 6.93 (Air = 1)

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Very slightly soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents, metals.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Ground mixtures of sodium carbide and mercury, aluminum, lead, or iron can react vigorously. A violent exothermic reaction or possible explosion occurs when mercury comes in contact with lithium and rubidium. Incompatible with boron diiodophosphide; ethylene oxide; metal oxides, metals(aluminum, potassium, lithium, sodium, rubidium); methyl azide; methylsilane, oxygen; oxidants(bromine, peroxyformic acid, chlorine dioxide, nitric acid, tetracarbonynickel, nitromethane, silver perchlorate, chlorates, sulfuric acid, nitrates,); tetracarbonylnickel, oxygen, acetylinic compounds, ammonia, ethylene oxide, methylsiliane, calcium,

Special Remarks on Corrosivity:
The high mobility and tendency to dispersion exhibited by mercury, and the ease with which it forms alloys (amalga) with many laboratory and electrical contact metals, can cause severe corrosion problems in laboratories. Special precautions: Mercury can attack copper and copper alloy materials.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available. LC50: Not available.

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified A5 (Not suspected for human.) by ACGIH. 3 (Not classifiable for human.) by IARC. May cause damage to the following organs: blood, kidneys, liver, brain, peripheral nervous system, central nervous system (CNS).

Other Toxic Effects on Humans:
Very hazardous in case of skin contact (irritant), of ingestion, of inhalation. Hazardous in case of skin contact (corrosive, permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:

May affect genetic material. May cause cancer based on animal data. Passes through the placental barrier in animal. May cause adverse reproductive effects(paternal effects- spermatogenesis; effects on fertility - fetotoxicity, post-implantation mortality), and birth defects.

Special Remarks on other Toxic Effects on Humans:

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Class 8: Corrosive material

Identification: : Mercury UNNA: 2809 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Mercury California prop. 65: This product contains the following ingredients for which the State of California has found to cause birth defects which would require a warning under the statute: Mercury Connecticut hazardous material survey.: Mercury Illinois toxic substances disclosure to employee act: Mercury Illinois chemical safety act: Mercury New York acutely hazardous substances: Mercury Rhode Island RTK hazardous substances: Mercury Pennsylvania RTK: Mercury Minnesota: Mercury Massachusetts RTK: Mercury New Jersey: Mercury New Jersey spill list: Mercury Louisiana spill reporting: Mercury California Director's List of Hazardous Substances.: Mercury TSCA 8(b) inventory: Mercury SARA 313 toxic chemical notification and release reporting: Mercury CERCLA: Hazardous substances.: Mercury: 1 lbs. (0.4536 kg)

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS D-2A: Material causing other toxic effects (VERY TOXIC). CLASS E: Corrosive liquid.

DSCL (EEC):
R23- Toxic by inhalation. R33- Danger of cumulative effects. R38- Irritating to skin. R41- Risk of serious damage to eyes. R50/53- Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. S2- Keep out of the

reach of children. S7- Keep container tightly closed. S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S39- Wear eye/face protection. S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). S46- If swallowed, seek medical advice immediately and show this container or label. S60- This material and its container must be disposed of as hazardous waste. S61- Avoid release to the environment. Refer to special instructions/Safety data sheets.

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 0

Reactivity: 0

Personal Protection:

National Fire Protection Association (U.S.A.):

Health: 3

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Face shield.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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ToxFAQs: CABS™/Chemical Agent Briefing Sheet

Lead

January 2006

What is lead?

Lead is a heavy, bluish-gray metal that has a low melting point. It occurs naturally in the Earth's crust, but it is not a particularly abundant element. It is rarely found naturally as a metal, but rather in its divalent (+2) oxidative state in ore deposits widely distributed throughout the world. The most important lead containing ores are galena (PbS), anglesite ($PbSO_4$), and cerussite ($PbCO_3$). Natural lead is a mixture of four stable isotopes: ^{208}Pb (51%–53%), ^{206}Pb (23.5%–27%), ^{207}Pb (20.5%–23%), and ^{204}Pb (1.35%–1.5%).

What are the forms of lead?

- Metallic lead
- Inorganic lead and lead compounds (or lead salts)
- Organic lead (containing carbon)

What are common uses of lead?

The largest use for lead is in storage batteries in cars and other vehicles. Lead may be used as a pure metal, alloyed with other metals, or as chemical compounds.

Lead used by industry comes from mined ores ("primary") or from recycled scrap metal or batteries ("secondary"). However, most lead today is obtained from recovery of recycled scrap, mostly lead-acid batteries.

Human activities, such as lead mining and smelting operations and manufacturing and use of lead products (e.g. leaded gasoline, lead-based paint), have resulted in the contamination of many industrial and residential areas with lead.

Form	Uses
Metallic lead **Lead and lead compounds (or lead salts), such as** • **lead acetate** • **lead chloride** • **lead nitrate** • **lead oxide** • **lead phosphate** • **lead subacetate** • **lead sulfate** • **lead sulfide**	Certain uses of lead, such as leaded gasoline, lead-based paints for domestic use, lead-based solder in food cans and water pipes, lead sinkers, and ammunition, have been reduced or banned to minimize lead's harmful effects on people and animals. • Cosmetics and hair dye – Some hair dyes and some non-Western cosmetics, such as kohl and Surma, contain lead. • Fishin g equipment – Most fishing weights and sinkers are made from lead. • Folk remedies – Many non-Western folk remedies used to treat diarrhea or other ailments may contain substantial amounts of lead. Examples of these include alarcon, ghasard, alkohl, greta, azarcon, liga, bali goli, pay-loo-ah, coral, and rueda. • Glazi ng – Applied to some ceramicware, can contain lead. • Lead based paint – Although the sale of residential lead-based paint was banned in the United States in 1978, it remains a major source of lead exposure for young children residing in older houses. • Lead batteries – Production of lead-acid batteries is the major use of lead. • Lead -based solder – Banned for use in water distribution systems, but many buildings and homes contain lead pipes or lead-based solder. Lead-based solder also is used for electrical circuitry applications. • Lead -shot and ammunition – Second highest production use of lead. • Other uses of lead include the production of lead alloys, soldering materials, shielding for x-ray machines, and manufacturing of corrosion- and acid-resistant materials used in the building industry.
Organic • **tetraethyl lead** • **tetramethyl lead**	The use of lead in gasoline was phased out in the 1980s, and has been banned since January 1, 1996. The use of lead in gasoline has contributed to its dispersion throughout the environment. During the combustion of gasoline containing these alkyl-lead compounds, significant amounts of inorganic lead can be released to the surrounding areas. **Current Uses** • Gasoline for off-road vehicles, farm equipment, and airplanes **Past Uses** • Gasoline additives (to increase octane rating)

What are routes of exposure for lead?

People are most likely to be exposed to lead by consuming contaminated food and drinking water. Exposure can also occur by inadvertently ingesting contaminated soil, dust, or lead-based paint.

Form	Routes of Exposure
Metallic lead **Lead and lead compounds (or lead salts), such as** • **lead acetate** • **lead chloride** • **lead nitrate** • **lead oxide** • **lead phosphate** • **lead subacetate** • **lead sulfate** • **lead sulfide**	• Ingestion is the primary source of exposure to the general population. • Lead paint is a major source of environmental exposure for children who ingest flaking paint, paint chips, and weathered powdered paint (mostly from deteriorated housing units in urban areas). Lead paint can also contribute to soil/dust lead which can be inadvertently ingested via hand-to-mouth activity of young children. • Lead can leach into drinking water from lead-based solder used in water pipes. • Lead can leach into foods or liquids stored in ceramic containers made with lead glazing. • Engaging in hobbies such as casting ammunition, making fishing weights, and stained glass can result in exposure to lead. • Exposure by inhalation can result during activities such as soldering with lead solder or sanding or sandblasting lead-based paint.
Organic • **tetraethyl lead** • **tetramethyl lead**	• Inhalation • Dermal studies in animals have shown that organic lead is well absorbed through the skin

Who are the populations most at risk and how are they usually exposed?

People living near hazardous waste sites, lead smelters or refineries, battery recycling or crushing centers, or other industrial lead sources may be exposed to lead and chemicals that contain lead. Workers in occupations that have sources of lead exposure (e.g., plumbers, miners, mechanics, and lead smelter or refinery workers).

Certain hobbies, folk remedies, home activities, and car repairs (e.g., radiator repair) can contribute to lead exposure. Smoking cigarettes or breathing second-hand smoke increases exposure because tobacco smoke contains small amounts of lead.

Pregnant women and their developing fetuses, and young children are particularly vulnerable to the effects of lead. Young children are more likely to play in dirt and to place their hands and other objects in their mouths, thereby increasing the opportunity for exposure via ingestion of lead-contaminated soil and dust.

What are possible toxic effects?

The most sensitive targets for lead toxicity are the developing nervous system, the hematological and cardiovascular systems, and the kidney. However, because of lead's many modes of action in biological systems, lead could potentially affect any system or organs in the body. The effects are the same whether it is breathed or swallowed.

Blood Lead Concentrations Corresponding to Adverse Health Effects		
Life Stage	**Effect**	**Blood lead (µg/dL)**
Children	Depressed ALAD* activity	< 5
	Neurodevelopmental effects	<10
	Sexual maturation	<10
	Depressed vitamin D	>15
	Elevated EP**	>15
	Depressed NCV***	>30
	Depressed hemoglobin	>40
	Colic >60	
Adult	Depressed ALAD*	< 5
	Depressed GFR****	<10
	Elevated blood pressure	<10
	Elevated EP (females)	>20
	Enzymuria/proteinuria	>30
	Peripheral neuropathy	>40
	Neurobehavioral effects	>40
	Altered thyroid hormone	>40
	Reduced fertility	>40
	Depressed hemoglobin	>50
Elderly Adult	Neurobehavioral effects	> 4

*aminolevulinic acid dehydratase (ALAD)
**erythrocyte porphyrin (EP)
***nerve conduction velocity (NCV)
****glomerular filtration rate (GFR)

Source: ATSDR Toxicological Profile for Lead (Draft for Public Comment), 2005.

How can I reduce the risk of exposure to lead?

- Do not allow children to chew or mouth surfaces that may have been painted with lead-based paint (homes built before 1978).
- If you have a water lead problem, the U.S. Environmental Protection Agency (EPA) recommends that you flush your cold water pipes if they have not been used in over 6 hours by running water until it is cold (5 seconds to 2 minutes) before drinking or cooking with it.
- Avoid some types of paints and pigments that contain lead and are used as make-up or hair coloring; keep these kinds of products away from children.
- Hire a professional contractor, who is required to follow certain health safety requirements for remediation or renovation involving lead-based paint, (www.epa.gov/lead/leadinfo.html#remodeling).
- Wash children's hands and faces often to remove lead dusts and soil, and regularly clean the house of dust and tracked in soil.

What are the safety guidelines for lead exposure?

Air	• **National Institute for Occupational Safety and Health (NIOSH)** Recommended exposure limit (REL) time-weighted average (TWA) – 0.05 mg/m^3 Immediately dangerous to life or health (IDLH) – 100 mg/m^3 • **Occupational Safety and Health Administration (OSHA)** Air – workplace 50 $\mu g/m^3$ Action level – 40 µg/100 g of whole blood • **The American Conference of Governmental Industrial Hygienists (ACGIH)** Threshold limit values (TLV)/(TWA) – 0.05 mg/m^3 TLV/TWA guideline for lead arsenate – 150 $\mu g/m^3$ TLV/TWA guideline for other forms of lead – 50 µg $lead/m^3$ • **U.S. Environmental Protection Agency (EPA)** National Primary and Secondary Ambient Air Quality Standards – 1.5 $\mu g/m^3$ • **World Health Organization (WHO)** Air quality guidelines –- 0.5 $\mu g/m^3$
	• **EPA** Maximum contaminant level (MCL) – action level 0.015 mg/L Action level for public supplies – 15 µg/L • **WHO** Drinking Water Quality Guidelines – 0.01 mg/L

Blood	• **Centers for Disease Control and Prevention (CDC)** Level of concern for children – 10 µg/dL • **OSHA** Cause for written notification and medical exam – 40 µg/dL Cause for medical removal from exposure – 50 µg/dL • **ACGIH** Advisory; biological exposure index – 30 µg/dL
Food	• **Food and Drug Administration (FDA)** Bottled drinking water – 0.005 mg/L
Other	• **ACGIH** Biological exposure indices (lead in blood) – 30 µg/100 mL • **Consumer Product Safety Commission** Paint – 600 ppm • **FDA** Ceramicware (µg/mL leaching solution) — 0.5–3.0 µg/mL

µg/m^3: micrograms per cubic meter mg/L: milligrams per liter
µg/dL: micrograms per deciliter mL: milliliter
µg/L: micrograms per liter ppm: parts per million
g: gram

What are the most important or common mediating factors?

Factors that determine the severity of the health effects from lead exposure include

- Do se
- Age of the person exposed
  - the developing nervous system is the most sensitive system to the effects of lead
  - the efficiency of lead absorption from the gastrointestinal tract is greater in children than in adults
- Life stages of women (childbirth, lactating, menopause)
- Occup ational exposures
- Duration of exposure
- Health and lifestyle of the person exposed
- Nutritional status of the person exposed
  - a diet adequate in calcium and iron may decrease lead absorption

The toxic effects of lead exposure may be worse in individuals with inherited genetic diseases or gene polymorphisms such as thalassemia, individuals with glucose-6-phosphate dehydrogenase (G6PD)

deficiency, and carriers of certain gene polymorphic forms (e.g., ALAD and vitamin D receptor). Research continues about this topic.

Is there a test to see if my child or I have been exposed to lead?

Blood	• The screening test of choice is blood lead levels. • Blood tests are commonly used to screen children for lead poisoning. • Analysis of lead in whole blood is the most common and accurate method of assessing lead exposure. • Exposure to lead also can be evaluated by measuring erythrocyte protoporphyrin (EP) in blood samples. EP is a part of red blood cells known to increase when the amount of lead in the blood is high. However, the EP level is not sensitive enough to identify children with elevated blood lead levels below about 25 micrograms per deciliter (µg/dL).
Bone and Teeth	• X-ray fluorescence techniques have been used to determine lead concentration in bones and teeth. It is not widely available and is used mostly in research. • Lead partitions to bone over a lifetime of exposure; therefore, bone lead measurements may be a better indicator of cumulative exposure than blood lead.
Urine	• Measurements of urinary lead levels have been used to assess lead exposure. • The measurement of lead excreted in urine following chelation with calcium disodium EDTA (EDTA provocation) has been used to detect elevated body burden of lead in adults and children.
Hair and Nails	• These are not reliable for testing due to errors external contamination. They are relatively poor predictors of blood lead, particularly at low concentrations.

Future Research Needs:

To close current gaps in the scientific database on the health effects of lead, a *long–term* research program is needed that might include the following:

- Further short-term studies or studies *in vitro* designed to clarify mechanisms of action for the various toxicities might be useful.
- Studies identifying exposures during different developmental periods can help identify critical periods of vulnerability for immunocompetence, development of sex organs, or neurobehavioral parameters.
- Chronic-duration exposure studies in animals would expand information on the toxicity of lead. Special studies that examine biochemical and morphological effects of lead may provide new information on mechanisms of action of lead, particularly for the effects of greatest concern such as neurobehavioral changes in children.
- Development of new and more sensitive tests of specific neuropsychological functions.
- Further investigation of links between lead and amyotrophic lateral sclerosis, essential tremor, schizophrenia, and Parkinson's disease.
- Epidemiological studies designed in a manner that permits more rigorous assessments of effect modification.
- Studies about the long-term consequences of lead-related neurobehavioral deficits detected in infants and children and the manifestation of chronic neurobehavioral problems in adolescence and adulthood.

- Further characterization of bone lead concentration as a biomarker of exposure for various effect end points (e.g., blood pressure and renal effects).
- Studies of the potential prevalence of elevated bone lead stores in women of reproductive age and the associated risk that this poses to fetal development by mobilization of maternal bone stores during pregnancy.
- Further clarification of the role of some genetic polymorphisms.
- Evaluation of cohorts from prospective studies into adulthood for potential late-appearing effects including cancer.

For more information

Agency for Toxic Substances and Disease Registry (ATSDR) Toxicological Profile for Lead

http://www.atsdr.cdc.gov/toxprofiles/tp13.html

ATSDR ToxFAQs™ for Lead

http://www.at sdr.cdc.gov/tfacts13.html

ATSDR Case Studies in Environmental Medicine Lead Toxicity

http://www.atsdr.cdc.gov/HEC/CSEM/lead/

ATSDR Interaction Profile for Chemical Mixtures for Arsenic, Cadmium, Chromium, and Lead

http://www.atsdr.cdc.gov/interactionprofiles/ip04.html

ATSDR Interaction Profile for Chemical Mixtures for Lead, Manganese, Zinc, and Copper

http://www.atsdr.cdc.gov/interactionprofiles/ip06.html

ATSDR Interaction Profile for Chemical Mixtures for Chlorpyrifos, Lead, Mercury, and Methylmercury

http://www.atsdr.cdc.gov/interactionprofiles/ip11.html

Centers for Disease Control and Prevention Lead Web Page

http://www.cdc.gov/lead/

U.S. Environmental Protection Agency Lead Web Page

http://www.epa.gov/lead/

U.S. Department of Labor, Occupational Safety & Health Administration

http://www.osha.gov/SLTC/lead/

For more information, contact:

Agency for Toxic Substances and Disease Registry
Division of Toxicology and Environmental Medicine
600 Clifton Road NE, Mailstop F-32
Atlanta, GA 30333 Phone: 1-800-CDC-INFO (800-232-4636) TTY 888-232-6348

FAX: (770)-488-4178
Email: CDCINFO@cdc.gov

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MATHESON TRI-GAS, INC.
150 Allen Road Suite 302
Basking Ridge, New Jersey 07920
Information: 1-800-416-2505

Emergency Contact:
CHEMTREC 1-800-424-9300
Calls Originating Outside the US:
703-527-3887 (Collect Calls Accepted)

SUBSTANCE: ETHYL CHLORIDE

TRADE NAMES/SYNONYMS:
MTG MSDS 32; CHLOROETHANE; MONOCHLOROETHANE; MURIATIC ETHER; KELENE; HYDROCHLORIC ETHER; ETHER HYDROCHLORIC; ETHER MURIATIC; NARCOTILE; AETHYLIS; CHELEN; CHLORETHYL; CHLORIDUM; CHLORYL; CHLORYL ANESTHETIC; ETHER CHLORATUS; AETHYLIS CHLORIDUM; STCC 4908162; UN 1037; C2H5CL; MAT08880; RTECS KH7525000

CHEMICAL FAMILY: halogenated, aliphatic

CREATION DATE: Jan 24 1989
REVISION DATE: Dec 11 2008

2. COMPOSITION, INFORMATION ON INGREDIENTS

COMPONENT: ETHYL CHLORIDE
CAS NUMBER: 75-00-3
PERCENTAGE: 100.0

3. HAZARDS IDENTIFICATION

NFPA RATINGS (SCALE 0-4): HEALTH=2 FIRE=4 REACTIVITY=0

EMERGENCY OVERVIEW:
PHYSICAL FORM: gas
MAJOR HEALTH HAZARDS: eye irritation, central nervous system depression
PHYSICAL HAZARDS: Flammable gas. May cause flash fire.

POTENTIAL HEALTH EFFECTS:
INHALATION:
SHORT TERM EXPOSURE: irritation, nausea, vomiting, irregular heartbeat, headache, symptoms of

drunkenness
LONG TERM EXPOSURE: disorientation, kidney damage, liver damage
SKIN CONTACT:
SHORT TERM EXPOSURE: irritation, blisters
LONG TERM EXPOSURE: same as effects reported in short term exposure
EYE CONTACT:
SHORT TERM EXPOSURE: irritation, blurred vision
LONG TERM EXPOSURE: same as effects reported in short term exposure
INGESTION:
SHORT TERM EXPOSURE: same as effects reported in other routes of exposure, sore throat, frostbite, headache
LONG TERM EXPOSURE: no information is available

4. FIRST AID MEASURES

INHALATION: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. Get immediate medical attention.

SKIN CONTACT: If frostbite or freezing occur, immediately flush with plenty of lukewarm water (105-115 F; 41-46 C). DO NOT USE HOT WATER. If warm water is not available, gently wrap affected parts in blankets. Get immediate medical attention.

EYE CONTACT: Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

INGESTION: Contact local poison control center or physician immediately. Never make an unconscious person vomit or drink fluids. When vomiting occurs, keep head lower than hips to help prevent aspiration. If person is unconscious, turn head to side. Get medical attention.

5. FIRE FIGHTING MEASURES

FIRE AND EXPLOSION HAZARDS: Severe fire hazard. Severe explosion hazard. Vapor/air mixtures are explosive. The vapor is heavier than air. Vapors or gases may ignite at distant ignition sources and flash back.

EXTINGUISHING MEDIA: regular dry chemical, carbon dioxide, water, regular foam

Large fires: Use regular foam or flood with fine water spray.

FIRE FIGHTING: Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. For fires in cargo or storage area: Cool containers with water from unmanned hose holder or monitor nozzles until well after fire is out. If this is impossible then take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire. For tank, rail car or tank truck: Evacuation radius: 800 meters (1/2 mile).

Water may be ineffective.

FLASH POINT: -58 F (-50 C) (CC)
LOWER FLAMMABLE LIMIT: 3.8%
UPPER FLAMMABLE LIMIT: 15.4%
AUTOIGNITION: 966 F (519 C)

6. ACCIDENTAL RELEASE MEASURES

WATER RELEASE:
Subject to California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65). Keep out of water supplies and sewers.

OCCUPATIONAL RELEASE:
Avoid heat, flames, sparks and other sources of ignition. Stop leak if possible without personal risk. Reduce vapors with water spray. Small spills: Absorb with sand or other non-combustible material. Collect spilled material in appropriate container for disposal. Large spills: Dike for later disposal. Remove sources of ignition. Keep unnecessary people away, isolate hazard area and deny entry. Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA).

7. HANDLING AND STORAGE

STORAGE: Store and handle in accordance with all current regulations and standards. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101. Grounding and bonding required. Protect from physical damage. Store outside or in a detached building. Store with flammable liquids. Keep separated from incompatible substances. Avoid contact with light. Store in a cool, dry place. Store in a well-ventilated area. Keep separated from incompatible substances.

8. EXPOSURE CONTROLS, PERSONAL PROTECTION

EXPOSURE LIMITS:
ETHYL CHLORIDE:
1000 ppm (2600 mg/m3) OSHA TWA
100 ppm ACGIH TWA (skin)
NIOSH (handle with caution in workplace)

VENTILATION: Ventilation equipment should be explosion-resistant if explosive concentrations of material are present. Ensure compliance with applicable exposure limits.

EYE PROTECTION: For the gas: Eye protection not required, but recommended. For the liquid: Wear splash resistant safety goggles. Contact lenses should not be worn. Provide an emergency eye wash fountain

and quick drench shower in the immediate work area.

CLOTHING: For the gas: Protective clothing is not required. For the liquid: Wear appropriate protective, cold insulating clothing.

GLOVES: Wear insulated gloves.

RESPIRATOR: The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA.
3800 ppm
Any supplied-air respirator.
Any self-contained breathing apparatus with a full facepiece.
Emergency or planned entry into unknown concentrations or IDLH conditions -
Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.
Any supplied-air respirator with a full facepiece that is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode.
Escape -
Any air-purifying full-facepiece respirator (gas mask) with a chin-style, front-mounted or back-mounted organic vapor canister.
Any appropriate escape-type, self-contained breathing apparatus.

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: gas
ODOR: Not available
MOLECULAR WEIGHT: 64.52
MOLECULAR FORMULA: C2-H5-CL
BOILING POINT: 54 F (12 C)
FREEZING POINT: -213 F (-136 C)
VAPOR PRESSURE: 1000 mmHg @ 20 C
VAPOR DENSITY (air=1): 2.2
SPECIFIC GRAVITY (water=1): 0.9
WATER SOLUBILITY: 0.6%
PH: Not applicable
VOLATILITY: Not applicable
ODOR THRESHOLD: Not available
EVAPORATION RATE: Not applicable
COEFFICIENT OF WATER/OIL DISTRIBUTION: Not applicable
SOLVENT SOLUBILITY:
Soluble: alcohol, ether, organic solvents

10. STABILITY AND REACTIVITY

REACTIVITY: Stable at normal temperatures and pressure. May react on contact with water. May release toxic and/or flammable gases.

CONDITIONS TO AVOID: Avoid heat, flames, sparks and other sources of ignition. Containers may rupture or explode if exposed to heat. Keep out of water supplies and sewers.

INCOMPATIBILITIES: metals, oxidizing materials

HAZARDOUS DECOMPOSITION:
Thermal decomposition products: acid halides, phosgene

POLYMERIZATION: Will not polymerize.

11. TOXICOLOGICAL INFORMATION

ETHYL CHLORIDE:
TOXICITY DATA: 152 gm/m3/10 minute(s) inhalation-rat LC50
CARCINOGEN STATUS: IARC: Human No Adequate Data, Animal Limited Evidence, Group 3; ACGIH: A3 -Confirmed Animal Carcinogen
LOCAL EFFECTS:
Irritant: eye
ACUTE TOXICITY LEVEL:
Slightly Toxic: inhalation
TARGET ORGANS: central nervous system
MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: heart or respiratory disorders, kidney disorders, liver disorders
TUMORIGENIC DATA: Available.
MUTAGENIC DATA: Available.
REPRODUCTIVE EFFECTS DATA: Available.
ADDITIONAL DATA: May be excreted in breast milk. Alcohol may enhance the toxic effects. Stimulants such as epinephrine may induce ventricular fibrillation.

12. ECOLOGICAL INFORMATION

Not available

13. DISPOSAL CONSIDERATIONS

Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001. Dispose in accordance with all applicable regulations.

14. TRANSPORT INFORMATION

U.S. DOT 49 CFR 172.101:
PROPER SHIPPING NAME: Ethyl chloride
ID NUMBER: UN1037
HAZARD CLASS OR DIVISION: 2.1
LABELING REQUIREMENTS: 2.1
QUANTITY LIMITATIONS:
PASSENGER AIRCRAFT OR RAILCAR: Forbidden
CARGO AIRCRAFT ONLY: 150 kg

CANADIAN TRANSPORTATION OF DANGEROUS GOODS:
SHIPPING NAME: Ethyl chloride
UN NUMBER: UN1037
CLASS: 2.1

15. REGULATORY INFORMATION

U.S. REGULATIONS:
CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4):
Chloroethane (Ethyl chloride): 100 LBS RQ

SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355 Subpart B): Not regulated.

SARA TITLE III SECTION 304 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355 Subpart C): Not regulated.

SARA TITLE III SARA SECTIONS 311/312 HAZARDOUS CATEGORIES (40 CFR 370 Subparts B and C):
ACUTE: Yes
CHRONIC: No
FIRE: Yes
REACTIVE: Yes
SUDDEN RELEASE: No

SARA TITLE III SECTION 313 (40 CFR 372.65):
Chloroethane (Ethyl chloride)

OSHA PROCESS SAFETY (29 CFR 1910.119): Not regulated.

STATE REGULATIONS:

California Proposition 65:

Known to the state of California to cause the following:

Chloroethane (Ethyl chloride)

Cancer (Jul 01, 1990)

CANADIAN REGULATIONS:

WHMIS CLASSIFICATION: AB

NATIONAL INVENTORY STATUS:

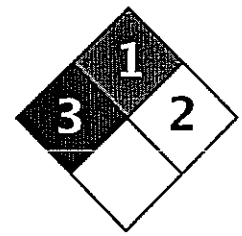
U.S. INVENTORY (TSCA): Listed on inventory.

TSCA 12(b) EXPORT NOTIFICATION: Not listed.

CANADA INVENTORY (DSL/NDSL): Not determined.

16. OTHER INFORMATION

ScienceLab.com
Chemicals & Laboratory Equipment



Health	3
Fire	1
Reactivity	2
Personal Protection	E

Material Safety Data Sheet
Arsenic MSDS

Section 1: Chemical Product and Company Identification

Product Name: Arsenic

Catalog Codes: SLA1006

CAS#: 7440-38-2

RTECS: CG0525000

TSCA: TSCA 8(b) inventory: Arsenic

CI#: Not applicable.

Synonym:

Chemical Name: Arsenic

Chemical Formula: As

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Arsenic	7440-38-2	100

Toxicological Data on Ingredients: Arsenic: ORAL (LD50): Acute: 763 mg/kg [Rat]. 145 mg/kg [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant), of eye contact (irritant).

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.
The substance is toxic to kidneys, lungs, the nervous system, mucous membranes.
Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Flammable in presence of open flames and sparks, of heat, of oxidizing materials.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder.
LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards:
Material in powder form, capable of creating a dust explosion. When heated to decomposition it emits highly toxic fumes.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Be careful that the product is not

present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents, acids, moisture.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 0.01 from ACGIH (TLV) [United States] [1995]
Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Lustrous solid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 74.92 g/mole

Color: Silvery.

pH (1% soln/water): Not applicable.

Boiling Point: Not available.

Melting Point: Sublimation temperature: 615°C (1139°F)

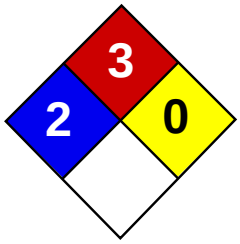
Critical Temperature: Not available.

Specific Gravity: 5.72 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.



Health	2
Fire	3
Reactivity	0
Personal Protection	H

Material Safety Data Sheet
2-Hexanone MSDS

Section 1: Chemical Product and Company Identification

Product Name: 2-Hexanone

Catalog Codes: SLH2950

CAS#: 591-78-6

RTECS: MP1400000

TSCA: TSCA 8(b) inventory: 2-Hexanone

CI#: Not available.

Synonym: Methyl butyl ketone

Chemical Formula: C6H12O

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
{2-}Hexanone	591-78-6	100

Toxicological Data on Ingredients: 2-Hexanone: ORAL (LD50): Acute: 2590 mg/kg [Rat]. 2430 mg/kg [Mouse]. DERMAL (LD50): Acute: 4860 mg/kg [Rabbit]. VAPOR (LC50): Acute: 8000 ppm 4 hour(s) [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of eye contact (irritant), of inhalation (lung irritant). Hazardous in case of skin contact (irritant), of ingestion, . Slightly hazardous in case of skin contact (permeator). Inflammation of the eye is characterized by redness, watering, and itching.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. Repeated or prolonged exposure is not known to aggravate medical condition.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.

Skin Contact:
After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cold water may be used. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 533°C (991.4°F)

Flash Points: CLOSED CUP: 23°C (73.4°F). OPEN CUP: 28°C (82.4°F) (TAG).

Flammable Limits: LOWER: 1.2% UPPER: 8%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances: Flammable in presence of open flames and sparks.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:
Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container.

Large Spill:
Flammable liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapour/spray. In case of insufficient ventilation, wear suitable respiratory equipment If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes

Storage:
Flammable materials should be stored in a separate safety storage cabinet or room. Keep away from heat. Keep away from sources of ignition. Keep container tightly closed. Keep in a cool, well-ventilated place. Ground all equipment containing material. A refrigerated room would be preferable for materials with a flash point lower than 37.8°C (100°F).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 25 CEIL: 40 (ppm) TWA: 100 CEIL: 165 (mg/m3) Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Not available.

Taste: Not available.

Molecular Weight: 100.16 g/mole

Color: Colorless to light yellow.

pH (1% soln/water): Not available.

Boiling Point: 127.5°C (261.5°F)

Melting Point: -56.9°C (-70.4°F)

Critical Temperature: Not available.

Specific Gravity: 0.8113 (Water = 1)

Vapor Pressure: 12 mm of Hg (@ 20°C)

Vapor Density: 3.45 (Air = 1)

Volatility: Not available.

Odor Threshold: 0.18 ppm

Water/Oil Dist. Coeff.: The product is equally soluble in oil and water; log(oil/water) = 0

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, acetone.

Solubility:

Easily soluble in acetone. Partially soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 2430 mg/kg [Mouse]. Acute dermal toxicity (LD50): 4860 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 8000 ppm 4 hour(s) [Rat].

Chronic Effects on Humans: Not available.

Other Toxic Effects on Humans:
Very hazardous in case of inhalation (lung irritant). Hazardous in case of skin contact (irritant), of ingestion, . Slightly hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Passes through the placental barrier in animal. Testicular damage in animal.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: Class 3: Flammable liquid.

Identification: : Ketone Liquid, n.o.s.(2-Hexanone) : UN1224 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Rhode Island RTK hazardous substances: 2-Hexanone Pennsylvania RTK: 2-Hexanone Florida: 2-Hexanone Massachusetts RTK: 2-Hexanone New Jersey: 2-Hexanone TSCA 8(b) inventory: 2-Hexanone

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada): CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F).

DSCL (EEC):
R10- Flammable. R37/38- Irritating to respiratory system and skin. R41- Risk of serious damage to eyes.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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Last Updated: 11/01/2010 12:00 PM

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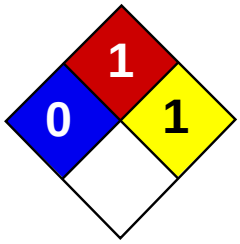

Health	1
Fire	1
Reactivity	1
Personal Protection	E

Material Safety Data Sheet
Zinc Metal MSDS

Section 1: Chemical Product and Company Identification

Product Name: Zinc Metal

Catalog Codes: SLZ1054, SLZ1159, SLZ1267, SLZ1099, SLZ1204

CAS#: 7440-66-6

RTECS: ZG8600000

TSCA: TSCA 8(b) inventory: Zinc Metal

CI#: Not applicable.

Synonym: Zinc Metal Sheets; Zinc Metal Shot; Zinc Metal Strips

Chemical Name: Zinc Metal

Chemical Formula: Zn

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Zinc Metal	7440-66-6	100

Toxicological Data on Ingredients: Zinc Metal LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects: Slightly hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. Repeated or prolonged exposure is not known to aggravate medical condition.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation: Not available.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 480°C (896°F)

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances:
Slightly flammable to flammable in presence of open flames and sparks, of heat, of oxidizing materials, of acids, of alkalis, of moisture. Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Flammable solid. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards:
Zinc + NaOH causes ignition. Oxidation of zinc by potassium proceeds with incandescence. Residues from zinc dust /acetic acid reduction operations may ignite after long delay if discarded into waste bins with paper. Incandescent reaction when Zinc and Arsenic or Tellurium, or Selenium are combined. When hydrazine mononitrate is heated in contact with zinc, a flamming decomposition occurs at temperatures a little above its melting point. Contact with acids and alkali hydroxides (sodium hydroxide, postasium hydroxide, calcium hydroxide, etc.) results in evolution of hydrogen with sufficient heat of reaction to ignite the hydrogen gas. Zinc foil ignites if traces of moisture are present. It is water reactive and produces flammable gases on contact with water. It may ignite on contact with water or moist air.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:
Flammable solid that, in contact with water, emits flammable gases. Stop leak if without risk. Do not get water inside container. Do not touch spilled material. Cover with dry earth, sand or other non-combustible material. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not breathe dust. Keep away from incompatibles such as oxidizing agents, acids, alkalis, moisture.

Storage:
Keep container tightly closed. Keep container in a cool, well-ventilated area. Keep from any possible contact with water. Do not allow water to get into container because of violent reaction.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Lustrous solid. Metal solid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 65.39 g/mole

Color: Bluish-grey

pH (1% soln/water): Not applicable.

Boiling Point: 907°C (1664.6°F)

Melting Point: 419°C (786.2°F)

Critical Temperature: Not available.

Specific Gravity: Not available.

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water, hot water, methanol, diethyl ether, n-octanol, acetone.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Excess heat, incompatible materials, moisture

Incompatibility with various substances:
Reactive with oxidizing agents, acids, alkalis. Slightly reactive to reactive with moisture. The product may react violently with water to emit flammable but non toxic gases.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Incompatible with acids, halogenated hydrocarbons, NH4NO3, barium oxide, Ba(NO3)2, Cadmium, CS2, chlorates, Cl2, CrO3, F2, Hydroxylamine, Pb(N3)2, MnCl2, HNO3, performic acid, KClO3, KNO3, N2O2, Selenium, NaClO3, Na2O2, Sulfur, Te, water, (NH4)2S, As2O3, CS2, CaCl2, chlorinated rubber, catalytic metals, halocarbons, o-nitroanisole, nitrobenzene, nonmetals, oxidants, paint primer base, pentacarbonoyliron, transition metal halides, seleninyl bromide, HCl, H2SO4, (Mg +Ba(NO3)2 +BaO2), (ethyl acetoacetate +tribromoneopentyl alcohol. Contact with Alkali Hydroxides(Sodium Hydroxide, Potassium Hydroxide, Calcium Hydroxide, etc) results in evolution of hydrogen. Ammonium nitrate + zinc + water causes a violent reaction with evolution of steam and zinc oxide. May react with water.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available. LC50: Not available.

Chronic Effects on Humans: Not available.

Other Toxic Effects on Humans: Slightly hazardous in case of skin contact (irritant), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: May cause skin irritation. Dermal exposure to zinc may produce leg pains, fatigue, anorexia and weight loss. Eyes: May cause eye irritation. Ingestion: May be harmul if swallowed. May cause digestive tract irritation with tightness in throat, nausea, vomiting, diarrhea, loss of appetite, malaise, abdominal pain. fever, and chills. May affect behavior/central nervous system and autonomic nervous system with ataxia, lethargy, staggering gait, mild derrangement in cerebellar function, lightheadness, dizzness, irritability, muscular stiffness, and pain. May also affect blood. Inhalation: Inhalation of zinc dust or fumes may cause respiratory tract and mucous membrane irritation with cough and chest pain. It can also cause "metal fume fever", a flu-like condition characterized appearance of chills, headached fever, maliase, fatigue, sweating, extreme thirst, aches in the legs and chest, and difficulty in breathing. A sweet taste may also be be present in metal fume fever, as well as a dry throat, aches, nausea, and vomiting, and pale grey cyanosis. The toxicological properties of this substance have not been fully investisgated.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: Not available.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations:
New York release reporting list: Zinc Metal Rhode Island RTK hazardous substances: Zinc Metal Pennsylvania RTK: Zinc Metal Florida: Zinc Metal Michigan critical material: Zinc Metal Massachusetts RTK: Zinc Metal New Jersey: Zinc Metal California Director's List of Hazardous Substances: Zinc Metal TSCA 8(b) inventory: Zinc Metal TSCA 12(b) one time export: Zinc Metal SARA 313 toxic chemical notification and release reporting: Zinc Metal CERCLA: Hazardous substances.: Zinc Metal: 1000 lbs. (453.6 kg)

Other Regulations: EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada): Not Available

DSCL (EEC):
R15- Contact with water liberates extremely flammable gases. R17- Spontaneously flammable in air. S7/8- Keep container tightly closed and dry.

HMIS (U.S.A.):

Health Hazard: 1

Fire Hazard: 1

Reactivity: 1

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 0

Flammability: 1

Reactivity: 1

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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Last Updated: 11/01/2010 12:00 PM

APPENDIX 5

Proposed Development Plans

PROPOSED ZONING SUMMARY (ZONING AREA AND FAR)

A. Permitted Floor Area Ratio (FAR) and Floor Area (FA)	FAR		Lot Area	FA	
Commercial	4.0	x	74,476.5 =	297,906	SF
Community Facility	5.0	x	74,476.5 =	372,383	SF
Residential	5.0	x	74,476.5 =	372,383	SF
Permitted Maximum	5.0	x	74,476.5 =	372,383	SF

B. Floor Area Ratio and Floor Area Summary

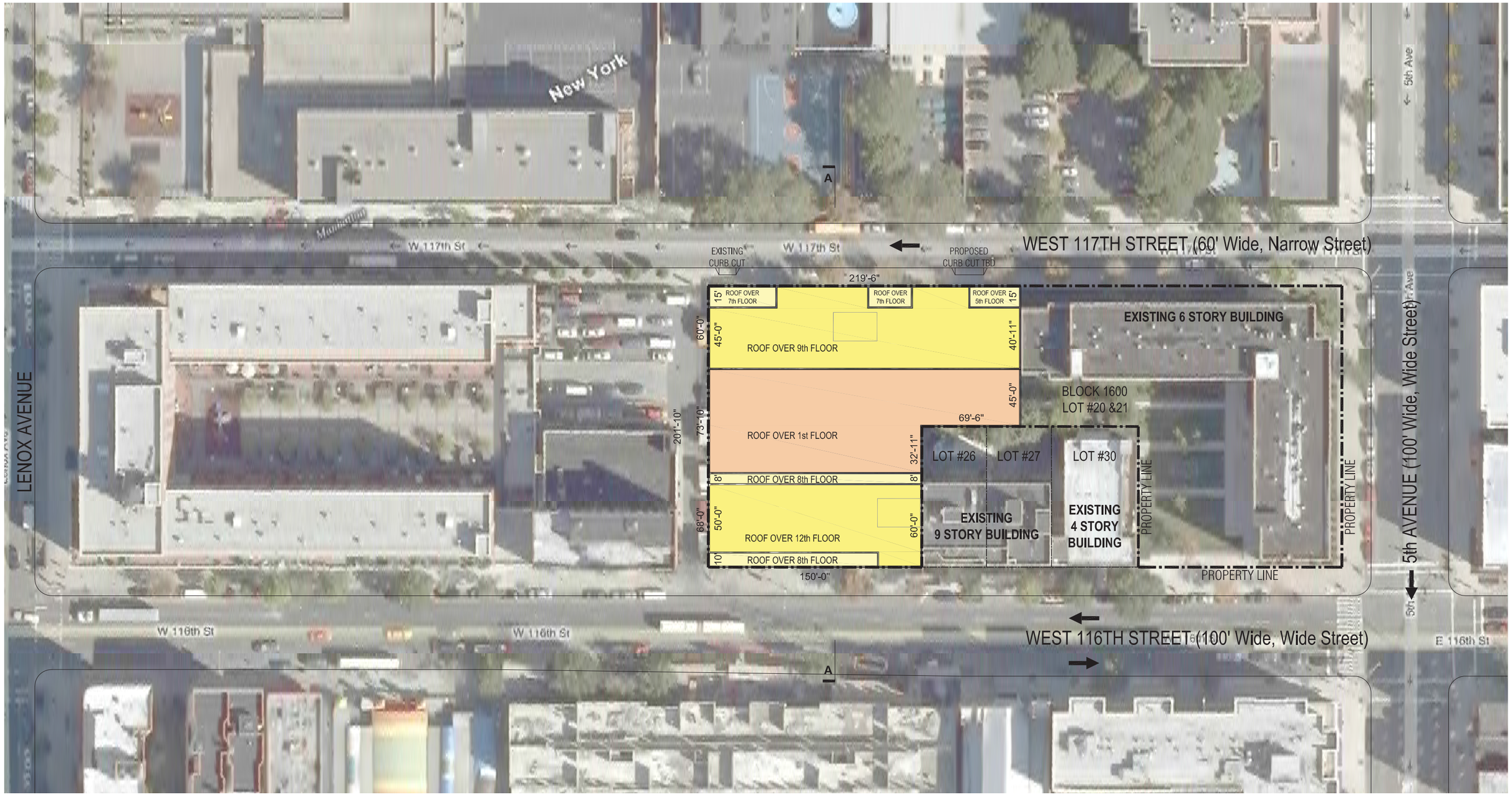
1) Existing Buildings			
Commercial	0.00	0 SF	0.00%
Community Facility	0.04	2,724 SF	0.81%
Residential	1.42	105,581 SF	31.44%
Total Existing	1.45	108,305 SF	32.25%
2) Enlargement			
Commercial	0.27	19,794 SF	5.89%
Community Facility	0.13	9,386 SF	2.79%
Residential	2.66	198,353 SF	59.06%
Total Enlargement	3.06	227,534 SF	67.75%
3) Total Existing and Enlargement			
Commercial	0.27	19,794 SF	5.89%
Community Facility	0.16	12,110 SF	3.61%
Residential	4.08	303,934 SF	90.50%
Total	4.51	335,838 SF	100.00%
Balance Unused	0.49	36,544 SF	

PROPOSED PARKING & LOADING SUMMARY

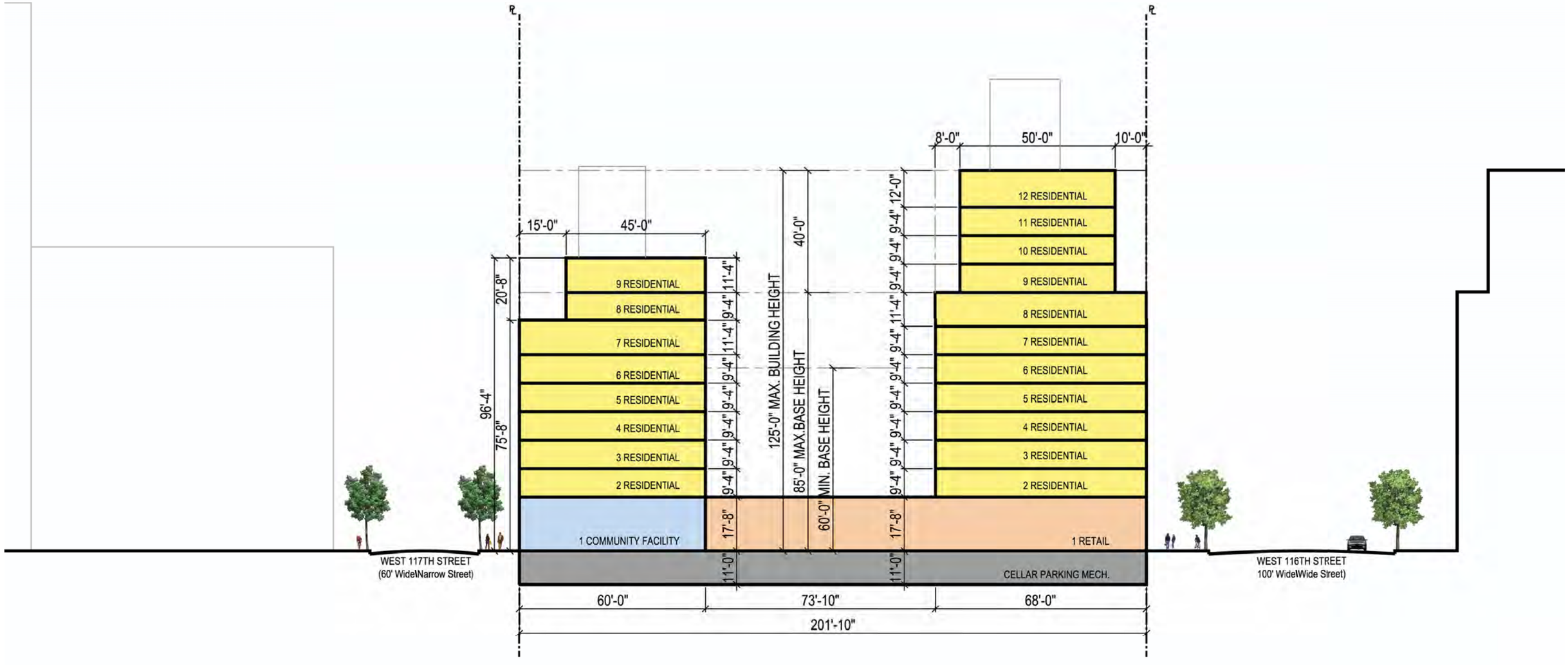
A. Required parking					
1) Commercial		None Required			
2) Community Facility		None Required			
3) Residential					
DU Provided:					
W117 Low Income Tenants		100 Units			
Public Housing Developments or Dwelling Units for					
W117 Low Income Tenants	15% of	DU	=	15	Spaces
W116 Market Rated		90 Units			
Market Rated	50% of	DU	=	45	Spaces
Total Required				60	Spaces
Existing Parking				32	Spaces
Permitted Parking				200	Spaces
Total Existing and Proposed (Attended)				166	Spaces

B. Loading Berth Required	None Required
Loading Berth Proposed	One

PROPOSED DEVELOPMENT AXONOMETRIC VIEW (WEST 117TH STREET)



PROPOSED DEVELOPMENT SITE PLAN



PROPOSED DEVELOPMENT SECTION A-A

APPENDIX 6

Previous Environmental Investigations and Reports

PHASE I

ENVIRONMENTAL

SITE ASSESSMENT

April 7, 2011

Site Identification:	**1428 Fifth Avenue (rear portion) Borough of Manhattan, New York**
Tax Lot Identification:	**Block 1600, Lot 20**
Property Description:	**Approximately 0.86-acre property containing a paved parking area, basketball courts, and a maintained yard area.**

ESI File: LM09015.11U

Prepared By:

Ecosystems Strategies, Inc.
24 Davis Avenue, Poughkeepsie, NY 12603
phone 845.452.1658 | fax 845.485.7083 | ecosystemsstrategies.com

Ecosystems Strategies, Inc.

PHASE I

ENVIRONMENTAL

SITE ASSESSMENT

April 7, 2011

ESI File: LM09015.11U

Prepared By:

Ecosystems Strategies, Inc.
24 Davis Avenue
Poughkeepsie, New York 12603

Prepared For:

L&M Development Partners Inc.
64 Fulton St, Suite 1001
New York, New York 10038

Phase I Environmental Site Assessment services performed by Ecosystems Strategies, Inc. have been conducted in accordance with ASTM Method E 1527-05.

The undersigned has reviewed this Phase I Environmental Site Assessment and certifies to L&M Development Partners that the information provided in this document is accurate as of the date of issuance by this office.

_____
Paul H. Ciminello
President

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FIGURES AND TABLES

APPENDICES

1.0 INTRODUCTION

1.1 Purpose of the Investigation

This Phase I Environmental Site Assessment (Phase I ESA) identifies recognized environmental conditions (RECs) and/or other significant environmental liabilities resulting from or associated with the storage, use, transport, or disposal of hazardous or regulated materials on the property located between 116th and 117th Street, to the immediate west of the building known as 1428 Fifth Avenue, Borough of Manhattan, New York (property descriptions are presented in Sections 2.1 and 3.3.2).

1.2 Methodology

This Phase I ESA has been prepared in conformance with guidelines set forth by the American Society for Testing and Materials (ASTM) Method E1527-05 (no exceptions to or deletions from this practice have occurred). A detailed Scope of Services is provided in Appendix H. This environmental site assessment was performed under the direct supervision and responsible charge of an environmental professional (see Appendix G), following the requirements for "all appropriate inquiry" as defined in 40 CFR Part 312.

Ecosystems Strategies, Inc. (ESI) performed the following work:

1. Investigation of the subject property's history and characteristics through the analysis of available historic maps, local and regional maps, local governmental and/or Tribal records, and information provided by subject property representatives and other knowledgeable individuals (see Section 5.0 for references).

2. Review of Federal, State, and/or Tribal regulatory-agency computer databases and printed records for documentation of potential environmental liabilities relevant to the property, consistent with (or exceeding) applicable ASTM requirements.

3. Inspection of the property by Paul Ciminello of ESI on April 6, 2011.

1.3 Limitations

This Phase I ESA is an evaluation of the property described in Section 2.1 below and is not valid for any other property or location. It is a representation of the property analyzed as of the dates that services were provided. This Phase I ESA cannot be held accountable for activities or events resulting in environmental liability after the respective dates of the site inspection or historic and regulatory research.

This Phase I ESA is based in part on certain information provided in writing or verbally by federal, state, and local officials (including public records) and other parties referenced herein. The accuracy or completeness of this information was not independently verified. Unless specifically noted, the findings and conclusions contained herein must be considered not as scientific certainties, but as probabilities based on professional judgment.

1.4 Key Definitions

Definitions of some common terms found in ASTM Standard 1527-05, as used in this Phase I ESA, are provided below.

Activity and Use Limitations (AULs)

Legal or physical restrictions or limitations on the use of, or access to, a site or facility to reduce or eliminate potential exposure to hazardous substances or petroleum products in the soil or ground water on the property, or to prevent activities that could interfere with the effectiveness of a response action. AULs may include institutional and/or engineering controls.

Key Site Manager

The person identified by the owner or operator of a property as having good knowledge of the uses and physical characteristics of the property.

Practically Reviewable

Information that is provided by a source in a manner and in a form that yields information relevant to the property without the need for extraordinary analysis of irrelevant data is Practically Reviewable. Records must be for a limited geographic area. Records arranged chronologically, lacking adequate address information to be located geographically, in large databases that are not sorted by zip code, or are so numerous to be unmanageable are not generally practically reviewable (i.e. data cannot be feasibly reviewed for its impact on the property).

Reasonably Ascertainable

Information that is (1) publicly available, (2) obtainable from its source within reasonable time and cost constraints, and (3) practically reviewable is Reasonably Ascertainable.

Recognized Environmental Conditions (RECs)

The presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate (1) an existing release, (2) a past release, or (3) a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, ground water, or surface water of the property. Material threat means a physically observable or obvious threat that is reasonably likely to lead to a release that is threatening and might result in impact to public health or the environment.

The term includes hazardous substances or petroleum products even under conditions in compliance with laws. The term is not intended to include *de minimis* conditions that generally do not present a threat to human health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies.

User

The party using ASTM Standard 1527-05 to complete an environmental site assessment.

2.0 SITE LOCATION AND DESCRIPTION

2.1 Description of the Subject Property

The subject property as defined in this Phase I ESA consists of the approximately 0.86-acre property located between 116th and 117th Street, to the immediate west of the building known as 1428 Fifth Avenue, Borough of Manhattan, New York (identified as Borough of Manhattan tax lot parcel: Block 1600, Lot 20). A Site Location Map is provided on Page 5.

The property is bounded on the eastern side by a six story building, on the northern side by West 117th Street, and on the southern side by West 116th Street (the property has an irregular shape). The entirety of the property is composed of a courtyard, basketball court, and paved parking lot. A map illustrating the layout of the property is provided on Page 6 and photographs of the property are provided in Appendix A.

2.1.1 Site Topography

Information on the subject property's topography was obtained from the review of the United States Geological Survey Topographic Map of the Central Park, New York Quadrangle (a copy of the relevant portion of this map, with the subject property indicated, is provided in Appendix B). According to the Topographic Map, the property is located in a relatively level area and has a surface elevation of approximately 30 feet above mean sea level. Field observations indicate that the property is relatively level.

The topographic map did not indicate the presence of any soil/gravel mining operations or unusual topographic patterns indicative of landfilling activities on the subject property. No on-site structures are depicted on the topographic map (the property is located in an urban area where only selected landmark buildings are depicted).

2.1.2 Site Geology

No information regarding site-specific investigations of the subsurface (e.g., test pits or borings) was readily available; therefore, no documented determinations are provided in this Phase I ESA.

A review of the Geologic Map of New York and the Surficial Geologic Map of New York (lower Hudson sheets) indicates that soils on the subject property are likely to consist of glacial till deposits, overlying hard crystalline bedrock. Soil maps presented in the New York City Reconnaissance Soil Survey (Soil Survey), issued by the New York City Soil and Water Conservation District, indicate that the Pavement & buildings, till substratum (0-5% slopes) soil series is likely to be located on the property. The Pavement & buildings, till substratum soil series consists of nearly level to gently sloping, highly urbanized areas with more than 80% of the surface covered by impervious pavement and buildings, over glacial till. [Note: The Soil Survey provides only a general guide to soil patterns across the city.] The presence of an on-site structure suggests that soils located on the property may have been altered by cutting, regrading and/or filling activities. No bedrock was observed on the property.

2.1.3 Site Hydrogeology

No site-specific investigation of groundwater depth or direction of flow has been reviewed by this office; therefore, no documented determinations are provided in this Phase I ESA.

Shallow groundwater flow in the vicinity of the property is likely to be to the southeast, toward the Harlem River (located approximately one mile from the property).

2.1.4 Surface Hydrology and Wetlands

Information regarding on-site surface hydrology was obtained from the review of applicable maps, including the New York State Department of Environmental Conservation (NYSDEC) Freshwater Wetlands Map and the United States Department of the Interior National Wetlands Inventory Map, and from observations made during the site inspection. According to these sources, there are no surface waterbodies, wet areas, or regulated wetlands on or near the property.

2.1.5 Sensitive Environmental Receptors

Sensitive Environmental Receptors (SERs) are valued physical, biological, and/or man-made features that may be adversely impacted by environmental contamination, and where a discharge or release could pose a greater threat than a discharge or release to other less valued areas. SERs include (but are not limited to) potable supply wells, wetlands, and protected wildlife habitat.

The review of maps and observations made during the site inspection indicate that no SERs are located on or in the immediate vicinity of the subject property.

2.2 Description of Adjoining and Surrounding Area Properties

The subject property is located in an urban area comprised primarily of multi-family residential and commercial properties. A description of the adjoining and nearby properties is provided in Table 1, below.

Table 1: Land Uses in the Vicinity of the Subject Property

Direction	Adjoining Use(s)	Vicinity Use(s)
North	• Childrens Aid Society • Mixed-use	• Residential • Commercial
East	• Residential	• Residential • Mixed-use • Institutional
South	• Mixed-use	• Residential • Commercial
West	• Mixed-use	• Mixed-use • Institutional

Site Location Map
1428 Fifth Avenue (rear portion)
Borough of Manhattan, New York

N

ESI File: LM09015.11U

April 2011

Children's Aid Society

residential

WEST 117TH STREET

sidewalk

dumpster

parking garage

courtyard

six story apartment building

paved parking lot

basketball court

church

residential retail

church

FIFTH AVENUE

Gran Pialto Cafe

church

WEST 116TH STREET

residential/retail

All feature locations are approximate. This map is intended as a schematic to be used in conjunction with the associated report, and it should not be relied upon as a survey for planning or other activities.

Selected Site Features Map

1428 Fifth Avenue (rear portion)
Borough of Manhattan, New York

Legend:

- subject property border
- exterior drains
- chain link fence

ESI File: LM09015.11U

April 2011

Scale: 1" = 95' approximately

3.0 INVESTIGATION

3.1 Site History

The history of the subject property was researched using interviews with knowledgeable individuals, and reviews of ownership records, historic maps, and local records. This review included both standard environmental record sources (as specified in ASTM 1527-05) and additional sources (if such sources were judged to be reasonably ascertainable and sufficiently useful, accurate, and complete in light of the objective of the records review).

3.1.1 User-Reported Information

ASTM Practice E 1527-05, Section 6, requires that the User (the party seeking to complete the environmental site assessment of the property) provide specific information to the Environmental Professional in order to meet the requirements for "all appropriate inquiry". Ms. Anne Carson, representing L&M Development Partners (L&M, "the User"), responded to a questionnaire provided by ESI as part of a previous Phase I Environmental Site Assessment prepared for the property in March 2009 (see Section 3.1.6, below). This questionnaire requested information regarding the subject property as specified in Section 6. Ms. Carson indicated that a previous environmental report had been prepared for the property (see Section 3.1.6, below). Ms. Carson had no other specialized knowledge or experience, actual knowledge, or knowledge of commonly known or reasonably ascertainable information regarding: 1) information material to recognized environmental conditions or other environmental liabilities in connection with the property; 2) the results of a review of title and/or judicial records for environmental liens/AULs; or, 3) reason(s) for a purchase price that does not reasonably reflect fair market value because of known or suspected contamination. Ms. Carson indicated that she has no additional knowledge regarding the subject property since the previous site assessment.

Ms. Carson indicated that L&M wanted to have the Phase I Environmental Site Assessment performed in order to qualify for one or more Landowner Liability Protections (LLPs) to CERCLA liability and to document potential environmental liabilities on the subject property.

3.1.2 Interview with Key Site Manager

Ms. Valerie Peterson (the property manager of the adjoining apartment building) was identified by Ms. Carson as a Key Site Manager for the subject property. Ms. Peterson was interviewed by ESI personnel as part of a previous Phase I Environmental Site Assessment conducted at the Site in March 2009. This interview covered the topics detailed in the User Questionnaire (see Section 3.1.1, above). Ms. Peterson was additionally asked to provide specific information regarding property features, site history and use, and commonly known information related to the property. Ms. Peterson had no specialized knowledge or experience, actual knowledge, or knowledge of commonly known or reasonably ascertainable information regarding potential environmental conditions and/or liabilities in connection with the property. Ms. Carson indicated that there is no new information relevant to the property. Pertinent information from the previous interview with Ms. Peterson is therefore provided in relevant report sections, where appropriate.

3.1.3 Ownership Records

Property ownership information, based on interviews with Ms. Peterson and a review of Borough of Manhattan computerized City Register records, indicates that the property has been owned by Impac. Associates Redevelopment Co. since it was purchased from the City of New York on April 14, 1981. No previous ownership information could be found in available records. This ownership summary does not constitute a title search.

3.1.4 Sanborn Fire Insurance Maps

A summary of the information obtained from the review of historic Sanborn Fire Insurance Company Maps dated 1902, 1912, 1951, 1976, 1980, and 1988 is provided below. Copies of relevant Sanborn maps are provided in Appendix C (note: subject property outlines on these maps, as drawn by ESI, may vary depending on map accuracy, and are approximations chosen to best reflect likely on-site historic uses).

1902: The western portion of the subject property is developed "Public School No. 184" and the northeastern portion of the property is shown as stable buildings associated with a "contractor's yard". Adjoining properties are shown as residential structures and vacant land. The surrounding area is developed primarily with residential structures as well as a church building and typewriter manufacturing facility to the east and west, respectively.

1912: The northeastern portion of the subject property, (formerly shown developed with stable buildings) as well as the northeastern, southeastern, and southwestern adjoining properties (formerly shown as vacant land), are now developed with two, six-story mixed-use buildings. New mixed-use structures are now shown in the surrounding area to the west and northwest.

1951: No changes are noted on the subject property or adjoining properties. The church building located nearby to the southeast now shows a new institutional structure consistent with the current on-site building.

1976: The subject property and northwestern adjoining property are now shown as vacant land. The northern adjoining properties are now shown new institutional and residential buildings consistent with the current on-site structures. Residential structures nearby to the north and west are now shown as vacant land.

1980: No changes are noted on the subject property. Adjoining and nearby properties to the northeast (formerly shown as residential buildings) are now shown as vacant land. No significant changes are noted in the surrounding area.

1988: No changes are noted on the subject property. Then northeastern adjoining property and nearby property to the east (formerly shown as vacant land and mixed-use/residential structures, respectively) are now developed with the current on-site residential structure. Nearby properties to the west (formerly shown as mixed-use structures) are now shown as vacant land.

3.1.5 Local Records

City Register Records

Borough of Manhattan City Register computerized ownership records for the subject property were reviewed on November 25, 2009. No information pertinent to the environmental integrity of the subject property was contained in these records.

Assessor's Office Records

The Site has recently been created as a separate tax lot. The original Phase I ESA on this Site included a review of the now adjoining building, now known as Lot 21 but previously known as Lot 20.

No information pertinent to the environmental integrity of the subject property was present in these records.

Building Department Records

Block and Lot Records

The Site has recently been created as a separate tax lot. The original Phase I ESA on this Site included a review of the now adjoining building, now known as Lot 21 but previously known as Lot 20.

The subject property is not identified as a "Little 'E' Restricted" site.

Environmental Control Board (ECB) Violations

A review of computerized Building Department records indicates there are no open ECB violations relating to the environmental integrity of the subject property.

Local Agency Interviews

A request was made on February 23, 2009 to search the available New York City Bureau of Fire Prevention (NYCBFP) records for information regarding the storage and/or use of petroleum, or other hazardous materials, on the subject property. Responses from the NYCBFP, dated March 19, 2009, indicate that no records are maintained for the subject property. Copies of the NYCBFP responses are provided in Appendix D.

3.1.6 Previous Environmental Reports

A Phase I Environmental Site Assessment was prepared for the subject property and the eastern adjoining property (Borough of Manhattan Block 1600, Lot 21) by ESI in March 2009. The assessment revealed no evidence of recognized environmental conditions in connection with the property; however, observations made by ESI during the Site inspection indicated the presence of small quantities of petroleum products and chemicals stored in the basement of the multi-family residential building located on the southern adjoining property (Lot 21). The March 2009 Phase I ESA concluded that a release of products from Lot 21 could potentially impact this adjoining building, and it was recommended that these products be stored properly.

As part of the March 2009 site assessment, ESI was provided with a copy of a Toxics Targeting Computerized Environmental Report (TT Report) prepared for the subject property by Toxics Targeting, Inc. in March 2004. The TT Report consisted of a Regulatory Review database search and identified two NYSDEC spill events within 200 feet of the subject property, consistent with the findings of both the previous and current database search conducted by ESI (see Section 3.2.2, below).

A Phase I Environmental Site Assessment Update was prepared for the subject property and southern adjoining property by ESI in November 2009. The assessment revealed no evidence of recognized environmental conditions in connection with the property other than the previously identified petroleum and chemical products that were stored on the southern adjoining property.

Excerpts from these reports are provided in Appendix E.

3.2 Review of Federal and State Agency Records

3.2.1 Methodology

Federal and state computer databases and printed records were reviewed for documentation of environmental conditions and/or liabilities relevant to the property (see Section 3.2.2, below). The following ASTM Standard Environmental Record Sources (as available for the subject property's locality) were reviewed (search distances are consistent with, or exceed, ASTM requirements).

Federal National Priority List (1.0 mile) and delisted National Priority List sites (0.5 mile)
Federal CERCLIS list and CERCLIS NFRAP site list (0.5 mile)
Federal RCRA CORRACTS facilities list (1.0 mile)
Federal RCRA non-CORRACTS TSD facilities list (0.5 mile)
Federal RCRA generators list (subject/adjoining properties)
Federal ERNS list (subject property)
Federal, State, and Tribal Institutional Control / Engineering Control registries (subject property)
State- and Tribal-equivalent NPL (1.0 mile)
State- and Tribal-equivalent CERCLIS (0.5 mile)
State and Tribal Brownfield and voluntary cleanup sites (0.5 mile)
State and Tribal leaking storage tank lists (0.25 mile)*
State (including locally administered) and Tribal registered storage tank lists (subject/adjoining)
State and Tribal landfill and/or solid waste disposal site lists (0.5 mile)

* *The search distance for this ASTM database has been reduced due to the high level of development of the area in which the subject property is located.*

The following Additional Environmental Record Sources (as available for the subject property's locality) were reviewed in order to enhance and supplement the review of standard sources:

State spill file records (0.25 mile)
State MOSF list (0.5 mile)
State radon data (by local municipality as available)
Federal and State wastewater discharge permits (subject/adjoining properties)

A copy of relevant portions of a database search conducted by FirstSearch Corporation for ESI is provided in Appendix F. Not all of the sites contained in the attached database search may be referenced in Section 3.2.2. Some sites may have been excluded based on either ASTM requirements, ESI's scope of services or professional opinion, and/or information obtained during the review of historic records and the site inspection. Some information may have been deemed to not be practically reviewable (e.g., records lack adequate address information). Sites or additional information not included in the database search may also be referenced based on ESI's knowledge of the subject property area.

3.2.2 Findings of Regulatory Records Review

Federal Hazardous Waste-Contaminated Sites

The subject property is not identified on the United States Environmental Protection Agency's (USEPA) National Priority List (NPL) of uncontrolled or abandoned hazardous waste sites identified for priority remedial actions. No NPL sites are located within one mile of the property and no delisted NPL sites are located within a half mile of the property.

The subject property is not identified on the USEPA's CERCLIS list of sites that are proposed to the NPL or that are in the screening and assessment phase for possible proposal to the NPL. No CERCLIS sites are located within a half mile of the property.

The subject property is not identified on the USEPA's CERCLIS No Further Remedial Action Planned (NFRAP) list, which are former CERCLIS sites that were delisted because no significant hazardous waste contamination was found, or because the site has been remediated. No CERCLIS NFRAP sites are located within a half mile of the property.

The subject property is not identified on readily available USEPA Institutional Control/Engineering Control registries.

State Sites

Inactive Hazardous Waste Disposal Sites

The subject property is not identified on the NYSDEC's registry of Inactive Hazardous Waste Disposal (IHWD) sites (a state equivalent to the federal NPL), and has not been listed as a site under investigation for inclusion in the IHWDS registry (a state equivalent to the federal CERCLIS List). No NYSDEC IHWD sites are located within 1.0 mile of the property.

Voluntary Cleanup, Brownfields Cleanup, and Environmental Restoration Programs

The subject property is not identified as participating in the NYSDEC's Voluntary Cleanup (VCP), Brownfields Cleanup (BCP), or Environmental Restoration (ERP) programs, which are designed to provide NYSDEC oversight of significantly contaminated properties. No participating sites are located within a half mile of the subject property.

Registry of Institutional and Engineering Controls in New York State

The subject property is not identified on the NYSDEC's Registry of Institutional and Engineering Controls in New York State.

Federal Hazardous Waste Handlers

The USEPA Resource Conservation and Recovery Information System (RCRIS) database details facilities that report treatment, storage or disposal of hazardous waste (TSD facilities) or generation or transportation of hazardous waste. Facilities that have been notified by the USEPA to take corrective action with regard to their handling of hazardous waste are classified as CORRACTS facilities.

CORRACTS AND/OR TSD FACILITIES

The subject property is not registered with the USEPA as a CORRACTS and/or TSD facility for hazardous waste or materials, and no CORRACTS and/or TSD facilities are located within one mile of the property.

GENERATORS OR TRANSPORTERS (NON-CORRACTS)

The subject property is not registered with the USEPA as a generator or transporter of hazardous waste, and no generators or transporters of hazardous waste are located on adjoining properties.

Landfills and Solid Waste Disposal Facilities

The NYSDEC's Facility Register does not list the subject property as an active or inactive landfill or solid waste disposal facility, and no landfills or solid waste disposal facilities are located within a half mile of the property.

Chemical Bulk Storage

A review of NYSDEC records indicates that the subject property is not registered as a chemical bulk storage (CBS) facility. Observations made during the site inspection did not indicate the presence of chemical bulk storage on the subject property. No adjoining properties are registered with the NYSDEC as CBS facilities.

Petroleum Bulk Storage

SUBJECT PROPERTY

A review of the NYSDEC petroleum bulk storage (PBS) database indicates that the subject property is not registered as a PBS facility. No evidence of aboveground or underground PBS tanks was noted on the subject property during the site inspection.

ADJOINING PROPERTIES

A review of the NYSDEC PBS database indicates that the "Dunlevy Milbank Children's Center" property at 14-32 West 118th Street, which is located approximately 200 feet northeast of the Site is a PBS facility (PBS Number 2-341487) containing a 10,000-gallon fuel oil UST. The "Canaan Houses" property at 8 West 118th Street, which is located approximately 250 feet northeast of the Site is a PBS facility (PBS Number: 2-600905) containing an active 5,000-gallon fuel oil UST. The "Public School 149- Manhattan" property at 34 West 118th Street, which adjoins the subject property to the northwest, is a PBS facility (PBS Number: 2-353752) containing two, active 10,000-gallon fuel oil ASTs. No open NYSDEC spill events are reported for these adjoining properties.

No overt evidence of PBS tanks was noted on other adjoining properties.

Major Oil Storage Facilities

The subject property is not listed with the NYSDEC as a major oil storage facility (MOSF) and no MOSFs are located within 0.5 mile of the subject property.

Federal Chemical and Petroleum Spills

The USEPA Emergency Response Notification System (ERNS) database details initial reports of releases of oil and hazardous substances as reported to federal authorities. There are currently no federal chemical or petroleum spills on record for the subject property.

State Chemical and Petroleum Spill and Leaking Underground Storage Tank Events

A review of the NYSDEC spill database (maintained since 1986) indicates that no spill events are known to have occurred on the subject property. Available information indicates that eighty-four spill events are known to have occurred within a quarter mile of the subject property (nine of these spills are classified as leaking underground storage tank [LUST] events). The spill events with the greatest likelihood of impacting the subject property are described as follows:

Spill number 0305658 occurred approximately 180 feet southeast of the property on West 116th Street and was reported on August 27, 2003 as the result of the discovery of petroleum contaminated soil beneath a sidewalk during the installation of a utility vault (likely to be associated with the above-mentioned spill). According to database records and Mr. Joe O' Connell of the NYSDEC, the spill was located approximately 130 feet to the west of the southwestern intersection of West 116th Street and Fifth Avenue. The database records indicate that petroleum contaminated soil was excavated and removed and that no groundwater was impacted. This spill event was closed by the NYSDEC in June 2005. Although this spill event occurred in close proximity to the subject property, database records and information provided by NYSDEC personnel suggest that the contaminated soil was excavated and removed, limiting any potential impacts to the property.

Active NYSDEC spill number 0601808 was reported for a church property at 33 West 115th Street on May 18, 2006. Petroleum contaminated soil was discovered during construction activities at an adjoining property. The source of the oil was found to be weeping from footings of the church

building. According to NYSDEC personnel, the source of the leak has been remediated and all contaminated soil has been removed, and that the spill has remained open pending the submittal of a closure report by the church. Based on information provided by NYSDEC personnel and the presumed direction of groundwater flow, this spill event is not likely to impact the subject property.

Spill number 0209842 was reported in December 2002 for the "Dunlevy Milbank Children" property, which is located 200 feet northeast of the Site at 14-32 West 118th Street. According to database records, a UST at this site failed a tank tightness test and that the tank and system were subsequently isolated and repaired and that there were no impacts to surrounding soil. This spill was closed in June 2004. Based on information provided in the database records, it is unlikely that this spill event has impacted the subject property.

Based on a review of the materials spilled, intervening distances between the releases and the subject property, the presumed direction of groundwater flow and other information located in the records reviewed, it is unlikely that any other spill events have impacted the subject property.

Air Discharges

No NYSDEC permits for air discharges from the subject property are known to exist. No operations likely to require a NYSDEC air discharge permit were noted on the subject property.

Wastewater Discharges

No USEPA National or NYSDEC State Pollutant Discharge Elimination System (NPDES or SPDES) permit is known to exist for the subject property. No operations likely to require a NPDES or SPDES permit were noted on the subject property. According to Ms. Peterson, the subject property is connected to the municipal wastewater system. No adjoining properties are registered as NPDES or SPDES facilities.

Radon

Information on radon levels was obtained from New York State Department of Health (NYSDOH) documents. No regulatory standards for radon levels currently exist in New York State. The USEPA has established a guidance value (the level where mitigation measures may be appropriate) for radon concentrations of 4.0 or greater picoCuries/liter (pCi/l). Other regulatory authorities (e.g., OSHA) have established guidance levels that are directly related to specific site activities (a determination as to applicable radon guidance levels is beyond the scope of this Phase I Environmental Site Assessment). A summary of available radon information for the subject property's vicinity is provided below in Table 2.

Table 2: Basement Radon Levels in Vicinity of Subject Property

All radon levels provided in picoCuries/liter (pCi/l)

NYSDOH Radon Information	New York City	Borough of Manhattan
Number of Homes Tested	1,314	105
Median Radon Level	0.9	0.96
Percent of Homes >4.0 pCi/l	6.7	10.5

These median radon levels are below the USEPA's guidance value of 4.0 pCi/l and less than 15% of the homes tested in the subject property's vicinity had levels in excess of this guidance value. These data support the conclusion that elevated radon levels are not likely to be present on the subject property. According to Ms. Peterson, radon testing has not been conducted on the subject property.

3.3 Site Inspection

3.3.1 Protocol

The site inspection was conducted on April 6, 2011 in order to address any potential concerns raised during the investigation of the site's history (Section 3.1) and the regulatory agency records review (Section 3.2), and to identify any additional indications of contamination from the use, storage, or disposal of hazardous or regulated materials. To the extent possible, site structures, vegetation, topography, surface waters, and other relevant site features were examined for any obvious evidence of existing or previous contamination or unusual patterns (e.g., vegetative stress, soil staining, surface water sheen, or the physical presence of contaminants), which would indicate that the environmental integrity had been or could be impacted.

Section 3.3.2 describes the physical characteristics of the subject property. Section 3.3.3 is divided into topics on specific environmental conditions or concerns, actual or potential, noted on the subject property during the site inspection. Section 3.3.4 describes the physical characteristics of adjoining properties as they relate to the potential or actual environmental condition of the subject property.

A Selected Site Features Map illustrating the general layout of the subject property and the locations of specific areas of concern (if any) is provided on Page 6. Photographs of the subject property are provided in Appendix A.

3.3.2 Physical Characteristics of the Subject Property

3.3.2.1 Property

The subject property is an irregular-shaped, approximately 0.86-acre parcel, which has 150 feet of frontage on the northern side of West 116th Street, 220 feet of frontage on the southern side of West 117th Street. The property contains a maintained courtyard area on the northeastern portion of the property; a basketball court on the southern portion of the property; and a paved parking area on the western portion of the property (see below). Chain-link fences define the northern, southern and western boundaries; the eastern property lines are undefined.

3.3.2.2 Structures

No structures are present on the subject property. No overt evidence of former on-site structures (e.g., foundation remains, supply wells, etc.) was observed during the site inspection.

3.3.3 Specific On-Site Environmental Conditions

Debris Areas

No significant quantities of debris were noted on the subject property.

Petroleum Storage

No quantities/containers of petroleum products, aboveground storage tanks, or indications of underground petroleum bulk storage tanks (e.g., fill ports or vent pipes) were observed on the subject property.

Chemical Storage

No quantities/containers of chemicals, aboveground chemical bulk storage tanks, or indications of underground chemical bulk storage tanks (e.g., fill ports or vent pipes) were observed on the subject property.

Asbestos-Containing Materials and Lead Based Paint

The likely dates of construction of the former on-site buildings (pre-1921) suggest that asbestos-containing materials (ACMs) and lead-based paint (LBP) may have been used during initial building construction and/or during subsequent maintenance work. Proper demolition procedures include the removal of asbestos and all painted wood from the Site. Debris from former on-site structures is likely to be present in subsurface soils; such materials, could contain asbestos or lead-based paint.

Wastewater Discharges

The term "wastewater" indicates water that is or has been used in an industrial or manufacturing process; or is directly related to manufacturing, processing, or raw materials storage areas at an industrial plant; or conveys or has conveyed sewage (water originating on or passing through or adjacent to a site, such as stormwater flows, is not generally considered to be wastewater). No evidence of wastewater discharges into drains, ditches, or streams on or adjacent to the property was observed on the subject property.

Stormwater Management and Exterior Drains/Sumps/Conduits

Stormwater drains are located in the paved parking lot and in the basketball court. No staining, odors, or other evidence of contamination was noted in or near any of the drains. According to available information, all stormwater drains lead to the municipal stormwater system. No other exterior stormwater catch basins, drains, sumps, or other potential significant conduits to the subsurface, or indications of liquid discharges into drains, ditches, or streams on or adjacent to the property, were observed on the subject property.

Staining/Corrosion/Leaks

No evidence of corrosion, leaks, or staining (indicative of an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products onto the subject property, including on-site structures and paved areas) was observed during the site inspection.

Topographic Irregularities

A small depressed area was observed in the northern portion of the property. No signs of contamination (odors, stressed vegetation, etc.) was observed near the depression.

No other overt topographic irregularities (e.g., sinkholes or berms) indicative of the presence of non-natural materials (including debris) in the subsurface were observed on the subject property.

Vegetative Features

No overt areas of stressed or dying vegetation indicative of the presence of contaminants in surface or subsurface soils were observed on the subject property.

Pits, Ponds, or Lagoons

No pits, ponds, or lagoons exhibiting evidence (e.g., discolored water, distressed vegetation, obvious wastewater discharge) of holding liquids or sludge containing hazardous substances or petroleum products were observed on the subject property.

Surface Waters

No surface water bodies are located on the subject property.

Odors

No unusual odors indicative of the presence of contamination were noted.

Polychlorinated Biphenyls

An inspection for the presence of equipment likely to contain polychlorinated biphenyls (PCBs) was conducted by this office. PCBs were widely used in equipment such as transformers, capacitors, and hydraulic equipment until 1979 when the USEPA regulated their use in this capacity. No equipment likely to contain PCBs was noted on the subject property.

3.3.4 Environmental Concerns at Adjoining and Nearby Properties

Adjoining and nearby properties were observed from the subject property and from public thoroughfares for the purpose of identifying any recognized environmental conditions or other potential environmental concerns. No conditions likely to significantly impact the subject property were observed during the site inspection.

4.0 CONCLUSIONS AND RECOMMENDATIONS

Ecosystems Strategies, Inc. (ESI) has performed a Phase I Environmental Site Assessment in conformance with the scope and limitations of ASTM Practice E 1527-05 of the property located between 116th and 117th Street, to the immediate west of the building known as 1428 Fifth Avenue, Borough of Manhattan, New York. Any exceptions to, or deletions from, this practice are described in Section 1.2 of this report. This assessment has revealed no evidence of recognized environmental conditions in connection with the property. ESI's conclusions and recommendations (in **bold**) regarding potential environmental liabilities associated with the property, if any, are presented below. Cost estimates for any proposed investigations and/or remedial actions are provided in *italics* where appropriate.

1. The subject property was not identified during the review of regulatory agency records conducted by this office. No adjoining or nearby properties were identified that are likely to significantly impact the environmental integrity of the subject property.

   No further investigation of regulatory records is recommended.

2. The subject property contains a basketball court, a paved parking area, and a maintained courtyard area that is associated with the six-story apartment building located on the northeastern adjoining and nearby property to the east since circa 1983. The western portion of the subject property historically contained "Public School No. 184" from prior to 1902 until sometime between 1951 and 1976. The northeastern portion of the subject property formerly contained mixed-use structures from sometime between 1902 and 1912 until sometime between 1951 and 1976. No evidence of industrial or significant commercial use of the property was found during the review of historical records.

   No further investigation is recommended. Subgrade fill material will require proper management as part of regular site development procedures.

5.0 SOURCES OF INFORMATION

5.1 Maps and Documents

Ecosystems Strategies, Inc., Phase I Environmental Site Assessments, dated November 25, 2009 and March 2, 2009.

FirstSearch Technology Corporation, Environmental FirstSearch Report, April 5, 2011

New York State Department of Environmental Conservation, Freshwater Wetlands Map of the Central Park, New York Quadrangle, dated 1975.

Sanborn Fire Insurance Company Maps dated 1902, 1912, 1951, 1976, 1980, and 1988.

Toxics Targeting, Inc., Toxics Targeting Computerized Environmental Report, dated March 22, 2004.

United States Department of Agriculture, Natural Resources Conservation Service, New York City Reconnaissance Soil Survey, dated 2005.

United States Department of the Interior National Wetlands Inventory Map of the Central Park, New York Quadrangle, dated April 1980.

United States Geological Survey Topographic Map of the Central Park, New York Quadrangle, dated 1966 (photorevised 1979).

University of the State of New York, Geologic Map of New York, Fisher, *et al*., editors (dated 1970, reprinted 1995) and Surficial Geologic Map of New York, D. Cadwell, editor (dated 1989), Lower Hudson Sheets.

5.2 Local Agency Records

Borough of Manhattan Assessor's Office computerized records, reviewed, November 25, 2009.

Borough of Manhattan Building Department computerized records, reviewed, November 25, 2009.

Borough of Manhattan City Register computerized records, reviewed, November 25, 2009.

New York City Bureau of Fire Prevention records inquiry response, March 19, 2009.

5.3 Communications

Ms. Anne Carson, representing L&M Development Partners, various dates, February, March, and November 2009.

Mr. Tell Metzger, representing L&M Development Partners, various dates March and April 2011.

Mr. Joe O'Connell, representing the NYSDEC, various dates, February 2009.

Ms. Valerie Peterson, the property manager, February 27, 2009.

6.0 Environmental Professional Statement

The following statements are required by 40 CFR 312.21(d) of the environmental professional(s) responsible for conducting and preparing the Phase I Environmental Site Assessment report.

I declare that, to the best of my professional knowledge and belief, I meet the definition of Environmental professional as defined in §312.10 of 40 CFR 312.

and

I have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the subject property. I have developed and performed the all appropriate inquiries in conformance with the standards and practices set forth in 40 CFR Part 312.

Paul H. Ciminello
President, Ecosystems Strategies, Inc.

Kimberly Punchar
Senior Project Manager, Ecosystems Strategies, Inc.

APPENDIX A

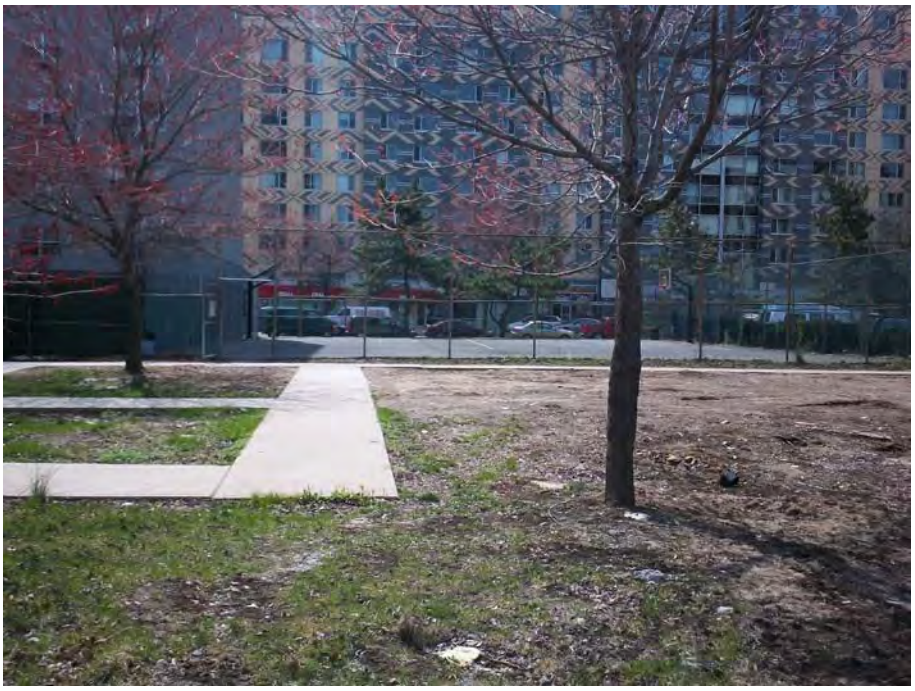
Site Photographs

PHOTOGRAPHS

1. **Western portion of the subject property as seen from the north.**

2. **Subject property as seen from the northwest.**

PHOTOGRAPHS

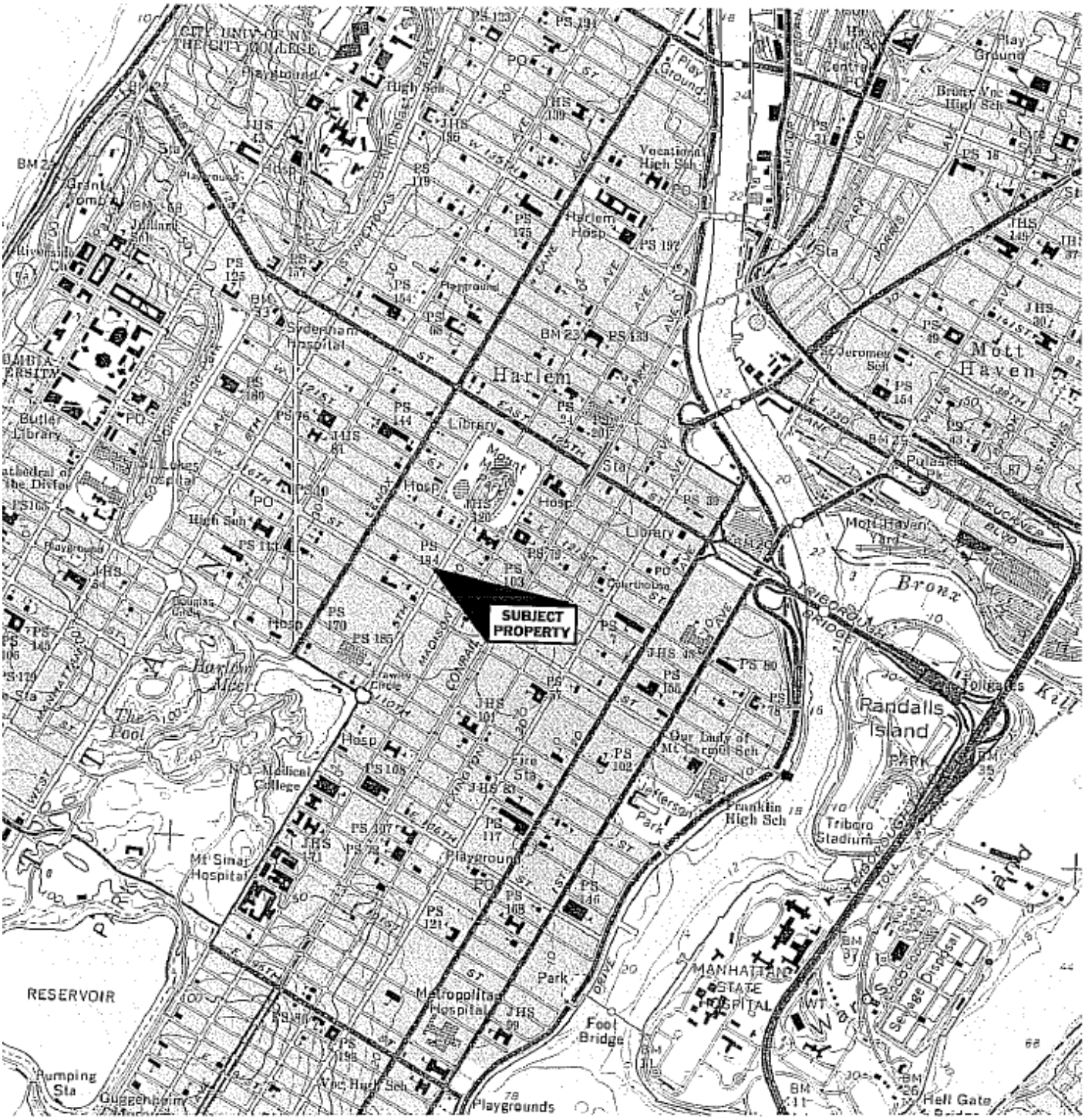


3. Subject property as seen from the northeast.

4. Central portion of the subject property as seen from the north.

APPENDIX B

Physical-Setting Map



Source: U.S. Department of the Interior Geological Survey Topographic Map of the Central Park, NY Quadrangle, dated 1966 (photorevised 1979)

U.S.G.S. Topographic Map 1428 Fifth Avenue Borough of Manhattan, New York	N	ESI File: LM09015.11U April 2011 Scale: 1:24000

APPENDIX C

Sanborn Fire Insurance Maps

MOUNT MORRIS SQUARE

48.

WEST 120th STREET

WEST 119th STREET

AVENUE

AVENUE

WEST 118th STREET

WEST 117th STREET

(See Volume Eight)

LENOX

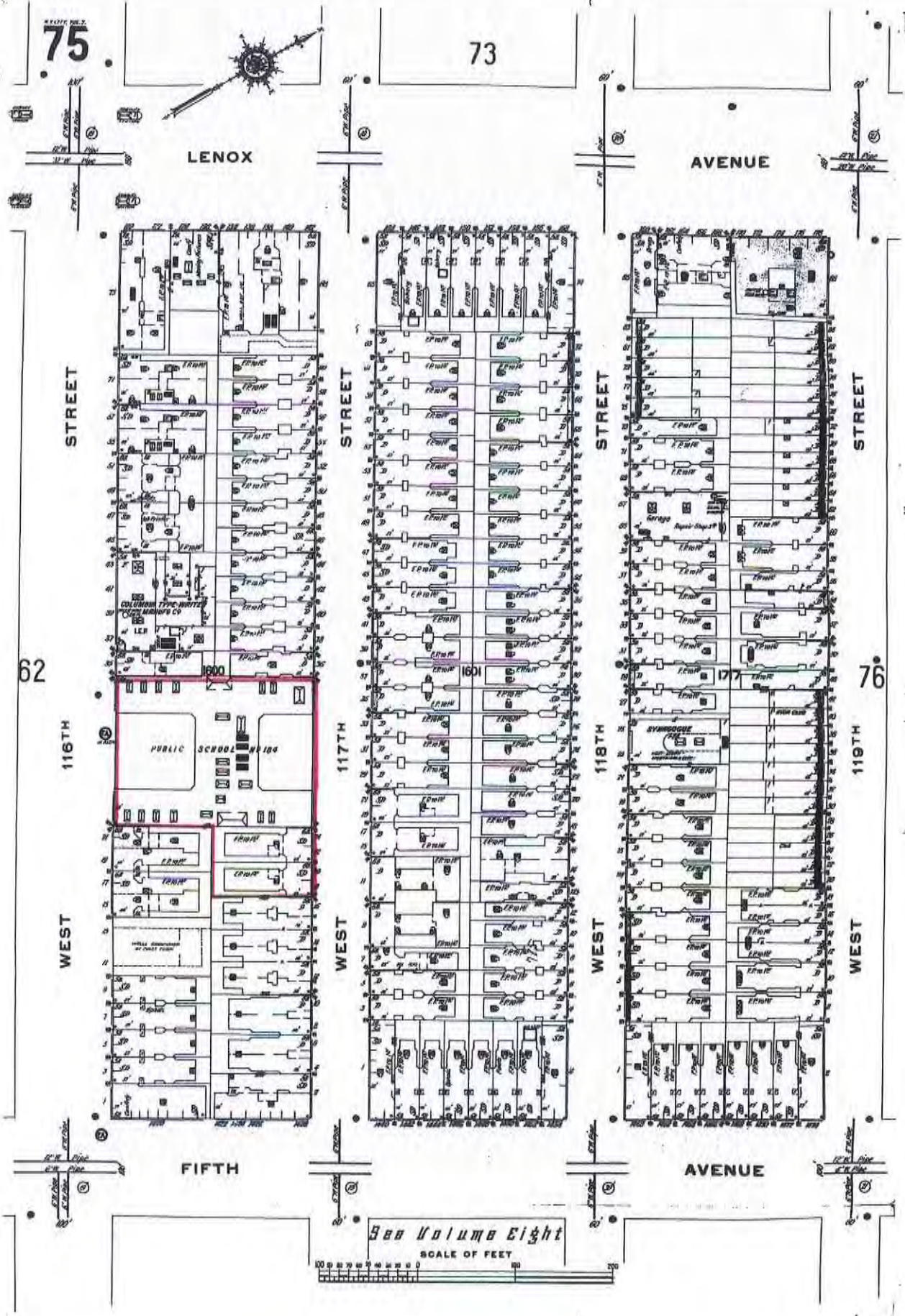
FIFTH

PUBLIC SCHOOL No 184

WEST 116th STREET

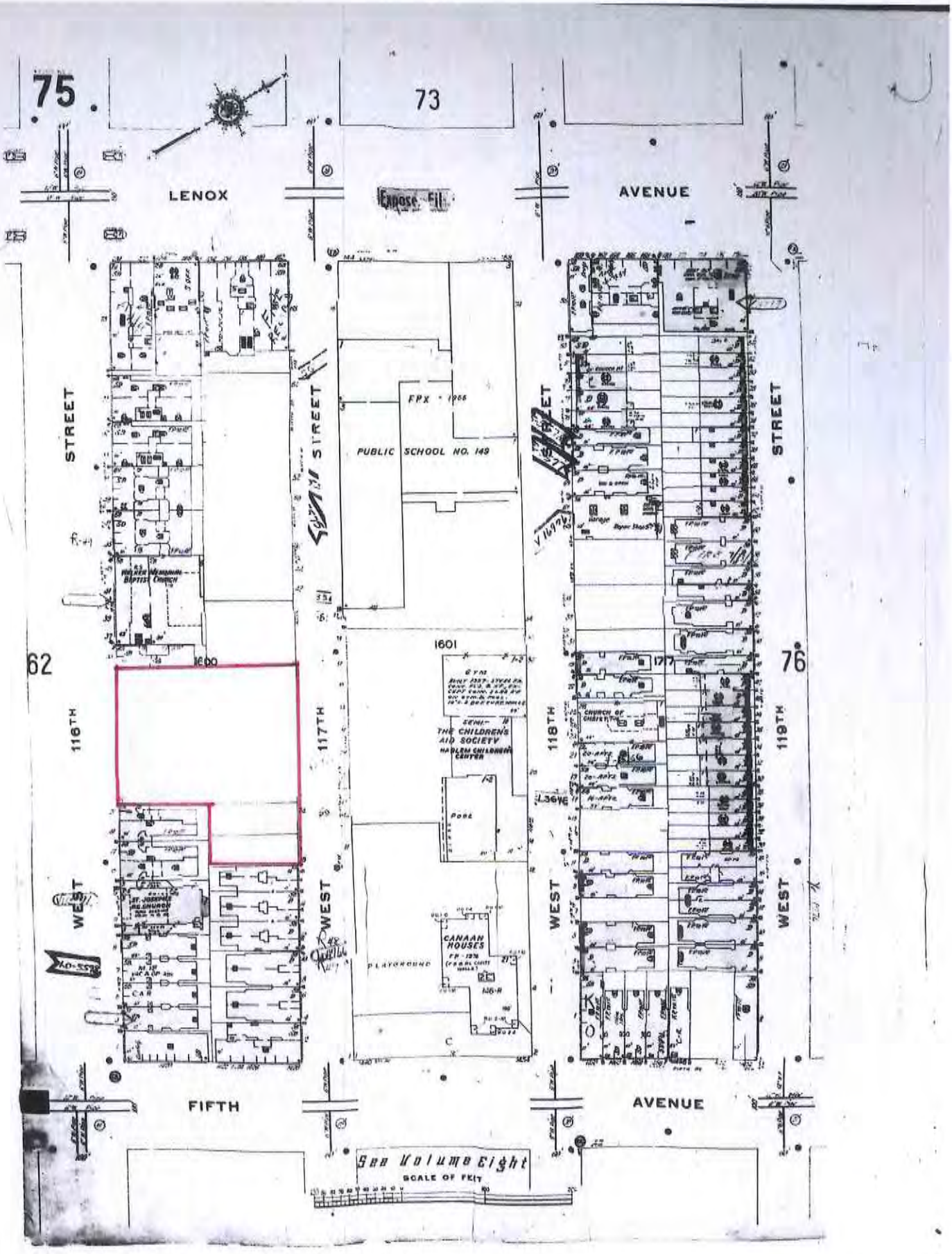
WEST 115th STREET

Scale of Feet

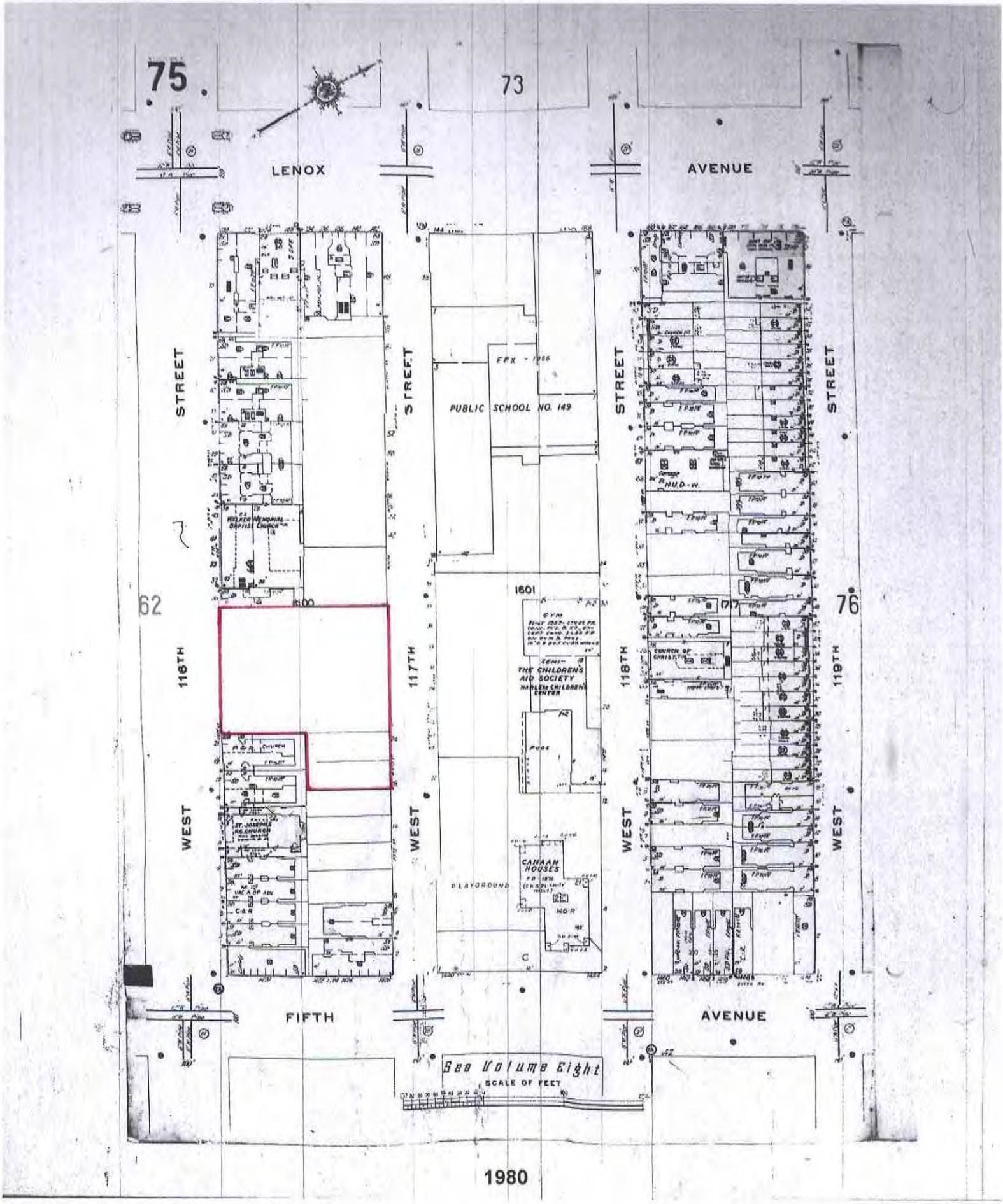

75
73
LENOX
AVENUE
STREET
STREET
STREET
STREET
62
76
1600
1601
1717
116TH
117TH
118TH
119TH
WEST
WEST
WEST
WEST
PUBLIC SCHOOL
FIFTH
AVENUE
See Volume Eight
SCALE OF FEET


NY .068
75
73
LENOX
AVENUE
STREET
STREET
STREET
STREET
62
76
1600
1601
177
PUBLIC SCHOOL
116TH
117TH
118TH
119TH
WEST
WEST
WEST
WEST
FIFTH
AVENUE
See Volume Eight
SCALE OF FEET

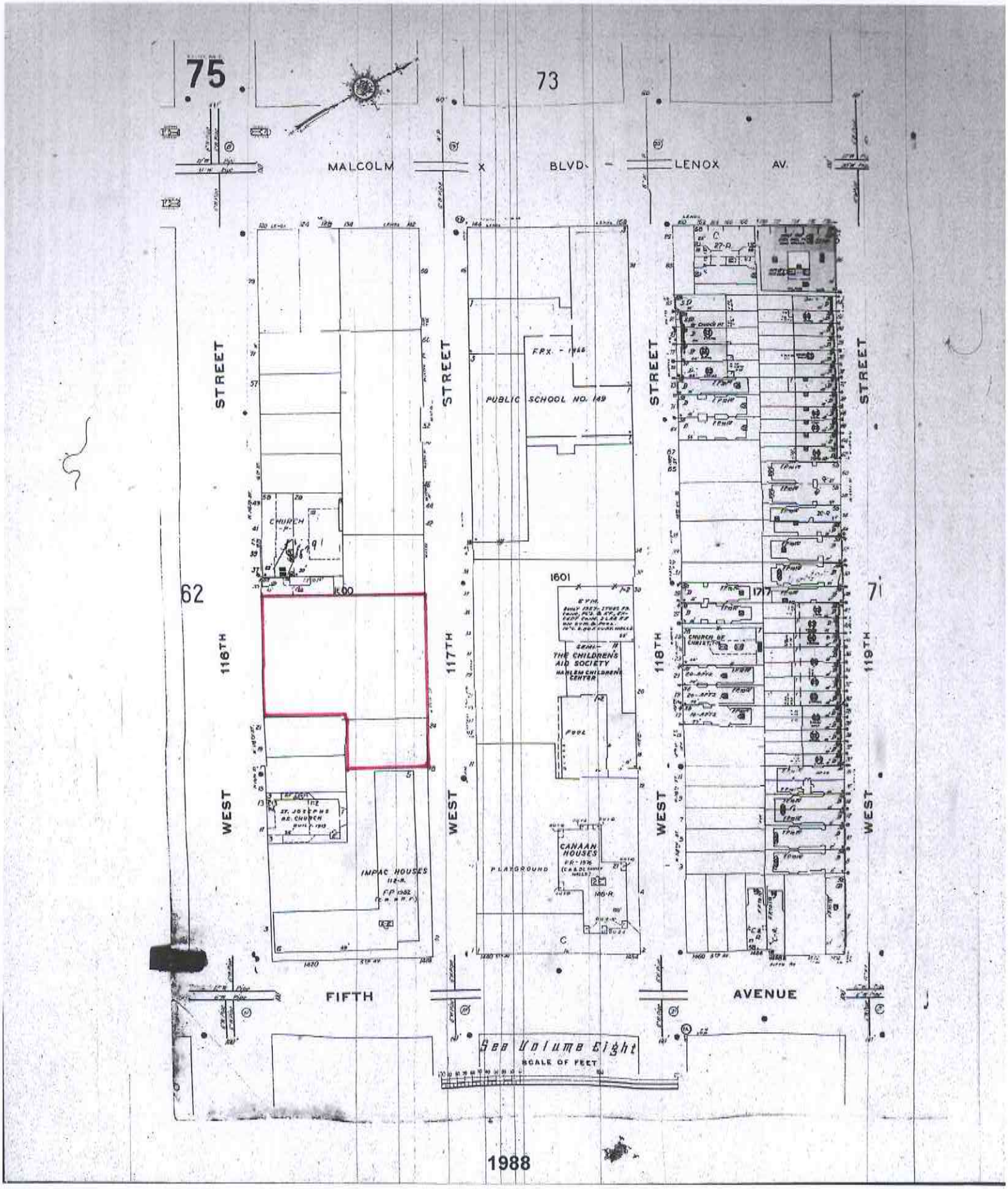
1951


75
73
LENOX
AVENUE
STREET
PUBLIC SCHOOL NO. 149
62
76
116TH
117TH
118TH
119TH
WEST
1601
THE CHILDREN'S AID SOCIETY
CANAAN HOUSES
PLAYGROUND
FIFTH
AVENUE
See Volume Eight
SCALE OF FEET

1976


75
73
LENOX
AVENUE
STREET
PUBLIC SCHOOL NO. 149
62
76
116TH
117TH
118TH
119TH
WEST
1601
THE CHILDRENS AID SOCIETY
HARLEM CHILDRENS CENTER
CANAAN HOUSES
PLAYGROUND
FIFTH
AVENUE
See Volume Eight
SCALE OF FEET

1980


75
73
MALCOLM X BLVD.
LENOX AV.
STREET
PUBLIC SCHOOL NO. 149
62
71
116TH
117TH
118TH
119TH
WEST
1601
THE CHILDREN'S AID SOCIETY
HARLEM CHILDREN'S CENTER
POOL
CANAAN HOUSES
PLAYGROUND
IMPAC HOUSES
ST. JOSEPH'S R.C. CHURCH
CHURCH
FIFTH
AVENUE
See Volume Eight
SCALE OF FEET
1988

APPENDIX D

New York City Bureau of Fire Prevention Response

CM09015

RECEIVED
MAR 3 0 2009
BY:

FIRE DEPARTMENT

9 METROTECH CENTER BROOKLYN, N.Y. 11201-3857

PUBLIC RECORDS UNIT
TANKS SECTION

Ref No: T- 13170

*None
ECOSYSTEMS STRATEGIES, INC.
24 DAVIS AVENUE
POUGHKEEPSIE, N.Y. 12603

CM09015

Dear Customer / Representative,

We have completed a search for address and the requsted information listed below. In the "Status" box below, we have listed the results and any additional comments we may have regarding the search.

Search Type Customer Requested	$10 - Motor - Existing		
Search Address	1428 FIFTH AVENUE		
Borough	01 - Manhattan		
Payment Type	Cashier	Payment No	45606
*Data Entered	3/19/2009	*Entered By	DJ
Account Number		Requested Folder	

No. of Tanks	No. of Gallons	Tank Type	Fuel Type	Conversion

***Additional Information**

*Status	Completed - Record not found

IMPORTANT NOTICE: THIS REPORT IS NOT VALID IF ALTERED, CORRECTED OR WITHOUT FDNY CERTIFICATION STAMP AND UNIT EMPLOYEE'S SIGNATURE.

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SIGNATURE

If you need further assistance or additional information, please call (718) 999-2441; 8 am - 4pm (Monday - Friday).

Thank you,

Donna James

Public Records Representative

E- 3/19/2009 DJ
C- 3/24/2009 DJ

LM09015

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MAR 30 2009
BY:

FIRE DEPARTMENT

9 METROTECH CENTER BROOKLYN, N.Y. 11201-3857

PUBLIC RECORDS UNIT
TANKS SECTION

Ref No: T- 13171

*None
ECOSYSTEMS STRATEGIES, INC.
24 DAVIS AVENUE
POUGHKEEPSIE, N.Y. 12603

LM09015

Dear Customer / Representative,

We have completed a search for address and the requsted information listed below. In the "Status" box below, we have listed the results and any additional comments we may have regarding the search.

Search Type Customer Requested	$10 - Motor - Removed / Sealed		
Search Address	1428 FIFTH AVENUE		
Borough	01 - Manhattan		
Payment Type	Cashier	Payment No.	45606
*Data Entered	3/19/2009	*Entered By	DJ
Block / Account Number		Requested Folder	

No. of Tanks	No. of Gallons	Tank Type	Fuel Type	Conversion

***Additional Information**

***Status** Completed - Record not found

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Thank you,

Donna Jones

Public Records Representative

E- 3/19/2009 DJ
C- 3/24/2009 DJ

LM9015

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MAR 3 0 2009
BY:----------

FIRE DEPARTMENT

9 METROTECH CENTER BROOKLYN, N.Y. 11201-3857

PUBLIC RECORDS UNIT
TANKS SECTION

Ref No: T- 13169

LM09015

*None
ECOSYSTEMS STRATEGIES, INC.
24 DAVIS AVENUE
POUGHKEEPSIE, N.Y. 12603

Dear Customer / Representative,

We have completed a search for address and the requsted information listed below. In the "Status" box below, we have listed the results and any additional comments we may have regarding the search.

Search Type Requested - Fee to Start	$10 - Fuel - Removed / Sealed		
Search Address	1428 FIFTH AVENUE		
Borough	01 - Manhattan		
Payment Type	Cashier	Payment No	45606
*Data Entered	3/19/2009	*Entered By	DJ
Account Number		Requested Folder	

No. of Tanks	No. of Gallons	Tank Type	Fuel Type	Conversion

***Additional Information**

***Status** Completed - Record not found

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SIGNATURE DJ

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Thank you,

Donna Jones

Public Records Representative

E- 3/19/2009 DJ
C- 3/24/2009 DJ

CM 09015

RECEIVED
MAR 3 0 2009
BY: ----------

FIRE DEPARTMENT

9 METROTECH CENTER BROOKLYN, N.Y. 11201-3857

PUBLIC RECORDS UNIT
TANKS SECTION

Ref No: T- 13168

*None
ECOSYSTEMS STRATEGIES, INC.
24 DAVIS AVENUE
POUGHKEEPSIE, N.Y. 12603

CM09015

Dear Customer / Representative,

We have completed a search for address and the requsted information listed below. In the "Status" box below, we have listed the results and any additional comments we may have regarding the search.

Search Type Customer Requested	$10 - Fuel - Existing		
Street Address	1428 FIFTH AVENUE		
Borough	01 - Manhattan		
Payment Type	Cashier	Payment No	45606
*Data Entered	3/19/2009	*Entered By	DJ
Account Number		Requested Folder	

No. of Tanks	No. of Gallons	Tank Type	Fuel Type	Conversion

***Additional Information**

***Status** Completed - Record not found

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ON FILE WITH FDNY/EMS

SIGNATURE DJ

If you need further assistance or additional information, please call (718) 999-2441; 8 am - 4pm (Monday - Friday).

Thank you,

Donna Jones

Public Records Representative

E- 3/19/2009 DJ
C- 3/24/2009 DJ

APPENDIX E

Previous Environmental Reports

Toxics Targeting Computerized Environmental Report

1428 5th Ave
New York, NY 10035

March 22, 2004

LIMITED WARRANTY AND DISCLAIMER OF LIABILITY

Who is Covered

This limited warranty is extended by Toxics Targeting, Inc. only to the original purchaser of the accompanying Computerized Environmental Report ("Report"). It may not be assigned to any other person.

What is Warranted

Toxics Targeting, Inc. warrants that it uses reasonable care to accurately transcribe the information contained in this Report from the sources from which it is obtained. This limited warranty is in lieu of all other express warranties which might otherwise arise with respect to the Report. No one is authorized to change or add to this limited warranty.

What We Will Do

If during the warranty period there is shown to be a material error in the transcription of the information contained in this Report from the sources from which it was obtained, Toxics Targeting, Inc. shall refund to the original purchaser the full purchase price paid for the Report. The remedy stated above is the exclusive remedy extended to the Purchaser by Toxics Targeting, Inc. for any failure of the Report to conform with this Warranty, or otherwise for breach of this Warranty or any other warranty, whether expressed or implied.

What We Won't Cover

Toxics Targeting, Inc. has not and can not verify the accuracy, correctness or completion of the information contained in this Report. Information is obtained from government agencies, site owners, and other sources, and errors are common in such information. Because Toxics Targeting, Inc. can not control the accuracy of the information contained in this Report, or the uses which may be made of the information, TOXICS TARGETING, INC. DISCLAIMS LIABILITY TO ANYONE FOR ANY EVENTS ARISING OUT OF THE USE OF THE INFORMATION. TOXICS TARGETING, INC. SHALL NOT BE LIABLE FOR ANY DAMAGE CAUSED BY THIS REPORT, WHETHER DIRECT OR INDIRECT, AND WHETHER OR NOT TOXICS TARGETING, INC. HAS BEEN ADVISED OF OR HAS KNOWLEDGE OF THE POSSIBILITY OF SUCH DAMAGES. TOXICS TARGETING, INC. EXPRESSLY DISCLAIMS ANY AND ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE. Some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages, so the above exclusion or limitation may not apply to you.

Period of Warranty

The period of warranty coverage is ninety days from the date of purchase of this Report. There shall be no warranty after the period of coverage. ANY AND ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR PARTICULAR USE SHALL HAVE NO GREATER DURATION THAN THE PERIOD OF WARRANTY STATED HERE, AND SHALL TERMINATE AUTOMATICALLY UPON THE EXPIRATION OF SUCH PERIOD. Some jurisdictions do not allow limitations on how long an implied warranty lasts, so the above exclusion or limitation may not apply to you.

PLEASE REFER TO PAGES ONE AND FOUR FOR A DESCRIPTION OF SOME OF THE LIMITATIONS OF THIS COMPUTERIZED ENVIRONMENTAL REPORT.

Table of Contents

Introduction

Toxics Targeting has combined environmental database searches, extensive regulatory analysis and sophisticated mapping techniques to produce your *Computerized Environmental Report.* It checks for the presence of 17 categories of government-reported toxic sites and provides detailed, up-to-date information on each identified site. The findings of your report are presented in an easy-to-understand format that:

1. *Maps* the approximate locations of selected government-reported toxic sites identified on or near a specified target address.

2. *Estimates* the distance and direction between the target address and each identified toxic site.

3. *Reports* air and water permit non-compliance and other regulatory violations.

4. *Profiles* some aspects of the usage, manufacture, storage, handling, transport or disposal of toxic chemicals at individual sites.

5. *Summarizes* some potential health effect information and drinking water standards for selected chemicals reported at individual sites.

The Three Sections Of Your Report

The first section highlights your report's findings by summarizing identified sites according to: **a)** distance intervals, **b)** direction, **c)** proximity to the target address and **d)** individual site categories. In addition, the locations of all identified toxic sites are illustrated on individual maps for each radius search distance used in your report. Finally, a close-up map illustrates the locations of all identified toxic sites, at the shortest radius search distance used in your report.

The second section of your report contains *Toxic Site Profiles* that provide detailed information on each identified toxic site. The information in each *Toxic Site Profile* varies according to its source. Some toxic site categories have extensive information, some have limited information. All the information is updated on a regular basis.

The third section of the report contains appendices that identify: **1)** on-site spills reported to the national Emergency Response Notification System (ERNS), **2)** various toxic sites that cannot be mapped due to incomplete or erroneous addresses or other mapping problems, **3)** codes that characterize hazardous wastes reported at various facilities, **4)** methods used to map toxic sites identified in your report and **5)** information sources used in your report.

How to Use Your Report

- Check Table One to see the number of identified sites by distance intervals.
- Check Table Two to see identified sites sorted by direction.
- Check Table Three to see identified sites ranked by proximity to the target address.
- Check Table Four to see identified sites sorted by site categories.
- Refer to the various maps to see the locations of identified toxic sites. Refer to the *Toxic Site Profile* and *Appendix* sections for additional information.

Toxic Site Databases Analyzed In Your Report

Search Radius

One-Mile 

1) *New York Inactive Hazardous Waste Disposal Site Registry:* a state listing of sites that can pose environmental or public health hazards requiring investigation or clean up.

One-Mile 

2) *CERCLIS* (Comprehensive Environmental Response, Compensation and Liability Information System): a federal listing of sites that can pose environmental or public health hazards requiring investigation or clean up.

One-Mile 

3) *National Priority List for Federal Superfund Cleanup:* a listing of sites known to pose environmental or health hazards that are being investigated or cleaned up under the Federal Superfund program.

One-Mile 

4) *New York Hazardous Substance Disposal Site Draft Study:* a state listing of sites contaminated with toxic substances that can pose environmental or public health hazards. These sites are not eligible for state clean up funding programs.

One-Mile 

5) *New York Solid Waste Facilities Registry, including New York City 1934 Sites:* active and inactive landfills, incinerators, transfer stations or other solid waste management facilities.

One-Mile 

6) *New York State Major Oil Storage Facilities:* sites with more than a 400,000 gallon capacity for storing petroleum products.

One-Mile 

7) *New York and Federal Hazardous Waste Treatment, Storage or Disposal Facilities:* sites reported by the NYS manifest system and the USEPA's Resource Conservation and Recovery Act Information System (RCRIS). Also includes the following databases:

- *RCRA violations:* waste facilities with violations reported by the USEPA pursuant to the Resource Conservation and Recovery Act.
- *RCRIS corrective action activity (CORRACTS):* waste facilities with RCRIS corrective action activity reported by the USEPA.

Half-Mile 

8a) *Toxic Spills: active* stationary source spills reported to state environmental authorities, including unremediated leaking underground storage tanks.

Half-Mile 

8b) *Toxic Spills: inactive* stationary and non-stationary source spills reported to state environmental authorities, including remediated leaking underground storage tanks.

Eighth-Mile 

9) *New York and Local Petroleum Bulk Storage Facilities:* sites with more than an 1,100 gallon capacity for storing petroleum products.

Eighth-Mile 

10) *New York and Federal Hazardous Waste Generators and Transporters:* sites reported by the NYS manifest system and the USEPA's Resource Conservation and Recovery Act Information System (RCRA). Also includes the following databases:

- *RCRA violations:* waste facilities with violations reported by the USEPA pursuant to the Resource Conservation and Recovery Act .
- *RCRIS corrective action activity (CORRACTS):* waste facilities with RCRIS corrective action activity reported by the USEPA.

Eighth-Mile 

11) *New York Chemical Bulk Storage Facilities:* Sites storing hazardous substances listed in 6 NYCRR Part 597 in aboveground tanks with capacities of 185 gallons or more and/or underground tanks of any size

Eighth-Mile 

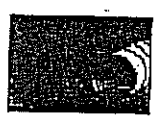
12) *New York Toxic Release Inventory Facilities:* discharges of selected toxic chemicals to air, land, water or treatment facilities.

Eighth-Mile 

13) *Historic New York City Utility Sites (1890's to 1940's):* power generating stations, manufactured gas plants, gas storage facilities, maintenance yards and other gas and electric utility sites.

Eighth-Mile 

14) *Air Discharges:* Air pollution point sources monitored by U.S. EPA and/or state and local air regulatory agencies.

Eighth-Mile 

15) *Federal Permit Compliance System Toxic Wastewater Discharges:* permitted toxic wastewater discharges.

Eighth-Mile 

16) *Federal Civil Enforcement Docket:* civil judiciary cases filed on behalf of the U. S. Environmental Protection Agency by the Department of Justice.

Property only 

17) *ERNS: Federal Emergency Response Notification System Spills:* a listing of federally reported spills.

Limitations Of The Information In Your Report

The information presented in your *Computerized Environmental Report* has been obtained from various local, state and federal government agencies. Please be aware that: 1) additional information on individual sites may be available, 2) newly discovered sites are continually reported and 3) all map locations are approximate. As a result, this report is intended to be the FIRST STEP in the process of identifying and evaluating possible environmental threats to specific properties and can only serve as a guide for conducting on-site visits or additional, more detailed toxic hazard research.

Toxics Targeting tries to ensure that the information in your report is presented accurately and with minimal alteration. The only systematic changes that are made correct obvious address errors in order to allow sites to be mapped. Any address changes that are made are noted in the map information section at the top of each corresponding *Toxic Site Profile.* Since the information presented in your report is not edited, please be aware that it can contain reporting errors or typographical mistakes made by the site owners/operators or government agencies that produced the information. Please be aware of some other limitations of the information in your report:

- The computerized map used by *Toxics Targeting* is the same one used by the U. S. Census. While the map is generally accurate, no map is perfect. In addition, *Toxics Targeting's* mapping methods estimate where toxic site addresses are located if the address is not specifically designated on the Census map. FOR THESE REASONS, ALL MAP LOCATIONS OF ADDRESSES AND REPORTED TOXIC SITES SHOULD BE CONSIDERED APPROXIMATE AND SHOULD BE VERIFIED BY ON-SITE VISITS;

- UNDISCOVERED, UNREPORTED OR UNMAPPABLE TOXIC SITES MIGHT NOT BE IDENTIFIED BY THIS REPORT'S CHECK OF 17 TOXIC SITE CATEGORIES. TOXIC SITES REPORTED IN OTHER GOVERNMENT DATABASES MIGHT ALSO EXIST. FOR THESE REASONS, YOUR REPORT MIGHT NOT IDENTIFY ALL THE TOXIC SITES THAT EXIST IN THE AREA IT SEARCHES;

- The appendix of your report contains a listing of sites that could not be mapped due to incomplete or erroneous address information or other mapping problems. This listing includes unmappable toxic sites in zip code areas within one mile of the target address as well as toxic sites without zip codes reported in the same county. IF YOU WOULD LIKE INFORMATION ON ANY OF THE LISTED SITES, PLEASE CONTACT *TOXICS TARGETING AND REFER TO THE SITE ID NUMBER.*

- Some toxic sites identified in your report may be classified as **known hazards**. Most of the toxic sites identified in your report involve **potential hazards** related to the on-site use, manufacture, handling, storage, transport or disposal of toxic chemicals. Some of the toxic sites identified in your report may be the addresses of parties responsible for toxic sites located elsewhere. YOU SHOULD ONLY CONCLUDE THAT TOXIC HAZARDS ACTUALLY EXIST AT A SPECIFIC SITE WHEN GOVERNMENT AUTHORITIES MAKE THAT DETERMINATION OR WHEN THAT CONCLUSION IS FULLY DOCUMENTED BY THE FINDINGS OF AN APPROPRIATE SITE INVESTIGATION UNDERTAKEN BY LICENSED PROFESSIONALS;

- Compass directions and distances are approximate. Compass directions are calculated from the subject property address to the mapped location of each identified toxic site. The compass direction does not necessarily refer to the closest property boundary of an identified toxic site. The compass direction also can vary substantially for toxic sites that are located very close to the subject property address.

- The information presented in your report is a summary of the information that *Toxics Targeting* obtains from government agencies on reported toxic sites. YOU MAY BE ABLE TO OBTAIN ADDITIONAL INFORMATION ABOUT REPORTED SITES WITH THE FREEDOM OF INFORMATION REQUEST FORM LETTERS THAT ARE PROVIDED ON THE INSIDE OF THE BACK COVER.

Section One:

Report Summary

- *Table One:* *Number of Identified Toxic Sites By Distance Interval*
- *Table Two:* *Identified Toxic Sites By Direction*
- *Table Three:* *Identified Toxic Sites Ranked By Proximity*
- *Table Four:* *Identified Toxic Sites By Category*
- *Map One:* *One-Mile Radius Map*
- *Map Two:* *Half-Mile Radius Map*
- *Map Three:* *Eighth-Mile Radius Map*
- *Map Four:* *Eighth-Mile Radius Close up Map*

1428 5th Ave

March 22, 2004

NUMBER OF IDENTIFIED SITES BY DISTANCE INTERVAL

Database Searched	0 - 100 ft	100 ft - 1/8 mi	1/8 mi - 1/4 mi	1/4 mi - 1/2 mi	1/2 mi - 1 mi	Site(s) Category Totals
NYS Inactive Hazardous Waste Disposal Sites *	0	0	0	0	0	0
CERCLIS Sites *	0	0	0	0	1	1
National Priority List Sites *	0	0	0	0	0	0
Hazardous Substance Waste Disposal Sites *	0	0	0	1	1	2
NYS Solid Waste Facilities *	0	0	0	0	1	1
NYS Major Oil Storage Facilities *	0	0	0	0	0	0
RCRA Hazardous Waste Treatment, Storage, Disposal Sites *	0	0	0	0	0	0
NYS Toxic Spills (incl. Leaking Undrgrnd Storage Tanks) **	0	8	45	200	Not searched	253
Local & State Petroleum Bulk Storage Sites ***	0	3	Not searched	Not searched	Not searched	3
RCRA Hazardous Waste Generators & Transporters ***	0	2	Not searched	Not searched	Not searched	2
NYS Chemical Bulk Storage Sites ***	0	0	Not searched	Not searched	Not searched	0
Toxic Release Inventory Sites (TRI) ***	0	0	Not searched	Not searched	Not searched	0
Historic Utility Facilities ***	0	0	Not searched	Not searched	Not searched	0
Permit Compliance System Toxic Wastewater Discharges ***	0	0	Not searched	Not searched	Not searched	0
NYS Air Discharges ***	0	0	Not searched	Not searched	Not searched	0
Civil & Administrative Enforcement Docket Facilities ***	0	0	Not searched	Not searched	Not searched	0
ERNS (Onsite) *****	0	Not searched	Not searched	Not searched	Not searched	0
NYC Fire Marshall Tank Sites (Onsite) *****	0	Not searched	Not searched	Not searched	Not searched	0
Distance Interval Totals	0	13	45	201	3	262

Search Radius: * 1 Mile Search Radius ** 1/2 Mile Search Radius *** 1/8 Mile Search Radius **** 1/8 Mile Search Radius ***** on-site only

Identified Toxic Sites by Direction

1428 5th Ave
New York, NY 10035

* Compass directions can vary substantially for sites located very close to the subject property address.

Sites less than 100 feet from subject property sorted by distance

No sites found less than 100 feet from subject property

Sites between 100 ft and 400 ft from the subject property sorted by direction and distance

Map Id#	Site Name	Site Street	Approximate Distance & Direction From Property	Toxic Site Category
11	DUNLEVY MILBANK CHILDREN	14-32 WEST 118TH STREET	384 feet to the N	Active Tank Test Failure
258	CANAAN HOUSES	8 WEST 118TH STREET	347 feet to the NNE	Petroleum Bulk Storage Site
142		20 EAST 116TH ST	337 feet to the SSE	Closed Status Spill (Misc. Spill Cause)
27	OPPOSITE OF 3 WEST 116 ST	SAME	165 feet to the SSW*	Active Haz Spill (Unknown/Other Cause)
141	MANHOLE 34126	W 116TH / 5TH AVE	169 feet to the SSW*	Closed Status Spill (Misc. Spill Cause)

Sites equal to or greater than 400 ft from subject property sorted by direction and distance

Map Id#	Site Name	Site Street	Approximate Distance & Direction From Property	Toxic Site Category
145	27 WEST 118TH ST	27 WEST 118TH ST	463 feet to the N	Closed Status Spill (Misc. Spill Cause)
147	APARTMENT HOUSE	50 WEST 119TH ST	770 feet to the N	Closed Status Spill (Misc. Spill Cause)
56	49 WEST 119TH ST/MANH	49 WEST 119TH STREET	811 feet to the N	Active Haz Spill (Misc. Spill Cause)
5	42 W. 120TH ST	42 W. 120TH ST	1006 feet to the N	Active Tank Failure
80	42 WEST 120TH STREET	42 WEST 120TH STREET	1006 feet to the N	Closed Status Tank Failure
155	42 WEST 120TH ST/CIBRO	42 WEST 120TH STREET	1006 feet to the N	Closed Status Spill (Misc. Spill Cause)
156	120TH ST & MT MORRIS PK	120TH ST & MT MORRIS PK	1040 feet to the N	Closed Status Spill (Misc. Spill Cause)
101	MANHOLE 19753	58 WEST 120TH ST	1122 feet to the N	Closed Status Spill (Unk/Other Cause)
6	24 WEST 121 STREET	24 W 121ST STREET	1283 feet to the N	Active Tank Failure
164	5 W. 121ST STREET	5 W. 121ST STREET	1303 feet to the N	Closed Status Spill (Misc. Spill Cause)
165	5 WEST 121ST STREET	5 WEST 121ST STREET	1303 feet to the N	Closed Status Spill (Misc. Spill Cause)
63	5 FAMILY HOUSE	21 WEST 121ST ST	1333 feet to the N	Active Haz Spill (Misc. Spill Cause)
180	230 LENOX AVE	230 LENOX AVE	1626 feet to the N	Closed Status Spill (Misc. Spill Cause)
189		32 WEST 123RD STREET	1770 feet to the N	Closed Status Spill (Misc. Spill Cause)
190		242 LENOX AV	1771 feet to the N	Closed Status Spill (Misc. Spill Cause)
106		36-38 WEST 123RD ST	1781 feet to the N	Closed Status Spill (Unk/Other Cause)
109	248 LENOX AVE/MANH	248 LENOX AVENUE	1855 feet to the N	Closed Status Spill (Unk/Other Cause)
112		104 WEST 123RD ST	1946 feet to the N	Closed Status Spill (Unk/Other Cause)
46		123 WEST 124TH STREET	2295 feet to the N	Active Haz Spill (Unknown/Other Cause)
131	VS 4031	141 WEST 124TH ST	2386 feet to the N	Closed Status Spill (Unk/Other Cause)
20	152 WEST 124TH STREET	152 WEST 124TH STREET	2405 feet to the N	Active Tank Test Failure

PHASE I

ENVIRONMENTAL

SITE ASSESSMENT

March 2, 2009

Site Identification:	1428 Fifth Avenue Borough of Manhattan, New York
Tax Lot Identification:	Block 1600, Lot 20
Property Description:	Approximately 1.7-acre property containing a six-story apartment building

ESI File: LM09015.10

Prepared By:

Ecosystems Strategies, Inc.
24 Davis Avenue, Poughkeepsie, NY 12603
phone 845.452.1658 | fax 845.485.7083 | ecosystemsstrategies.com

4.0 CONCLUSIONS AND RECOMMENDATIONS

Ecosystems Strategies, Inc. (ESI) has performed a Phase I Environmental Site Assessment in conformance with the scope and limitations of ASTM Practice E 1527-05 of the property located at 1428 Fifth Avenue, Borough of Manhattan, New York. Any exceptions to, or deletions from, this practice are described in Section 1.2 of this report. This assessment has revealed no evidence of recognized environmental conditions in connection with the property. ESI's conclusions and recommendations (in **bold**) regarding potential environmental liabilities associated with the property, if any, are presented below. Cost estimates for any proposed investigations and/or remedial actions are provided in *italics* where appropriate.

1. The subject property has contained the current six-story apartment building since circa 1983. The subject property historically contained residential and mixed-use residential/retail structures (note: Sanborn maps indicate the presence of a manufacturing facility in a first floor storefront in a former on-site building located on West 116th Street). No evidence of industrial or significant commercial use of the property was found during the review of historical records. The potential exists that debris from the demolition of former on-site structures may be present in the subsurface (such debris could contain lead based paint, asbestos, or other regulated materials).

   No further investigation of historic records is recommended. Any future development activities at the property should be conducted with an awareness of the potential presence of subsurface debris and provision should be made for the proper management of any materials that warrant special handling.

2. The subject property was not identified during the review of regulatory agency records conducted by this office. No adjoining or nearby properties were identified that are likely to significantly impact the environmental integrity of the subject property.

   No further investigation of regulatory records is recommended.

3. Small quantities of petroleum products and chemicals are stored on the subject property. Releases from these containers could potentially impact the property.

   It is recommended that all petroleum and chemical products be properly stored and that appropriate absorbent materials be maintained in all areas where releases could potentially occur.

PHASE I

ENVIRONMENTAL

SITE ASSESSMENT

November 25, 2009

Site Identification:	**1428 Fifth Avenue Borough of Manhattan, New York**
Tax Lot Identification:	**Block 1600, Lot 20**
Property Description:	**Approximately 1.7-acre property containing a six-story apartment building**

ESI File: LM09015.10U

Prepared By:

Ecosystems Strategies, Inc.
24 Davis Avenue, Poughkeepsie, NY 12603
phone 845.452.1658 | fax 845.485.7083 | ecosystemsstrategies.com

4.0 CONCLUSIONS AND RECOMMENDATIONS

Ecosystems Strategies, Inc. (ESI) has performed a Phase I Environmental Site Assessment in conformance with the scope and limitations of ASTM Practice E 1527-05 of the property located at 1428 Fifth Avenue, Borough of Manhattan, New York. Any exceptions to, or deletions from, this practice are described in Section 1.2 of this report. This assessment has revealed no evidence of recognized environmental conditions in connection with the property. ESI's conclusions and recommendations (in **bold**) regarding potential environmental liabilities associated with the property, if any, are presented below. Cost estimates for any proposed investigations and/or remedial actions are provided in *italics* where appropriate.

1. The subject property has contained the current six-story apartment building since circa 1983. The subject property historically contained residential and mixed-use residential/retail structures (note: Sanborn maps indicate the presence of a manufacturing facility in a first floor storefront in a former on-site building located on West 116th Street). No evidence of industrial or significant commercial use of the property was found during the review of historical records. The potential exists that debris from the demolition of former on-site structures may be present in the subsurface (such debris could contain lead based paint, asbestos, or other regulated materials).

   No further investigation of historic records is recommended. Any future development activities at the property should be conducted with an awareness of the potential presence of subsurface debris and provision should be made for the proper management of any materials that warrant special handling.

2. The subject property was not identified during the review of regulatory agency records conducted by this office. No adjoining or nearby properties were identified that are likely to significantly impact the environmental integrity of the subject property.

   No further investigation of regulatory records is recommended.

3. Small quantities of petroleum products and chemicals were observed on the subject property during a previous site assessment. Although these products were not observed on the subject property during the current site assessment, these products may still be present on the property. Releases from these containers could potentially impact the property.

   It is recommended that all petroleum and chemical products be properly stored and that appropriate absorbent materials be maintained in all areas where releases could potentially occur.

APPENDIX F

Regulatory Review Database Report

FirstSearch Technology Corporation

Environmental FirstSearch™ Report

Target Property:

1428 FIFTH AVE

NEW YORK NY 10035

Job Number: LM09015.11

PREPARED FOR:

Ecosystems Strategies, Inc.

24 Davis Avenue

Poughkeepsie, NY 12603

04-05-11

Tel: (781) 551-0470 *Fax: (781) 551-0471*

Environmental FirstSearch
Search Summary Report

Target Site: 1428 FIFTH AVE
NEW YORK NY 10035

FirstSearch Summary

Database	Sel	Updated	Radius	Site	1/8	1/4	1/2	1/2>	ZIP	TOTALS
NPL	Y	01-14-11	1.00	0	0	0	0	0	0	0
NPL Delisted	Y	01-14-11	0.50	0	0	0	0	-	0	0
CERCLIS	Y	01-26-11	0.50	0	0	0	0	-	0	0
NFRAP	Y	01-26-11	0.50	0	0	0	0	-	0	0
RCRA COR ACT	Y	11-10-10	1.00	0	0	0	0	0	0	0
RCRA TSD	Y	01-11-11	0.50	0	0	0	0	-	0	0
RCRA GEN	Y	01-11-11	0.25	0	0	0	-	-	0	0
RCRA NLR	Y	01-11-11	0.25	0	0	0	-	-	0	0
Federal Brownfield	Y	03-01-11	0.50	0	0	0	0	-	0	0
ERNS	Y	01-24-11	0.12	0	0	-	-	-	0	0
Tribal Lands	Y	12-01-05	1.00	0	0	0	0	0	0	0
State/Tribal Sites	Y	02-03-11	1.00	0	0	0	0	0	0	0
State Spills 90	Y	02-03-11	0.25	0	11	50	-	-	10	71
State Spills 80	Y	11-02-10	0.25	0	0	4	-	-	0	4
State/Tribal SWL	Y	05-03-06	0.50	0	0	0	0	-	0	0
State/Tribal LUST	Y	02-03-11	0.25	0	1	8	-	-	0	9
State/Tribal UST/AST	Y	02-03-11	0.25	0	3	0	-	-	0	3
State/Tribal EC	Y	02-03-11	0.12	0	0	-	-	-	0	0
State/Tribal IC	Y	02-03-11	0.12	0	0	-	-	-	0	0
State/Tribal VCP	Y	02-03-11	0.50	0	0	0	0	-	0	0
State/Tribal Brownfields	Y	02-03-11	0.50	0	0	0	0	-	0	0
NPDES	Y	02-10-11	0.25	0	0	0	-	-	0	0
Federal Other	Y	01-01-10	0.25	0	0	0	-	-	0	0
State Permits	Y	04-01-06	0.25	0	0	0	-	-	0	0
State Other	Y	02-03-11	0.25	0	0	0	-	-	0	0
FI Map Coverage	Y	12-30-10	0.12	2	2	-	1	-	0	5
Federal IC/EC	Y	02-07-11	0.12	0	0	-	-	-	0	0
- TOTALS -				2	17	62	1	0	10	92

Notice of Disclaimer

Due to the limitations, constraints, inaccuracies and incompleteness of government information and computer mapping data currently available to FirstSearch Technology Corp., certain conventions have been utilized in preparing the locations of all federal, state and local agency sites residing in FirstSearch Technology Corp.'s databases. All EPA NPL and state landfill sites are depicted by a rectangle approximating their location and size. The boundaries of the rectangles represent the eastern and western most longitudes; the northern and southern most latitudes. As such, the mapped areas may exceed the actual areas and do not represent the actual boundaries of these properties. All other sites are depicted by a point representing their approximate address location and make no attempt to represent the actual areas of the associated property. Actual boundaries and locations of individual properties can be found in the files residing at the agency responsible for such information.

Waiver of Liability

Although FirstSearch Technology Corp. uses its best efforts to research the actual location of each site, FirstSearch Technology Corp. does not and can not warrant the accuracy of these sites with regard to exact location and size. All authorized users of FirstSearch Technology Corp.'s services proceeding are signifying an understanding of FirstSearch Technology Corp.'s searching and mapping conventions, and agree to waive any and all liability claims associated with search and map results showing incomplete and or inaccurate site locations.

Environmental FirstSearch
Site Information Report

Request Date:	04-05-11	**Search Type:**	COORD
Requestor Name:	adam	**Job Number:**	LM09015.11
Standard:	ASTM-05	**Filtered Report**	

Target Site: 1428 FIFTH AVE
NEW YORK NY 10035

Demographics

Sites:	92	**Non-Geocoded:**	10	**Population:**	NA
Radon:	NA				

Site Location

	Degrees (Decimal)	**Degrees (Min/Sec)**		**UTMs**
Longitude:	-73.947306	-73:56:50	**Easting:**	588801.677
Latitude:	40.80127	40:48:5	**Northing:**	4517018.072
Elevation:	29		**Zone:**	18

Comment

Comment:

Additional Requests/Services

Adjacent ZIP Codes: 1 Mile(s)

ZIP Code	City Name	ST	Dist/Dir	Sel
10025	NEW YORK	NY	0.31 SW	Y
10026	NEW YORK	NY	0.00 --	Y
10027	NEW YORK	NY	0.19 NE	Y
10029	NEW YORK	NY	0.02 SE	Y
10037	NEW YORK	NY	0.69 NE	Y
10024	NEW YORK	NY	0.97 SW	N
10030	NEW YORK	NY	0.86 NE	N
10451	BRONX	NY	0.91 NE	N
10454	BRONX	NY	0.91 NE	N

Services:

	Requested?	Date
Fire Insurance Maps	Yes	04-05-11
Aerial Photographs	No	
Historical Topos	No	
City Directories	No	
Title Search/Env Liens	No	
Municipal Reports	No	
Online Topos	No	

Environmental FirstSearch
Sites Summary Report

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

TOTAL: 92 **GEOCODED:** 82 **NON GEOCODED:** 10 **SELECTED:** 29

Map ID	DB Type	Site Name/ID/Status	Address	Dist/Dir	ElevDiff	Page No.
1	*FIMAP*	*FIRE INSURANCE MAP* *POLY-19773/SANBORN*	*NEW YORK NY 10025*	*0.00 --*	*N/A*	*1*
2	*FIMAP*	*FIRE INSURANCE MAP* *POLY-20442/SANBORN*	*NEW YORK NY 10025*	*0.00 --*	*N/A*	*2*
4	*FIMAP*	*FIRE INSURANCE MAP* *POLY-19767/SANBORN*	*NEW YORK NY 10029*	*0.03 SE*	*N/A*	*3*
5	*FIMAP*	*FIRE INSURANCE MAP* *POLY-20436/SANBORN*	*NEW YORK NY 10029*	*0.03 SE*	*N/A*	*4*
60	*FIMAP*	*FIRE INSURANCE MAP* *NY-FSE-16/SANBORN*	*NEW YORK CITY NY*	*0.33 SW*	*N/A*	*5*
10	*LUST*	*DUNLEVY MILBANK CHILDREN* *0209842/CLOSED*	*14-32 W 118TH ST* *NEW YORK NY 10026*	*0.08 NE*	*+ 3*	*6*
20	*LUST*	*105 LENOX AVE/HARLEM HOSP* *9010952/CLOSED*	*105 LENOX AVE* *NEW YORK NY 10026*	*0.15 NW*	*- 2*	*8*
30	LUST	APART 0805163/CLOSED	86 W 119TH ST NEW YORK NY 10026	0.16 NW	- 1	N/A
35	LUST	42 WEST 120TH ST 9411587/HISTORIC-ACTIVE	42 W 120TH ST NEW YORK NY 10026	0.18 NE	- 1	N/A
35	LUST	42 WEST 120TH STREET 9313894/CLOSED	42 W 120TH ST NEW YORK NY 10026	0.18 NE	- 1	N/A
36	LUST	TAFT HOUSES -NYCHA 9315466/ACTIVE	1740 MADISON AVE NEW YORK NY 10029	0.18 SE	- 1	N/A
36	LUST	TAFT HOUSES -NYCHA 9402166/CLOSED	1740 MADISON AVE NEW YORK NY 10029	0.18 SE	- 1	N/A
54	LUST	24 WEST 121 STREET 9908095/CLOSED	24 W 121ST ST NEW YORK NY 10027	0.24 NE	- 1	N/A
48	LUST	127 W 119TH ST 9111198/CLOSED	127 W 119TH ST NEW YORK NY 10026	0.24 NW	- 2	N/A
3	*SPILLS*	*OPPOSITE OF 3 WEST 116 ST* *0305658/CLOSED*	*3 W 116TH ST* *NEW YORK NY 10026*	*0.03 SE*	*0*	*10*
6	*SPILLS*	*CHURCH* *0601808/ACTIVE*	*33 115TH ST* *NEW YORK NY 10026*	*0.04 SW*	*- 1*	*12*
7	*SPILLS*	*MANHOLE M56965* *0513522/CLOSED*	*5TH AVE and W 116TH ST* *NEW YORK NY 10026*	*0.06 SE*	*0*	*14*
7	*SPILLS*	*MANHOLE 34126* *9809535/CLOSED*	*W 116TH ST and 5TH AVE* *NEW YORK NY 10026*	*0.06 SE*	*0*	*16*
7	*SPILLS*	*MANHOLE 56966* *0513717/CLOSED*	*5TH AVE and W 116TH ST* *NEW YORK NY 10026*	*0.06 SE*	*0*	*18*
8	*SPILLS*	*0001066/CLOSED*	*15 W 115TH ST* *NEW YORK NY 10026*	*0.06 SW*	*- 2*	*19*
9	*SPILLS*	*WEST 115 ST* *0010119/CLOSED*	*W 115TH ST* *NEW YORK NY 10026*	*0.08 SW*	*- 2*	*20*

Environmental FirstSearch
Sites Summary Report

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

TOTAL: 92 **GEOCODED:** 82 **NON GEOCODED:** 10 **SELECTED:** 29

Map ID	DB Type	Site Name/ID/Status	Address	Dist/Dir	ElevDiff	Page No.
12	***SPILLS***	***27 WEST 118TH ST 9512814/CLOSED***	***27 W 118TH ST NEW YORK NY 10026***	***0.09 NE***	***+ 2***	***21***
13	***SPILLS***	***0103884/CLOSED***	***5TH AVE and W 115TH ST NEW YORK NY 10026***	***0.09 SE***	***- 2***	***22***
15	***SPILLS***	***0110011/CLOSED***	***20 E 116TH ST NEW YORK NY 10029***	***0.10 SE***	***+ 1***	***24***
16	***SPILLS***	***NEW CONSTRUCTION 9709656/CLOSED***	***81 W 115TH ST NEW YORK NY 10026***	***0.11 SW***	***- 3***	***26***
17	***SPILLS***	***APARTMENT HOUSE 0000405/CLOSED***	***50 W 119TH ST NEW YORK NY 10026***	***0.14 NE***	***- 1***	***27***
18	***SPILLS***	***NW CORNER 9815148/CLOSED***	***LENOX AVE and 117TH ST NEW YORK NY 10026***	***0.14 NW***	***- 1***	***29***
19	***SPILLS***	***0308444/CLOSED***	***LENOX AVE and W 116TH ST NEW YORK NY 10026***	***0.14 NW***	***- 1***	***30***
19	***SPILLS***	***9901554/CLOSED***	***LENOX AVE and W 116TH ST NEW YORK NY 10026***	***0.14 NW***	***- 1***	***32***
20	SPILLS	105 LENOX AVE/HARLEM HOSP 9010952/CLOSED	105 LENOX AVE NEW YORK NY 10026	0.15 NW	- 2	N/A
23	SPILLS	HARLEM HOSPITAL 9515425/CLOSED	135 LENOX AVE NEW YORK NY 10026	0.15 NW	- 1	N/A
21	SPILLS	116TH ST 0412749/CLOSED	MADISON AVE NEW YORK NY 10035	0.15 SE	+ 2	N/A
22	SPILLS	ENGINE CO. 058/LADD. CO. 26 FD 9704554/CLOSED	1367 5TH AVE NEW YORK NY 10029	0.15 SW	- 6	N/A
22	***SPILLS***	***ENGINE CO. 058/LADD. CO. 26 FD 9702345/ACTIVE***	***1367 5TH AVE NEW YORK NY 10029***	***0.15 SW***	***- 6***	***34***
28	SPILLS	0304253/CLOSED	65 W 119TH ST NEW YORK NY 10026	0.16 NE	- 2	N/A
26	***SPILLS***	***63 W.119TH ST 0107880/ACTIVE***	***63 W 119TH ST NEW YORK NY 10026***	***0.16 NE***	***- 1***	***36***
25	SPILLS	102 W 116TH ST 0008395/CLOSED	102 W 116TH ST NEW YORK NY 10026	0.16 NW	- 1	N/A
27	SPILLS	TAFT HOUSES -NYCHA 9100577/CLOSED	1365 5TH AVE NEW YORK NY 10029	0.16 SW	- 7	N/A
31	SPILLS	112-114 W 116TH ST 9104068/CLOSED	112 W 116TH ST NEW YORK NY 10026	0.17 NW	- 1	N/A
32	SPILLS	79 WEST 119 STREET 9313703/CLOSED	79 W 119TH ST NEW YORK NY 10026	0.17 NW	- 1	N/A
33	SPILLS	2 WEST 120TH ST 9612461/CLOSED	2 W 120TH ST NEW YORK NY 10026	0.18 NE	+ 19	N/A

Environmental FirstSearch
Sites Summary Report

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

TOTAL: 92 **GEOCODED:** 82 **NON GEOCODED:** 10 **SELECTED:** 29

Map ID	DB Type	Site Name/ID/Status	Address	Dist/Dir	ElevDiff	Page No.
35	***SPILLS***	***APARTMENT BUILDING 9411587/ACTIVE***	***42 W 120TH ST NEW YORK NY 10026***	***0.18 NE***	***- 1***	***38***
34	SPILLS	22 WEST 120TH ST 9508811/CLOSED	22 W 120TH ST NEW YORK NY 10026	0.18 NE	+ 1	N/A
33	SPILLS	2 WEST 120TH STREET 9208787/CLOSED	2 W 120TH ST NEW YORK NY 10026	0.18 NE	+ 19	N/A
33	SPILLS	2 WEST 120TH ST 0200862/CLOSED	2 W 120TH ST NEW YORK NY 10026	0.18 NE	+ 19	N/A
37	SPILLS	MANHOLE 19753 0009907/CLOSED	58 W 120TH ST NEW YORK NY 10026	0.18 NE	- 1	N/A
38	SPILLS	TAFT HOUSES -NYCHA 9506363/CLOSED	95 W 119TH ST NEW YORK NY 10026	0.18 NW	- 1	N/A
36	SPILLS	HOUSING PROJECT 9802907/CLOSED	1740 MADISON AVE NEW YORK NY 10029	0.18 SE	- 1	N/A
39	SPILLS	1350 5TH AVE 9604496/CLOSED	1350 5TH AVE NEW YORK NY 10026	0.19 SW	- 9	N/A
40	SPILLS	120TH ST and MT MORRIS PK 9507979/CLOSED	120TH ST and MT MORRIS PK NEW YORK NY 10027	0.20 NE	- 1	N/A
41	SPILLS	70 LENOX AVE 9209724/CLOSED	70 LENOX AVE NEW YORK NY 10026	0.20 SW	- 3	N/A
41	SPILLS	KING TOWERS -NYCHA 9503896/CLOSED	70 LENOX AVE NEW YORK NY 10026	0.20 SW	- 3	N/A
41	***SPILLS***	***KING TOWERS -NYCHA 9102023/ACTIVE***	***70 LENOX AVE NEW YORK NY 10026***	***0.20 SW***	***- 3***	***40***
42	SPILLS	OPEN EXCAVATION 0406279/CLOSED	91 E 116TH ST NEW YORK NY 10035	0.22 SE	+ 1	N/A
42	SPILLS	SERVICE BOX 19135 1004210/CLOSED	91 E 116TH ST NEW YORK NY 10035	0.22 SE	+ 1	N/A
43	SPILLS	PS 185 9814544/CLOSED	20 W 112TH ST NEW YORK NY 10026	0.22 SW	- 8	N/A
43	SPILLS	PS 185 9814724/CLOSED	20 W 112TH ST NEW YORK NY 10026	0.22 SW	- 8	N/A
45	SPILLS	BETWEEN LENOX AND 7TH AVE 0908562/CLOSED	109 W 119TH ST NEW YORK NY 10026	0.23 NW	- 1	N/A
44	SPILLS	200 LENOX AVENUE 9608875/CLOSED	200 LENOX AVE NEW YORK NY 10027	0.23 NW	- 1	N/A
46	SPILLS	ROADWAY 0800328/CLOSED	E 113TH ST and MADISON AVE NEW YORK NY 10029	0.23 SE	- 8	N/A
51	SPILLS	BROWNSTONE HOUSE 0701787/CLOSED	12 W 121ST ST NEW YORK NY 10027	0.24 NE	- 1	N/A

Environmental FirstSearch
Sites Summary Report

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

TOTAL: 92 **GEOCODED:** 82 **NON GEOCODED:** 10 **SELECTED:** 29

Map ID	DB Type	Site Name/ID/Status	Address	Dist/Dir	ElevDiff	Page No.
50	SPILLS	155 WEST 117TH ST 9608696/CLOSED	155 W 117TH ST NEW YORK NY 10026	0.24 NW	+ 1	N/A
48	SPILLS	127 WEST 119TH ST 9710463/CLOSED	127 W 119TH ST NEW YORK NY 10026	0.24 NW	- 2	N/A
48	SPILLS	127 WEST 119TH ST/MANH 9008744/CLOSED	127 W 119TH ST NEW YORK NY 10026	0.24 NW	- 2	N/A
47	SPILLS	123 WEST 119TH ST 9514113/CLOSED	123 W 119TH ST NEW YORK NY 10026	0.24 NW	- 1	N/A
49	SPILLS	129 WEST 119TH ST/MANH 9008277/CLOSED	129 W 119TH ST NEW YORK NY 10026	0.24 NW	- 1	N/A
52	SPILLS	BROWNSTONE ROW HOUSE 0701416/CLOSED	136 W 119TH ST NEW YORK NY 10026	0.24 NW	- 1	N/A
48	SPILLS	HPD OWNED RESIDENCE 9710446/CLOSED	127 W 119TH ST NEW YORK NY 10026	0.24 NW	- 2	N/A
53	SPILLS	MOUNT OLIZET BAPTIST CHUR 9510835/CLOSED	201 LENOX AVE NEW YORK NY 10027	0.24 NW	- 1	N/A
59	SPILLS	WHYE RESIDENCE 0312761/CLOSED	17 W 121ST ST NEW YORK NY 10027	0.25 NE	- 1	N/A
57	SPILLS	5 WEST 121ST STREET 9507949/CLOSED	5 W 121ST ST NEW YORK NY 10027	0.25 NE	- 2	N/A
57	SPILLS	5 W. 121ST STREET 9507969/CLOSED	5 W 121ST ST NEW YORK NY 10027	0.25 NE	- 2	N/A
56	SPILLS	5 FAMILY HOUSE 9704227/CLOSED	21 W 121ST ST NEW YORK NY 10027	0.25 NE	- 1	N/A
55	SPILLS	121 WEST 119TH STREET 0605155/CLOSED	121 W 119TH ST NEW YORK NY 10026	0.25 NW	- 1	N/A
58	SPILLS	E2MIS 157505 0412815/CLOSED	28 E 112TH ST NEW YORK NY 10029	0.25 SE	- 8	N/A
	SPILLS	NYCT DIESEL SPILL FROM BUS 1009465/CLOSED	116TH ST and 8TH AVE NEW YORK NY	NON GC	N/A	N/A
	SPILLS	219761; 5 AVE 1008930/CLOSED	5TH Ave NEW YORK NY	NON GC	N/A	N/A
	SPILLS	MANHOLE 60084 0411283/CLOSED	E 118TH ST NEW YORK NY	NON GC	N/A	N/A
	SPILLS	BUILDING 511 0412297/CLOSED	W 112TH ST NEW YORK NY	NON GC	N/A	N/A
	SPILLS	DOUGLAS ELMAN REALTY 0910916/CLOSED	1158 5TH AVE AVE NEW YORK NY	NON GC	N/A	N/A
	SPILLS	REGULATOR 29 0212097/CLOSED	118TH ST NEW YORK NY	NON GC	N/A	N/A

Environmental FirstSearch
Sites Summary Report

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

TOTAL: 92 **GEOCODED:** 82 **NON GEOCODED:** 10 **SELECTED:** 29

Map ID	DB Type	Site Name/ID/Status	Address	Dist/Dir	ElevDiff	Page No.
	SPILLS	DRUM RUN 1000423/CLOSED	1143 5TH AVE NEW YORK NY	NON GC	N/A	N/A
	SPILLS	SERVICE BOX 51021 9912624/CLOSED	MADISON ST NEW YORK NY	NON GC	N/A	N/A
	SPILLS	SERVICE BOX 60707 0405457/CLOSED	MADISON AVE NEW YORK NY	NON GC	N/A	N/A
	SPILLS	INTERSECTION 0910725/CLOSED	116TH and MALCOLM X BLVD NEW YORK NY	NON GC	N/A	N/A
24	SPILLS80	49 WEST 119TH ST/MANH 8907609/CLOSED	49 W 119TH ST NEW YORK NY 10026	0.15 NE	- 1	N/A
22	SPILLS80	TAFT HOUSES -NYCHA 8809818/CLOSED	1367 5TH AVE NEW YORK NY 10029	0.15 SW	- 6	N/A
29	SPILLS80	KING TOWERS 8708238/CLOSED	90 LENOX AVE NEW YORK NY 10026	0.16 SW	- 2	N/A
35	SPILLS80	42 WEST 120TH ST/CIBRO 8803777/CLOSED	42 W 120TH ST NEW YORK NY 10026	0.18 NE	- 1	N/A
10	***UST***	***DUNLEVY MILBANK CHLDRNS CNTR PBS2-341487/ACTIVE***	***14-32 W 118TH ST NEW YORK NY 10026***	***0.08 NE***	***+ 3***	***42***
11	***UST***	***PUBLIC SCHOOL 149 - MANHATTAN PBS2-353752/ACTIVE***	***34 W 118TH ST NEW YORK NY 10026***	***0.08 NE***	***+ 2***	***44***
14	***UST***	***CANAAN HOUSES PBS2-600905/ACTIVE***	***8 W 118TH ST NEW YORK NY 10026***	***0.09 NE***	***+ 3***	***47***

Environmental FirstSearch
Site Detail Report

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

FIMAP

SEARCH ID: 79 **DIST/DIR:** 0.00 -- **ELEVATION:** **MAP ID:** 1

NAME: FIRE INSURANCE MAP
ADDRESS:
NEW YORK NY 10025
CONTACT:
SOURCE:

REV: 11/18/98
ID1: POLY-19773
ID2:
STATUS: SANBORN
PHONE:

SITE INFORMATION

SOURCE COLLECTION: SANBORN

NUMBER OF MAPS: UNDETERMINED

POSSIBLE MAP LOCATION

NEW YORK CITY

NEWTOWN

ROCKAWAY BEACH

RICHMOND BOROUGH OF NEW YORK CITY

Environmental FirstSearch
Site Detail Report

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

FIMAP

SEARCH ID: 81 **DIST/DIR:** 0.00 -- **ELEVATION:** **MAP ID:** 2

NAME: FIRE INSURANCE MAP
ADDRESS:
NEW YORK NY 10025
CONTACT:
SOURCE:

REV: 11/18/98
ID1: POLY-20442
ID2:
STATUS: SANBORN
PHONE:

SITE INFORMATION

SOURCE COLLECTION: SANBORN

NUMBER OF MAPS: UNDETERMINED

POSSIBLE MAP LOCATION

NEW YORK CITY

NEWTOWN

RICHMOND BOROUGH OF NEW YORK CITY

ROCKAWAY BEACH

Environmental FirstSearch
Site Detail Report

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

FIMAP

SEARCH ID: 78 **DIST/DIR:** 0.03 SE **ELEVATION:** **MAP ID:** 4

NAME: FIRE INSURANCE MAP
ADDRESS:
NEW YORK NY 10029
CONTACT:
SOURCE:

REV: 11/18/98
ID1: POLY-19767
ID2:
STATUS: SANBORN
PHONE:

SITE INFORMATION

SOURCE COLLECTION: SANBORN

NUMBER OF MAPS: UNDETERMINED

POSSIBLE MAP LOCATION

NEWTOWN

NEW YORK CITY

ROCKAWAY BEACH

RICHMOND BOROUGH OF NEW YORK CITY

Environmental FirstSearch
Site Detail Report

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

FIMAP

SEARCH ID: 80 **DIST/DIR:** 0.03 SE **ELEVATION:** **MAP ID:** 5

NAME: FIRE INSURANCE MAP
ADDRESS:
NEW YORK NY 10029
CONTACT:
SOURCE:

REV: 11/18/98
ID1: POLY-20436
ID2:
STATUS: SANBORN
PHONE:

SITE INFORMATION

SOURCE COLLECTION: SANBORN

NUMBER OF MAPS: UNDETERMINED

POSSIBLE MAP LOCATION

NEW YORK CITY

NEWTOWN

ROCKAWAY BEACH

RICHMOND BOROUGH OF NEW YORK CITY

Environmental FirstSearch
Site Detail Report

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

FIMAP

SEARCH ID: 82 **DIST/DIR:** 0.33 SW **ELEVATION:** **MAP ID:** 60

NAME: FIRE INSURANCE MAP
ADDRESS:
CENTRAL PARK NY
CONTACT:
SOURCE:

REV: 4/12/06
ID1: NY-FSE-16
ID2:
STATUS: SANBORN
PHONE:

SITE INFORMATION

SOURCE COLLECTION: SANBORN

NUMBER OF MAPS: UNDETERMINED

POSSIBLE MAP LOCATION

NEW YORK CITY

Environmental FirstSearch
Site Detail Report

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

LUST

SEARCH ID: 75 **DIST/DIR:** 0.08 NE **ELEVATION:** 32 **MAP ID:** 10

NAME: DUNLEVY MILBANK CHILDREN
ADDRESS: 14-32 W 118TH ST
NEW YORK CITY NY 10026
NEW YORK
CONTACT:
SOURCE: NY DEC

REV: 11/2/10
ID1: 0209842
ID2: 236688
STATUS: CLOSED
PHONE:

SITE INFORMATION

SPILL DATE: 12/27/2002
DATE REPORTED: 12/27/2002
CLOSED DATE: 6/16/2004
INSP DATE:
MATERIAL SPILLED: 2 FUEL OIL
MATERIAL CLASS: PETROLEUM
AMOUNT SPILLED: 0 G
AMOUNT RECOVERED: 0 G

RESOURCE AFFECTED

SOIL:	True	**AIR:**	False
INDOOR AIR:	False	**GROUNDWATER:**	False
SURFACE WATER:	False	**DRINKING WATER:**	False
SEWER:	False	**IMPERVIOUS SURFACE:**	False
SUBWAY:	False	**UNDERGROUND UTILITIES:**	False

CAUSE OF SPILL: TANK TEST FAILURE
WATERBODY AFFECTED:
SOURCE OF SPILL: COMMERCIAL/INDUSTRIAL
REPORTED BY: TANK TESTER
REGION:
UST TRUST? NO

SPILL INVESTIGATOR: CESAWYER
SPILL CONTACT: DAVE FAZIN
TELEPHONE: (516) 939-2959

SPILLER: DUN LEVY MILBANK CHILDREN
GARY
ADDRESS: 14-32 WEST 118TH STREET
NEW YORK CITY, NY 10026-
TELEPHONE:

REPORTED BY: TANK TESTER

LAST DEC UPDATE: 6/16/2004
CLEAN UP MEET STANDARDS? NO
PENALTY RECOMMENDED? NO

CALLER REMARKS: TANK FAILED THE TEST.

DEC REMARKS:
Prior to Sept, 2004 data translation this spill Lead_DEC Field was SAWYER 12/30/2002-Vought-Dave Fazin called and not at work. Called Gary Dawyot at site and left message to call duty desk and that letter was in mail. Tightness test letter sent 12/30/2002. 1/7/04-Vought-Spill transferred from Vought to Austin. 1/27/04 - Sawyer - Spill transferred from Austin to Sawyer. 6/16/04 - Swayer - Tank and system was isolated and repaired no impact to surrounding soil. Gary Dwyot forwarded information. Closed.

THERE MAYBE MORE DEC REMARKS AVAILABLE, PLEASE CONTACT THE NY DEC (518) 402-9549 FOR FURTHER INFORMATION

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

LUST

SEARCH ID: 69 **DIST/DIR:** 0.15 NW **ELEVATION:** 27 **MAP ID:** 20

NAME: 105 LENOX AVE/HARLEM HOSP
ADDRESS: 105 LENOX AVE
NEW YORK CITY NY
NEW YORK
CONTACT:
SOURCE: NY DEC

REV: 11/2/10
ID1: 9010952
ID2: 77190
STATUS: CLOSED
PHONE:

SITE INFORMATION

SPILL DATE: 1/14/1991
DATE REPORTED: 1/14/1991
CLOSED DATE: 1/17/1991
INSP DATE:
MATERIAL SPILLED: 6 FUEL OIL
MATERIAL CLASS: PETROLEUM
AMOUNT SPILLED: -1
AMOUNT RECOVERED: 0

RESOURCE AFFECTED

SOIL:	True	**AIR:**	False
INDOOR AIR:	False	**GROUNDWATER:**	False
SURFACE WATER:	False	**DRINKING WATER:**	False
SEWER:	False	**IMPERVIOUS SURFACE:**	False
SUBWAY:	False	**UNDERGROUND UTILITIES:**	False

CAUSE OF SPILL: TANK FAILURE
WATERBODY AFFECTED:
SOURCE OF SPILL: INSTITUTIONAL, EDUCATIONAL, GOV., OTHER
REPORTED BY: OTHER
REGION:
UST TRUST? NO

SPILL INVESTIGATOR: O DOWD
SPILL CONTACT:
TELEPHONE:

SPILLER: HARLEM HOSPITAL

ADDRESS: 105 LENOX AVENUE
NEW YORK, NY
TELEPHONE:

REPORTED BY: OTHER

LAST DEC UPDATE: 1/29/1991
CLEAN UP MEET STANDARDS? YES
PENALTY RECOMMENDED? NO

CALLER REMARKS: 20K TANK, ABC TANK CLEANERS CALLED TO PUMP OUT PIT,WHOLE TANK RUPTUREDIN BASEMENT,OIL IN CONTAINMENT PIT,TANK OVERFILL,TANKS-A-LOT TO CLEAN UP SPILL,ENGINEER TURNED OFF WRONG CHECK VALVE.

DEC REMARKS:
Prior to Sept, 2004 data translation this spill Lead_DEC Field was O,DOWD 01/17/91: TANK OVERFILL,ALL IN CONTAINMENT DIKE,NO AFFECT ON SEWERS,NYCDEP WAS ON SCENE TO INVESTIGATE,ABC TANK TO CLEAN UP,DEC CONFIRMED CLEAN UP and DISPOSAL OF CONTAMINATED MATERIAL.

THERE MAYBE MORE DEC REMARKS AVAILABLE, PLEASE CONTACT THE NY DEC (518) 402-9549 FOR FURTHER INFORMATION

- Continued on next page -

Environmental FirstSearch
Site Detail Report

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

LUST

SEARCH ID: 69 **DIST/DIR:** 0.15 NW **ELEVATION:** 27 **MAP ID:** 20

NAME:	105 LENOX AVE/HARLEM HOSP	**REV:**	11/2/10
ADDRESS:	105 LENOX AVE	**ID1:**	9010952
	NEW YORK CITY NY	**ID2:**	77190
	NEW YORK	**STATUS:**	CLOSED
CONTACT:		**PHONE:**	
SOURCE:	NY DEC		

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

SPILLS

SEARCH ID: 47 **DIST/DIR:** 0.03 SE **ELEVATION:** 29 **MAP ID:** 3

NAME: OPPOSITE OF 3 WEST 116 ST
ADDRESS: 3 W 116TH ST
MANHATTAN NY
NEW YORK
CONTACT:
SOURCE: NYSDEC

REV: 2/3/11
ID1: 0305658
ID2: 137491
STATUS: CLOSED
PHONE:

SITE INFORMATION

SPILL DATE: 8/27/2003
DATE REPORTED: 8/27/2003
CLOSED DATE: 6/2/2005
INSP DATE:
MATERIAL SPILLED: OTHER -
MATERIAL CLASS: PETROLEUM
AMOUNT SPILLED: 15 G
AMOUNT RECOVERED: 0 G

RESOURCE AFFECTED

SOIL:	True	**AIR:**	False
INDOOR AIR:	False	**GROUNDWATER:**	False
SURFACE WATER:	False	**DRINKING WATER:**	False
SEWER:	False	**IMPERVIOUS SURFACE:**	False
SUBWAY:	False	**UNDERGROUND UTILITIES:**	False

CAUSE OF SPILL: UNKNOWN
WATERBODY AFFECTED:
SOURCE OF SPILL: UNKNOWN
REPORTED BY: AFFECTED PERSONS
REGION:
UST TRUST? NO

SPILL INVESTIGATOR: JHOCONNE
SPILL CONTACT: RON ELLIOT
TELEPHONE: (212) 580-6763

SPILLER: UNKNOWN FOR NOW
SAME
ADDRESS: SAME
N/A, ZZ
TELEPHONE:

REPORTED BY: AFFECTED PERSONS

LAST DEC UPDATE: 6/2/2005
CLEAN UP MEET STANDARDS? NO
PENALTY RECOMMENDED? NO

CALLER REMARKS: CON ED HAS 25 YARDS OF CONTAMINATED SOIL SPILL IS FUEL OIL UNKNOWN TYPE FUEL OIL

DEC REMARKS:
Prior to Sept, 2004 data translation this spill Lead_DEC Field was O CONNELL e2mis no. 150-081: On 8/27 14:35 K. Watts of Construction Management reported that while his Contractors were working at address Opposite 13 W116 St discovered a foul smelling dark soil that has a fuel oil smell. There is approx 25 yards of soil that is affected and approx 15 gallons of the oil in the open excavation. The excavation is approx 60 L x 10 W x 12 D. They are excavating on the sidewalk to install Transformer Vaults there. According to Watts there is a river going north/south beneath where they are excavating and they were going to support this area so our equipment does not sink. Chem Lab has been called for 8/28/2003 in the morning to take samples for PCB, ID and Flash point. No cleanup action is being taken at this time. UPDATE 8/27 16:45 the original 300 yards that was removed was clean dirt. After they reached the 12 level they (Contractor) noticed the fuel smelling dirt. The Project Manager R Diaz originally told Watts that the River water table was in the vicinity (approx 15 to 17 down.). Also the job included sinking piles to put a Pad on to support the Transformers. Watts told me that the chances were very good that the water could be affected. 12/04/03 9:49 - The lab resutlst (03-07197-001; 03-07196-001; 03-07195-001)

- Continued on next page -

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

SPILLS

SEARCH ID: 47 **DIST/DIR:** 0.03 SE **ELEVATION:** 29 **MAP ID:** 3

NAME: OPPOSITE OF 3 WEST 116 ST
ADDRESS: 3 W 116TH ST
MANHATTAN NY
NEW YORK
CONTACT:
SOURCE: NYSDEC

REV: 2/3/11
ID1: 0305658
ID2: 137491
STATUS: CLOSED
PHONE:

indictate presense of Lt. fuel oil and THC is 530 PPM. PCB <1. As per K. Watts 19705, six roll off of soil were removed and transported by Clean Harbors as oily soil to Con Edison approved site. No water was involved. The job was completed on 10/23/03 and the excavation was backfilled. Incident being closed. Updated by Bharat Mukhi 72227 MandC - EHS.

THERE MAYBE MORE DEC REMARKS AVAILABLE, PLEASE CONTACT THE NY DEC (518) 402-9549 FOR FURTHER INFORMATION

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

SPILLS

SEARCH ID: 30 **DIST/DIR:** 0.04 SW **ELEVATION:** 28 **MAP ID:** 6

NAME: CHURCH
ADDRESS: 33 115TH ST
NEW YORK NY
NEW YORK
CONTACT:
SOURCE: NYSDEC

REV: 2/3/11
ID1: 0601808
ID2: 364146
STATUS: ACTIVE
PHONE:

SITE INFORMATION

SPILL DATE: 5/15/2006
DATE REPORTED: 5/18/2006
CLOSED DATE:
INSP DATE:
MATERIAL SPILLED: 2 FUEL OIL
MATERIAL CLASS: PETROLEUM
AMOUNT SPILLED: G
AMOUNT RECOVERED: 0 G

RESOURCE AFFECTED

SOIL:	True	**AIR:**	False
INDOOR AIR:	False	**GROUNDWATER:**	False
SURFACE WATER:	False	**DRINKING WATER:**	False
SEWER:	False	**IMPERVIOUS SURFACE:**	False
SUBWAY:	False	**UNDERGROUND UTILITIES:**	False

CAUSE OF SPILL: UNKNOWN
WATERBODY AFFECTED:
SOURCE OF SPILL: INSTITUTIONAL, EDUCATIONAL, GOV., OTHER
REPORTED BY: OTHER
REGION:
UST TRUST? NO

SPILL INVESTIGATOR: rmpiper
SPILL CONTACT: PAUL CIMNELLO
TELEPHONE: (845) 452-1658

SPILLER: CHURCH
PAUL CIMNELLO
ADDRESS: 33 115 and 36 115TH STREET
NEW YORK, NY
TELEPHONE:

REPORTED BY: OTHER

LAST DEC UPDATE: 1/11/2007
CLEAN UP MEET STANDARDS? NO
PENALTY RECOMMENDED? NO

CALLER REMARKS: DURING CONSTRUCTION ON A BUILDING YOU COULD SEE OIL COMING OUT OF GROUND: IT LOOKS LIKE IT MAY BE COMING FROM THE CHURCH AND TRAVELING UNDERGROUND TO 35 -36_ SOIL HJAS BEEN STOCK PILED AND WILL BE TAKEN AWAY

DEC REMARKS:
DEC Piper responded to site to meet w./ Paul. AS per visit oil appeared out of sw corner of property. Site is contr. site. Church is adjacent to site to the east and is possible source of oil slug. No other report of oil entering site. mailed a second csl. 9/28/06- DEC Piper mailed a second csl. 10/10/06- DEC Piper spoke w. Alan from Island Tank. Alan performed tightness test on system and determined that fill and vent lines were leaking, replaced lines and fill box. They will excavate soil and collect endpoints. They will fax info when completed. 12/18/06- DEC Piper received message from Adam Lee from Eco Stratedgies requesting closure. Piper left message asking for copy of report. 1/11/07- DECP iper spoke w. Vinnie at Island Tank. He will have report shortly.

THERE MAYBE MORE DEC REMARKS AVAILABLE, PLEASE CONTACT THE NY DEC (518) 402-9549 FOR FURTHER

- Continued on next page -

Environmental FirstSearch
Site Detail Report

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

SPILLS

SEARCH ID: 30 **DIST/DIR:** 0.04 SW **ELEVATION:** 28 **MAP ID:** 6

NAME: CHURCH
ADDRESS: 33 115TH ST
NEW YORK NY
NEW YORK
CONTACT:
SOURCE: NYSDEC

REV: 2/3/11
ID1: 0601808
ID2: 364146
STATUS: ACTIVE
PHONE:

INFORMATION

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

SPILLS

SEARCH ID: 42 **DIST/DIR:** 0.06 SE **ELEVATION:** 29 **MAP ID:** 7

NAME: MANHOLE M56965
ADDRESS: 5TH AVE and W 116TH ST
MANHATTAN NY
NEW YORK
CONTACT:
SOURCE: NYSDEC

REV: 2/3/11
ID1: 0513522
ID2: 360007
STATUS: CLOSED
PHONE:

SITE INFORMATION

SPILL DATE: 2/22/2006
DATE REPORTED: 2/22/2006
CLOSED DATE: 5/11/2006
INSP DATE:
MATERIAL SPILLED: UNKNOWN PETROLEUM
MATERIAL CLASS: PETROLEUM
AMOUNT SPILLED: G
AMOUNT RECOVERED: 0 G

RESOURCE AFFECTED

SOIL:	True	**AIR:**	False
INDOOR AIR:	False	**GROUNDWATER:**	False
SURFACE WATER:	False	**DRINKING WATER:**	False
SEWER:	False	**IMPERVIOUS SURFACE:**	False
SUBWAY:	False	**UNDERGROUND UTILITIES:**	False

CAUSE OF SPILL: UNKNOWN
WATERBODY AFFECTED:
SOURCE OF SPILL: UNKNOWN
REPORTED BY: RESPONSIBLE PARTY
REGION:
UST TRUST? NO

SPILL INVESTIGATOR: GDBREEN
SPILL CONTACT: ERT DESK MIKE DAUGHTERY
TELEPHONE: (212) 580-8383

SPILLER: CON EDISON MANHOLE M56965
ERT DESK MIKE DAUGHTERY
ADDRESS: WEST 116TH ST/5TH AVE
MANHATTAN, NY
TELEPHONE:

REPORTED BY: RESPONSIBLE PARTY

LAST DEC UPDATE: 5/11/2006
CLEAN UP MEET STANDARDS? NO
PENALTY RECOMMENDED? NO

CALLER REMARKS: 1 QUART ON DIRT NOT CLEANED UP PENDING TEST RESULTS. CON ED 163052

DEC REMARKS:
163052. Found 17:00. Called E/V desk 17:16. M56965 - W 116 ST 37 43 (5 AVE). Stephen Presuto14921, Trouble Shooter Hv, Was in process of doing a manhole inspection And found unknown oil coming from duct on north wall of manhole to soil on concrete floor of manhole. He states that it is approx. 1 Qt total, mixed with soil. And also reports the following: There was or is no smoke or fire involved. No sewer or waterway affected. No injuries and weather had no affect. Account F7160 is being used for this incident. Source and cause of spill are unknown. No private property affected. No oil filled equipment in the structure. Environmental yellow tag 38879 was applied. No standing water. No substantial cracks. W/bound lane. 2 liquid samples were taken from the spill, 1 for id and 1 for pcb. Sample priority E . Chain of custody EE11972. Logger F.Curtis 38078
Update: after phone conversation with T.Regan 07430,this incident is now Spill-Unknown Oil Type Due to the finder was not sure as to the source of oil. Logger F.Curtis 38078. 5/11/06 This spill is being closed on the basis of the report in eDocs. (SKA)

THERE MAYBE MORE DEC REMARKS AVAILABLE, PLEASE CONTACT THE NY DEC (518) 402-9549 FOR FURTHER

- Continued on next page -

Environmental FirstSearch
Site Detail Report

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

SPILLS

SEARCH ID: 42 **DIST/DIR:** 0.06 SE **ELEVATION:** 29 **MAP ID:** 7

NAME: MANHOLE M56965
ADDRESS: 5TH AVE and W 116TH ST
MANHATTAN NY
NEW YORK
CONTACT:
SOURCE: NYSDEC

REV: 2/3/11
ID1: 0513522
ID2: 360007
STATUS: CLOSED
PHONE:

INFORMATION

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

SPILLS

SEARCH ID: 41 **DIST/DIR:** 0.06 SE **ELEVATION:** 29 **MAP ID:** 7

NAME: MANHOLE 34126
ADDRESS: W 116TH ST and 5TH AVE
MANHATTAN NY
NEW YORK
CONTACT:
SOURCE: NYSDEC

REV: 2/3/11
ID1: 9809535
ID2: 111092
STATUS: CLOSED
PHONE:

SITE INFORMATION

SPILL DATE: 10/29/1998
DATE REPORTED: 10/29/1998
CLOSED DATE: 11/4/2003
INSP DATE:
MATERIAL SPILLED: DIELECTRIC FLUID
MATERIAL CLASS: PETROLEUM
AMOUNT SPILLED: 1 G
AMOUNT RECOVERED: 0 G

RESOURCE AFFECTED

SOIL:	True	**AIR:**	False
INDOOR AIR:	False	**GROUNDWATER:**	False
SURFACE WATER:	False	**DRINKING WATER:**	False
SEWER:	False	**IMPERVIOUS SURFACE:**	False
SUBWAY:	False	**UNDERGROUND UTILITIES:**	False

CAUSE OF SPILL: EQUIPMENT FAILURE
WATERBODY AFFECTED:
SOURCE OF SPILL: INSTITUTIONAL, EDUCATIONAL, GOV., OTHER
REPORTED BY: AFFECTED PERSONS
REGION:
UST TRUST? NO

SPILL INVESTIGATOR: CAENGELH
SPILL CONTACT: STEVE ROMERO
TELEPHONE: (212) 580-6763

SPILLER: CON ED

ADDRESS:
, NY
TELEPHONE:

REPORTED BY: AFFECTED PERSONS

LAST DEC UPDATE: 11/12/2003
CLEAN UP MEET STANDARDS? NO
PENALTY RECOMMENDED? NO

CALLER REMARKS: CON ED 120911 DEFECTIVE CABLE

DEC REMARKS:
Prior to Sept, 2004 data translation this spill Lead_DEC Field was ENGELHARDT E2MIS 120911 10/29/98 1342 HRS LOU PINTO 48962 FIELD OPERATOR WORKING ON FEEDER FAULT 2M37 REPORTS TO MCC MICHAEL CROWE 71453 1 PT DIELECTRIC FLUID LEAK (INSULTAUM) IN M34126 SWC W116TH ST and 5TH AVE - PLACED PADS - CONTAINED - DID NOT ENTER SEWER OR WATERWAYS - NO IMPACT - NO AGENCY ON SITE - TOOK WIPE SAMPLE - HUNG SIGN 18163 - NO OIL FILLED EQUIPMENT IN STRUCTURE - - LOGGER MICHAEL CROWE 10/29/98 1415 HRS MR STEVE ROMERO CIG NOTIFIED BY MICHAEL CROWE-MC 10/30/98 01:16 RECEIVED LAB RESULTS AT 01:06 LAB SEQUENCE 98-11856 AROCLOR - 1254 PCB - 13 PPM 11-2-98 09:55 Cleanup completed on 10-30-98 at 2100 hours, supervised by P.Reidmiller 52281. 1-pint oil removed with absorbant, mh was then flushed. 1-55 gallon drum nonhazardous waste generated. Tag 18163 removed. Crew: G.Garcia 18644 and W.Garcia 17040.

THERE MAYBE MORE DEC REMARKS AVAILABLE, PLEASE CONTACT THE NY DEC (518) 402-9549 FOR FURTHER

- Continued on next page -

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

SPILLS

SEARCH ID: 41 **DIST/DIR:** 0.06 SE **ELEVATION:** 29 **MAP ID:** 7

NAME: MANHOLE 34126
ADDRESS: W 116TH ST and 5TH AVE
MANHATTAN NY
NEW YORK
CONTACT:
SOURCE: NYSDEC

REV: 2/3/11
ID1: 9809535
ID2: 111092
STATUS: CLOSED
PHONE:

INFORMATION

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

SPILLS

SEARCH ID: 39 **DIST/DIR:** 0.06 SE **ELEVATION:** 29 **MAP ID:** 7

NAME: MANHOLE 56966
ADDRESS: 5TH AVE and W 116TH ST
MANHATTAN NY
NEW YORK
CONTACT:
SOURCE: NYSDEC

REV: 2/3/11
ID1: 0513717
ID2: 360242
STATUS: CLOSED
PHONE:

SITE INFORMATION

SPILL DATE: 2/28/2006
DATE REPORTED: 2/28/2006
CLOSED DATE: 5/12/2006
INSP DATE:
MATERIAL SPILLED: DIELECTRIC FLUID
MATERIAL CLASS: PETROLEUM
AMOUNT SPILLED: 0 G
AMOUNT RECOVERED: 0 G

RESOURCE AFFECTED

SOIL:	True	**AIR:**	False
INDOOR AIR:	False	**GROUNDWATER:**	False
SURFACE WATER:	False	**DRINKING WATER:**	False
SEWER:	False	**IMPERVIOUS SURFACE:**	False
SUBWAY:	False	**UNDERGROUND UTILITIES:**	False

CAUSE OF SPILL: EQUIPMENT FAILURE
WATERBODY AFFECTED:
SOURCE OF SPILL: INSTITUTIONAL, EDUCATIONAL, GOV., OTHER
REPORTED BY: RESPONSIBLE PARTY
REGION:
UST TRUST? NO

SPILL INVESTIGATOR: GDBREEN
SPILL CONTACT: ERT DESK
TELEPHONE: (212) 580-8383

SPILLER: CON EDISON MH 56966
ERT DESK
ADDRESS: WEST 116TH/ 5TH AVE
MANHATTAN, NY
TELEPHONE:

REPORTED BY: RESPONSIBLE PARTY

LAST DEC UPDATE: 5/12/2006
CLEAN UP MEET STANDARDS? NO
PENALTY RECOMMENDED? NO

CALLER REMARKS: LEAKING FEEDER, NO TO 5 QUESTIONS; CONED 163112

DEC REMARKS:
163112. Found 10:10 hrs. Called E/V desk 10:13 hrs M56966 - N/S W116 ST 54 W/O 5 AVE Michael Melendez 11285, Operating Supervisor U.G Reports that in process of working on maintenance work in the above manhole. Found approx. 1 pint of cable oil leaking from a 3c lead joint to concrete floor. This is now a D-Fault location D-Fault tag 01289 placed, see ME06003240. And for this reason, this cannot be considered a 72-hour De Minimus spill. And also reports the following: There was or is no smoke or fire involved. No sewer or waterway affected. No injuries and weather had no affect. Account 12039 is being used for this incident. Source and cause of spill are leaking joint. No private property affected. No oil filled equipment in the structure No substantial cracks. Access anytime. 1 lane of traffic. No samples taken due to D-Fault. Clean pending repair. Logger F.Curtis 38078 5/12/06 This spill is being closed based on report in eDocs. (SKA)

THERE MAYBE MORE DEC REMARKS AVAILABLE, PLEASE CONTACT THE NY DEC (518) 402-9549 FOR FURTHER INFORMATION

- Continued on next page -

Environmental FirstSearch
Site Detail Report

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

SPILLS

SEARCH ID: 39 **DIST/DIR:** 0.06 SE **ELEVATION:** 29 **MAP ID:** 7

NAME: MANHOLE 56966
ADDRESS: 5TH AVE and W 116TH ST
MANHATTAN NY
NEW YORK
CONTACT:
SOURCE: NYSDEC

REV: 2/3/11
ID1: 0513717
ID2: 360242
STATUS: CLOSED
PHONE:

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

SPILLS

SEARCH ID: 58 **DIST/DIR:** 0.06 SW **ELEVATION:** 27 **MAP ID:** 8

NAME:
ADDRESS: 15 W 115TH ST
MANHATTAN NY
NEW YORK
CONTACT:
SOURCE: NYSDEC

REV: 2/3/11
ID1: 0001066
ID2: 144964
STATUS: CLOSED
PHONE:

SITE INFORMATION

SPILL DATE: 1/31/2000
DATE REPORTED: 4/26/2000
CLOSED DATE: 6/14/2000
INSP DATE:
MATERIAL SPILLED: WASTE OIL/USED OIL
MATERIAL CLASS: PETROLEUM
AMOUNT SPILLED: 0 G
AMOUNT RECOVERED: 0 G

RESOURCE AFFECTED

SOIL:	True	**AIR:**	False
INDOOR AIR:	False	**GROUNDWATER:**	False
SURFACE WATER:	False	**DRINKING WATER:**	False
SEWER:	False	**IMPERVIOUS SURFACE:**	False
SUBWAY:	False	**UNDERGROUND UTILITIES:**	False

CAUSE OF SPILL: DELIBERATE
WATERBODY AFFECTED:
SOURCE OF SPILL: UNKNOWN
REPORTED BY: OTHER
REGION:
UST TRUST? NO

SPILL INVESTIGATOR: MXTIPPLE
SPILL CONTACT: MR ROSS
TELEPHONE: (718) 366-4970

SPILLER: UNKNOWN

ADDRESS:
, NY
TELEPHONE:

REPORTED BY: OTHER

LAST DEC UPDATE: 8/24/2000
CLEAN UP MEET STANDARDS? NO
PENALTY RECOMMENDED? NO

CALLER REMARKS: CALLER STATES WASTE OIL WAS DUMPED ONTO NYC HOUSING AUTHORITY PROPERTY - CALLER DID PHASE 1 and 2 CLEAN UP

DEC REMARKS:
Prior to Sept, 2004 data translation this spill Lead_DEC Field was TIPPLE PAPEERWORK SUBMITTED-LOT CLEANED

THERE MAYBE MORE DEC REMARKS AVAILABLE, PLEASE CONTACT THE NY DEC (518) 402-9549 FOR FURTHER INFORMATION

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

SPILLS

SEARCH ID: 54 **DIST/DIR:** 0.08 SW **ELEVATION:** 27 **MAP ID:** 9

NAME: WEST 115 ST
ADDRESS: W 115TH ST
MANHATTAN NY
NEW YORK
CONTACT:
SOURCE: NYSDEC

REV: 2/3/11
ID1: 0010119
ID2: 295509
STATUS: CLOSED
PHONE:

SITE INFORMATION

SPILL DATE: 12/8/2000
DATE REPORTED: 12/8/2000
CLOSED DATE: 5/10/2001
INSP DATE:
MATERIAL SPILLED: WASTE OIL/USED OIL
MATERIAL CLASS: PETROLEUM
AMOUNT SPILLED: 120 G
AMOUNT RECOVERED: 0 G

RESOURCE AFFECTED

SOIL:	True	**AIR:**	False
INDOOR AIR:	False	**GROUNDWATER:**	False
SURFACE WATER:	False	**DRINKING WATER:**	False
SEWER:	False	**IMPERVIOUS SURFACE:**	False
SUBWAY:	False	**UNDERGROUND UTILITIES:**	False

CAUSE OF SPILL: ABANDONED DRUMS
WATERBODY AFFECTED:
SOURCE OF SPILL: UNKNOWN
REPORTED BY: LOCAL AGENCY
REGION:
UST TRUST? NO

SPILL INVESTIGATOR: TJDEMEO
SPILL CONTACT: WAI MAN WONG
TELEPHONE: (718) 595-4783

SPILLER: UNKNOWN

ADDRESS:
, NY
TELEPHONE:

REPORTED BY: LOCAL AGENCY

LAST DEC UPDATE: 5/16/2001
CLEAN UP MEET STANDARDS? NO
PENALTY RECOMMENDED? NO

CALLER REMARKS: 2 55 GALS DRUMS AND 1 5 GAL PAIL OF WASTE OIL DISCOVERED ON SIDEWALK IFO VACANT LOT

DEC REMARKS:
Prior to Sept, 2004 data translation this spill Lead_DEC Field was DEMEO 5/15/2001 TJD Drum emptied 5/10/01 see spill 9930008 PIN 01036

THERE MAYBE MORE DEC REMARKS AVAILABLE, PLEASE CONTACT THE NY DEC (518) 402-9549 FOR FURTHER INFORMATION

Environmental FirstSearch
Site Detail Report

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

SPILLS

SEARCH ID: 18 **DIST/DIR:** 0.09 NE **ELEVATION:** 31 **MAP ID:** 12

NAME: 27 WEST 118TH ST
ADDRESS: 27 W 118TH ST
MANHATTAN NY
NEW YORK
CONTACT:
SOURCE: NYSDEC

REV: 2/3/11
ID1: 9512814
ID2: 122433
STATUS: CLOSED
PHONE:

SITE INFORMATION

SPILL DATE: 1/15/1996
DATE REPORTED: 1/15/1996
CLOSED DATE: 1/16/1996
INSP DATE:
MATERIAL SPILLED: 2 FUEL OIL
MATERIAL CLASS: PETROLEUM
AMOUNT SPILLED: 5 G
AMOUNT RECOVERED: 5 G

RESOURCE AFFECTED

SOIL:	True	**AIR:**	False
INDOOR AIR:	False	**GROUNDWATER:**	False
SURFACE WATER:	False	**DRINKING WATER:**	False
SEWER:	False	**IMPERVIOUS SURFACE:**	False
SUBWAY:	False	**UNDERGROUND UTILITIES:**	False

CAUSE OF SPILL: HUMAN ERROR
WATERBODY AFFECTED:
SOURCE OF SPILL: TANK TRUCK
REPORTED BY: RESPONSIBLE PARTY
REGION:
UST TRUST? NO

SPILL INVESTIGATOR: MCTIBBE
SPILL CONTACT:
TELEPHONE:

SPILLER: T AND S TRUCKING
SAME
ADDRESS: 53 SECOND AVE
BROOKLYN, NY 11215-
TELEPHONE:

REPORTED BY: RESPONSIBLE PARTY

LAST DEC UPDATE: 1/27/1998
CLEAN UP MEET STANDARDS? NO
PENALTY RECOMMENDED? NO

CALLER REMARKS: DRIVER MISREAD THE GAUGE - RESULTED IN TANK OVERFILL

DEC REMARKS:
Prior to Sept, 2004 data translation this spill Lead_DEC Field was TIBBE CLEANED BY RP.

THERE MAYBE MORE DEC REMARKS AVAILABLE, PLEASE CONTACT THE NY DEC (518) 402-9549 FOR FURTHER INFORMATION

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

SPILLS

SEARCH ID: 56 **DIST/DIR:** 0.09 SE **ELEVATION:** 27 **MAP ID:** 13

NAME:
ADDRESS: 5TH AVE and W 115TH ST
MANHATTAN NY
NEW YORK
CONTACT:
SOURCE: NYSDEC

REV: 2/3/11
ID1: 0103884
ID2: 301962
STATUS: CLOSED
PHONE:

SITE INFORMATION

SPILL DATE: 7/12/2001
DATE REPORTED: 7/12/2001
CLOSED DATE: 9/28/2001
INSP DATE:
MATERIAL SPILLED: WASTE OIL/USED OIL
MATERIAL CLASS: PETROLEUM
AMOUNT SPILLED: 25 G
AMOUNT RECOVERED: 0 G

RESOURCE AFFECTED

SOIL:	True	**AIR:**	False
INDOOR AIR:	False	**GROUNDWATER:**	False
SURFACE WATER:	False	**DRINKING WATER:**	False
SEWER:	False	**IMPERVIOUS SURFACE:**	False
SUBWAY:	False	**UNDERGROUND UTILITIES:**	False

CAUSE OF SPILL: ABANDONED DRUMS
WATERBODY AFFECTED:
SOURCE OF SPILL: UNKNOWN
REPORTED BY: LOCAL AGENCY
REGION:
UST TRUST? NO

SPILL INVESTIGATOR: TDGHIOSA
SPILL CONTACT: WAIMAN WONG
TELEPHONE: (718) 595-4784

SPILLER: UNKNOWN

ADDRESS:
, ZZ -
TELEPHONE:

REPORTED BY: LOCAL AGENCY

LAST DEC UPDATE: 9/28/2001
CLEAN UP MEET STANDARDS? NO
PENALTY RECOMMENDED? NO

CALLER REMARKS: 2 DRUMS...1 EMPTY 1 ABOUT 1/2 FULL...THERE WERE REPORTED IN DEC 2000 AND NOTHING HAS BEEN DONE W/ THEM AS OF YET. CR 0010119.

DEC REMARKS:
Prior to Sept, 2004 data translation this spill Lead_DEC Field was GHIOSAY SEPT 28, 2001 MILRO EMPTIED TWO DRUMS UNDER DRUM RUN PIN. SEE SPILL NO 99-30008/PIN 01036. NFA FOR THIS SPILL.

THERE MAYBE MORE DEC REMARKS AVAILABLE, PLEASE CONTACT THE NY DEC (518) 402-9549 FOR FURTHER INFORMATION

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

SPILLS

SEARCH ID: 61 **DIST/DIR:** 0.10 SE **ELEVATION:** 30 **MAP ID:** 15

NAME:
ADDRESS: 20 E 116TH ST
MANHATTAN NY
NEW YORK
CONTACT:
SOURCE: NYSDEC

REV: 2/3/11
ID1: 0110011
ID2: 175184
STATUS: CLOSED
PHONE:

SITE INFORMATION

SPILL DATE: 1/17/2002
DATE REPORTED: 1/17/2002
CLOSED DATE: 12/16/2002
INSP DATE:
MATERIAL SPILLED: 2 FUEL OIL
MATERIAL CLASS: PETROLEUM
AMOUNT SPILLED: 10 G
AMOUNT RECOVERED: 0 G

RESOURCE AFFECTED

SOIL:	True	**AIR:**	False
INDOOR AIR:	False	**GROUNDWATER:**	False
SURFACE WATER:	False	**DRINKING WATER:**	False
SEWER:	False	**IMPERVIOUS SURFACE:**	False
SUBWAY:	False	**UNDERGROUND UTILITIES:**	False

CAUSE OF SPILL: EQUIPMENT FAILURE
WATERBODY AFFECTED:
SOURCE OF SPILL: COMMERCIAL/INDUSTRIAL
REPORTED BY: OTHER
REGION:
UST TRUST? NO

SPILL INVESTIGATOR: MXTIPPLE
SPILL CONTACT: INDIRA SEELALL
TELEPHONE: (718) 205-1700

SPILLER:
INDIRA SEELALL
ADDRESS: 20 EAST 116TH ST
MANHATTAN, NY
TELEPHONE:

REPORTED BY: OTHER

LAST DEC UPDATE: 12/17/2002
CLEAN UP MEET STANDARDS? NO
PENALTY RECOMMENDED? NO

CALLER REMARKS: BROKEN VALVE CAUSED RELEASE - SPILL CONTAINED AND WILL BE CLEANED UP 1-18

DEC REMARKS:
Prior to Sept, 2004 data translation this spill Lead_DEC Field was TIPPLE Spill has been cleaned up by A.L. Eastmond Spill was originally Krimgold s, but was switched to Tipple. Site was an oil spill in a basement area. Eastmond came in cleaned the site and poured a new cement floor. There was no confirmation concerning if the soil below the the slab was ever cleaned. On June 5, 2002 Michelle Tipple wrote a letter to Indira Seelall of New York Friendly Construction Inc. requesting a subsurface investigation of the area (soil borings and water samples). 7/10/2002 - Sangesland got a call from Shazad Kahn (718-961-8530) He is an independent tester who was hired by the owner to take care of this spill . He had a copy of Michelle s letter, but did not know exactly what was required. Based on the photographs of the area, it appears that the problem is a 6ft x 12ft area in the basement. Sangesland suggested that two borings should be drilled generally through the center of each half of the floor. The the borings should be screened and a sample taken of the hottest area. The contactor should push down to also collect water samples. If bedrock is hit before reaching water, Sangesland suggested that a report showing totally clean soil samples MAY BE ADEQUATE for Ms. Tipple. She MAY still require the water samples. Only Ms. Tipple can make that decision. 7/15/02 RECIEVED NOTE THAT THE INDEPENDANT TESTING CO. HAD DONE BORINGS TAKEN SAMPLES

- Continued on next page -

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

SPILLS

SEARCH ID: 61 **DIST/DIR:** 0.10 SE **ELEVATION:** 30 **MAP ID:** 15

NAME:
ADDRESS: 20 E 116TH ST
MANHATTAN NY
NEW YORK
CONTACT:
SOURCE: NYSDEC

REV: 2/3/11
ID1: 0110011
ID2: 175184
STATUS: CLOSED
PHONE:

AND CLOSED THE HOLES WITHOUT SPEAKING TO MS.TIPPLE PRIOR TO BEGINNING WORK. I DO NOT KNOW WHERE THE BORINGS WERE LOCATED, NOR WAS I ABLE TO BE PRESENT FOR THE OCCASION. 8/30/2002 Inadequate report sent, no information as to location of samples, depth of samples, field screening etc. New conc. slab appears to be covering something. R. Lewis from Eastman stated that they only picked up bags of petroleum contaminated debris, they did no remedial work. There were tanks removed from the site,(Eastman report concrete floor with dirt around tanks) there was no reference anywhere in the reporting that the tanks were removed and or disposed, size and if they should have been registered. 10/28/2002 Another phone request for closure, still inadequate information/cleanup to date. 12/16/2002 SITE VISIT BY TIPPLE. CONTRACTOR HAD CONCRETE FLOOR OPENED, EXCAVATION REVEALED NO OBSREVABLE INDICATIONS OF CONTAMINANTS, EITHER VISUAL OR OLFACTORY . NATIVE FILL CONSISTED OF OLD BRICK, SHIST AS WELL AS SOIL. NO FURTHER ACTION IS REQUIRED. CURRENT TANK AT THIS SITE HAS A 750 GAL CAPACITY.

THERE MAYBE MORE DEC REMARKS AVAILABLE, PLEASE CONTACT THE NY DEC (518) 402-9549 FOR FURTHER INFORMATION

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

SPILLS

SEARCH ID: 44 **DIST/DIR:** 0.11 SW **ELEVATION:** 26 **MAP ID:** 16

NAME: NEW CONSTRUCTION
ADDRESS: 81 W 115TH ST
MANHATTAN NY
NEW YORK
CONTACT:
SOURCE: NYSDEC

REV: 2/3/11
ID1: 9709656
ID2: 211724
STATUS: CLOSED
PHONE:

SITE INFORMATION

SPILL DATE: 11/19/1997
DATE REPORTED: 11/19/1997
CLOSED DATE: 7/12/2006
INSP DATE:
MATERIAL SPILLED: UNKNOWN PETROLEUM
MATERIAL CLASS: PETROLEUM
AMOUNT SPILLED: 0 G
AMOUNT RECOVERED: 0 G

RESOURCE AFFECTED

SOIL:	False	**AIR:**	True
INDOOR AIR:	False	**GROUNDWATER:**	False
SURFACE WATER:	False	**DRINKING WATER:**	False
SEWER:	False	**IMPERVIOUS SURFACE:**	False
SUBWAY:	False	**UNDERGROUND UTILITIES:**	False

CAUSE OF SPILL: OTHER
WATERBODY AFFECTED:
SOURCE OF SPILL: INSTITUTIONAL, EDUCATIONAL, GOV., OTHER
REPORTED BY: RESPONSIBLE PARTY
REGION:
UST TRUST? NO

SPILL INVESTIGATOR: SXLASDIN
SPILL CONTACT: HELEN B ATKINSON
TELEPHONE: (212) 366-4500 209

SPILLER: CONTINENTAL GENERAL
BILL DUNN
ADDRESS: 1 GATEWAY CENTER
NEWARK, NJ 07102-
TELEPHONE:

REPORTED BY: RESPONSIBLE PARTY

LAST DEC UPDATE: 7/12/2006
CLEAN UP MEET STANDARDS? NO
PENALTY RECOMMENDED? NO

CALLER REMARKS: UPON CUTTING A HOLE IN THE WALL TO MEET THE MAIN DRAIN IN THE STREET FOR DOMESTIC WATER-BETWEEN POINT A AND POINT B THERE IS A FUEL TANK-FUMES COMING FROM TANK. WILL CAUSE DEC FOR INFO ON HOW TO REMOVE TANK.

DEC REMARKS:
Prior to Sept, 2004 data translation this spill Lead_DEC Field was M TIBBE CFDC Helen B. Atkinson 212-366-4500 ext. 209 12/11/97 - Teddy from Continental General contractors left message that they removed the tank and there was no contamination. Possible gasoline tank. 7/12/06. no spill reported. close spill.

THERE MAYBE MORE DEC REMARKS AVAILABLE, PLEASE CONTACT THE NY DEC (518) 402-9549 FOR FURTHER INFORMATION

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Environmental FirstSearch
Site Detail Report

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

SPILLS

SEARCH ID: 44 **DIST/DIR:** 0.11 SW **ELEVATION:** 26 **MAP ID:** 16

NAME:	NEW CONSTRUCTION	**REV:**	2/3/11
ADDRESS:	81 W 115TH ST	**ID1:**	9709656
	MANHATTAN NY	**ID2:**	211724
	NEW YORK	**STATUS:**	CLOSED
CONTACT:		**PHONE:**	
SOURCE:	NYSDEC		

Environmental FirstSearch
Site Detail Report

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

SPILLS

SEARCH ID: 26 **DIST/DIR:** 0.14 NE **ELEVATION:** 28 **MAP ID:** 17

NAME: APARTMENT HOUSE
ADDRESS: 50 W 119TH ST
NEW YORK NY
NEW YORK
CONTACT:
SOURCE: NYSDEC

REV: 2/3/11
ID1: 0000405
ID2: 182429
STATUS: CLOSED
PHONE:

SITE INFORMATION

SPILL DATE: 4/10/2000
DATE REPORTED: 4/10/2000
CLOSED DATE: 2/19/2003
INSP DATE:
MATERIAL SPILLED: 2 FUEL OIL
MATERIAL CLASS: PETROLEUM
AMOUNT SPILLED: 1 G
AMOUNT RECOVERED: 0 G

RESOURCE AFFECTED

SOIL:	True	**AIR:**	False
INDOOR AIR:	False	**GROUNDWATER:**	False
SURFACE WATER:	False	**DRINKING WATER:**	False
SEWER:	False	**IMPERVIOUS SURFACE:**	False
SUBWAY:	False	**UNDERGROUND UTILITIES:**	False

CAUSE OF SPILL: TANK OVERFILL
WATERBODY AFFECTED:
SOURCE OF SPILL: PRIVATE DWELLING
REPORTED BY: AFFECTED PERSONS
REGION:
UST TRUST? NO

SPILL INVESTIGATOR: TOMASELLO
SPILL CONTACT: WALTER MILLER
TELEPHONE: (212) 369-4079

SPILLER: INTERBORO

ADDRESS: UNK
NEW YORK, NY
TELEPHONE:

REPORTED BY: AFFECTED PERSONS

LAST DEC UPDATE: 2/19/2003
CLEAN UP MEET STANDARDS? NO
PENALTY RECOMMENDED? NO

CALLER REMARKS: CALLER STATES EVERY MONTH OIL IS DELIVERED ATLEAST 1 GALLON GETS SPILLED DUE TO TANK OVERFILL-ON GOING PROBLEM AND ALSO HAS SEEN OIL SPRAYED ON WALL IN BASEMENT.

DEC REMARKS:

THERE MAYBE MORE DEC REMARKS AVAILABLE, PLEASE CONTACT THE NY DEC (518) 402-9549 FOR FURTHER INFORMATION

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

SPILLS

SEARCH ID: 45 **DIST/DIR:** 0.14 NW **ELEVATION:** 28 **MAP ID:** 18

NAME: NW CORNER
ADDRESS: LENOX AVE and 117TH ST
MANHATTAN NY
NEW YORK
CONTACT:
SOURCE: NYSDEC

REV: 2/3/11
ID1: 9815148
ID2: 76533
STATUS: CLOSED
PHONE:

SITE INFORMATION

SPILL DATE: 3/22/1999
DATE REPORTED: 3/22/1999
CLOSED DATE: 6/6/2002
INSP DATE:
MATERIAL SPILLED: UNKNOWN MATERIAL
MATERIAL CLASS: OTHER
AMOUNT SPILLED: 1 G
AMOUNT RECOVERED: 0 G

RESOURCE AFFECTED

SOIL:	True	**AIR:**	False
INDOOR AIR:	False	**GROUNDWATER:**	False
SURFACE WATER:	False	**DRINKING WATER:**	False
SEWER:	False	**IMPERVIOUS SURFACE:**	False
SUBWAY:	False	**UNDERGROUND UTILITIES:**	False

CAUSE OF SPILL: HUMAN ERROR
WATERBODY AFFECTED:
SOURCE OF SPILL: COMMERCIAL/INDUSTRIAL
REPORTED BY: AFFECTED PERSONS
REGION:
UST TRUST? NO

SPILL INVESTIGATOR: CAENGELH
SPILL CONTACT:
TELEPHONE:

SPILLER: UNKNOWN CONTRACTOR
UNKNOWN
ADDRESS: UNKNOWN
UNKNOWN, ZZ
TELEPHONE:

REPORTED BY: AFFECTED PERSONS

LAST DEC UPDATE: 1/31/2003
CLEAN UP MEET STANDARDS? NO
PENALTY RECOMMENDED? NO

CALLER REMARKS: CONTRACTOR WORKING FOR NYC HIT AND ABANDONED NATURAL GAS LINE WHILE DIGGING AT ABOVE LOCATION GAS LINE HAD AN UNKNOWN LIQUID MATERIAL IN IT POSS WATER MATERIAL ENTERED THE SOIL IN THE DIG SITE SOIL SAMPLES WILL BE TAKEN CLEAN UP IS UNDERWAY MATERIAL BE TREATED AS HAZ MAT

DEC REMARKS:
Prior to Sept, 2004 data translation this spill Lead_DEC Field was ENGELHARDT Con Ed e2mis 123776: D.MILES REPORTS 3RD PARTY SPILL CONTRACTOR DAMAGED 6 ABANDONED MAIN 1-GAL OF UNKNOWN FLUID LEAKED FROM 6 MAIN INTO CONTRACTORS EXCAVATION,CON-ED CREW INSTALLED 6 STRAP SADDLE ON MAIN SPILL CONTAINED CHEMIST ENROUTE TO LOCATION TO TAKE SAMPLES. DID NOT ENTER ANY SEWERS OR WATERWAYS.CLEAN UP IN PROGRESS ENTERED BY 30233. P. Lonseth,78189,3/29/99. Changed open status to pending results entered stop time. Lab analysis for benzene is 8 PPM waiting further analysis. Soil is containerized and at 110th street yard P.LONSETH,78189,4/26/99. Closed job. P.lonseth,78189,5/12/99. The 8ppm was sampled from the abandoned main at this location. The sample was of water. There was no sludge or oils present.

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Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

SPILLS

SEARCH ID: 45 **DIST/DIR:** 0.14 NW **ELEVATION:** 28 **MAP ID:** 18

NAME: NW CORNER
ADDRESS: LENOX AVE and 117TH ST
MANHATTAN NY
NEW YORK
CONTACT:
SOURCE: NYSDEC

REV: 2/3/11
ID1: 9815148
ID2: 76533
STATUS: CLOSED
PHONE:

THERE MAYBE MORE DEC REMARKS AVAILABLE, PLEASE CONTACT THE NY DEC (518) 402-9549 FOR FURTHER INFORMATION

Environmental FirstSearch
Site Detail Report

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

SPILLS

SEARCH ID: 59 **DIST/DIR:** 0.14 NW **ELEVATION:** 28 **MAP ID:** 19

NAME:
ADDRESS: LENOX AVE and W 116TH ST
MANHATTAN NY
NEW YORK
CONTACT:
SOURCE: NYSDEC

REV: 2/3/11
ID1: 0308444
ID2: 155909
STATUS: CLOSED
PHONE:

SITE INFORMATION

SPILL DATE: 11/10/2003
DATE REPORTED: 11/10/2003
CLOSED DATE: 11/13/2003
INSP DATE:
MATERIAL SPILLED: COOKING GREASE
MATERIAL CLASS: OTHER
AMOUNT SPILLED: 0 G
AMOUNT RECOVERED: 0 G

RESOURCE AFFECTED

SOIL:	True	**AIR:**	False
INDOOR AIR:	False	**GROUNDWATER:**	False
SURFACE WATER:	False	**DRINKING WATER:**	False
SEWER:	False	**IMPERVIOUS SURFACE:**	False
SUBWAY:	False	**UNDERGROUND UTILITIES:**	False

CAUSE OF SPILL: UNKNOWN
WATERBODY AFFECTED:
SOURCE OF SPILL: UNKNOWN
REPORTED BY: OTHER
REGION:
UST TRUST? NO

SPILL INVESTIGATOR: MXTIPPLE
SPILL CONTACT: RACQUEL RIVERA
TELEPHONE: (212) 996-8584

SPILLER:

ADDRESS:
Update, ZZ
TELEPHONE:

REPORTED BY: OTHER

LAST DEC UPDATE: 3/30/2004
CLEAN UP MEET STANDARDS? NO
PENALTY RECOMMENDED? NO

CALLER REMARKS: CLEANUP IN PROGRESS

DEC REMARKS:
Prior to Sept, 2004 data translation this spill Lead_DEC Field was TIPPLE

THERE MAYBE MORE DEC REMARKS AVAILABLE, PLEASE CONTACT THE NY DEC (518) 402-9549 FOR FURTHER INFORMATION

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

SPILLS

SEARCH ID: 60 **DIST/DIR:** 0.14 NW **ELEVATION:** 28 **MAP ID:** 19

NAME:
ADDRESS: LENOX AVE and W 116TH ST
MANHATTAN NY
NEW YORK
CONTACT:
SOURCE: NYSDEC

REV: 2/3/11
ID1: 9901554
ID2: 208542
STATUS: CLOSED
PHONE:

SITE INFORMATION

SPILL DATE: 5/10/1999
DATE REPORTED: 5/10/1999
CLOSED DATE: 8/18/2009
INSP DATE:
MATERIAL SPILLED: WASTEWATER
MATERIAL CLASS: OTHER
AMOUNT SPILLED: 1 G
AMOUNT RECOVERED: 1 G

RESOURCE AFFECTED

SOIL:	True	**AIR:**	False
INDOOR AIR:	False	**GROUNDWATER:**	False
SURFACE WATER:	False	**DRINKING WATER:**	False
SEWER:	False	**IMPERVIOUS SURFACE:**	False
SUBWAY:	False	**UNDERGROUND UTILITIES:**	False

CAUSE OF SPILL: EQUIPMENT FAILURE
WATERBODY AFFECTED:
SOURCE OF SPILL: COMMERCIAL/INDUSTRIAL
REPORTED BY: RESPONSIBLE PARTY
REGION:
UST TRUST? NO

SPILL INVESTIGATOR: JMKRIMGO
SPILL CONTACT:
TELEPHONE:

SPILLER: CON ED
CALLER
ADDRESS: 4 IRVING PLACE
MANHATTAN, NY 10003
TELEPHONE:

REPORTED BY: RESPONSIBLE PARTY

LAST DEC UPDATE: 8/18/2009
CLEAN UP MEET STANDARDS? NO
PENALTY RECOMMENDED? NO

CALLER REMARKS: CON ED WAS REMOVING AN ABANDONED GAS MAIN AND 1/2 GAL OF DRIP WATER SPILLED ONTO SOIL - SOIL BEING REMOVED CON ED 124766

DEC REMARKS:
08/18/09 - See eDocs for Con Ed report detailing cleanup and closure. Prior to Sept, 2004 data translation this spill Lead_DEC Field was ENGELHARDT DEC INSPECTOR NOTES 8-19-99 E-Mailed ERTs for E2mis report. CON ED E2MIS REPORT 6-01-99 While removing an abondoned gas main which contained drip water approx.1/2 gal spilled on to the soil in the excavation, spill was contained and spoiled soil excavated and placed in drum. Samples were taken for analysis. Reported to and input by Pollicino CIG was notified. Cleanup was completed 16:20

THERE MAYBE MORE DEC REMARKS AVAILABLE, PLEASE CONTACT THE NY DEC (518) 402-9549 FOR FURTHER INFORMATION

- Continued on next page -

Environmental FirstSearch
Site Detail Report

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

SPILLS

SEARCH ID: 60 **DIST/DIR:** 0.14 NW **ELEVATION:** 28 **MAP ID:** 19

NAME:
ADDRESS: LENOX AVE and W 116TH ST
MANHATTAN NY
NEW YORK
CONTACT:
SOURCE: NYSDEC

REV: 2/3/11
ID1: 9901554
ID2: 208542
STATUS: CLOSED
PHONE:

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

SPILLS

SEARCH ID: 32 **DIST/DIR:** 0.15 SW **ELEVATION:** 23 **MAP ID:** 22

NAME: ENGINE CO. 058/LADD. CO. 26 FDNY -DDC
ADDRESS: 1367 5TH AVE
MANHATTAN NY
NEW YORK
CONTACT:
SOURCE: NYSDEC

REV: 2/3/11
ID1: 9702345
ID2: 190797
STATUS: ACTIVE
PHONE:

SITE INFORMATION

SPILL DATE: 5/23/1997
DATE REPORTED: 5/23/1997
CLOSED DATE:
INSP DATE:
MATERIAL SPILLED: DIESEL
MATERIAL CLASS: PETROLEUM
AMOUNT SPILLED: 0 G
AMOUNT RECOVERED: 0 G

RESOURCE AFFECTED

SOIL:	True	**AIR:**	False
INDOOR AIR:	False	**GROUNDWATER:**	False
SURFACE WATER:	False	**DRINKING WATER:**	False
SEWER:	False	**IMPERVIOUS SURFACE:**	False
SUBWAY:	False	**UNDERGROUND UTILITIES:**	False

CAUSE OF SPILL: EQUIPMENT FAILURE
WATERBODY AFFECTED:
SOURCE OF SPILL: INSTITUTIONAL, EDUCATIONAL, GOV., OTHER
REPORTED BY: OTHER
REGION:
UST TRUST? NO

SPILL INVESTIGATOR: ADZHITOM
SPILL CONTACT: TONY MORINO - NYC DDC
TELEPHONE: (718) 391-1062

SPILLER: ENGINE CO 58/LADDER CO 26
TONY MORINO - NYC DDC
ADDRESS: 1367 5TH AV
MANHATTAN, NY
TELEPHONE:

REPORTED BY: OTHER

LAST DEC UPDATE: 6/30/2010
CLEAN UP MEET STANDARDS? NO
PENALTY RECOMMENDED? NO

CALLER REMARKS: LEAKING UST CAUSED SPILL - THEY JUST GOT LAB RESULTS BACK TODAY TO CONFIRM SPILL OCCURRED - INVESTIGATION and REPORT WILL BE SENT TO DDC - REMEDIATION WILL TAKE PLACE IF NECESSARY. ALSO SEE SPILL 9704554.

DEC REMARKS:
Prior to Sept, 2004 data translation this spill Lead_DEC Field was ZHITOMIRSKY 1/13/2006 Reviewed free product recovery data. The site has a free product plume. Source is still unknown. Consultants are trying to determine a source prior to recommending a remedial strategy.IRM is implemented but has not been very successful. The permanent system is required. AZ 4/17/2006 Contacted John Busse (URS) and reviewed submitted Proposed Remedial Strategy for Free Product Recovery Only. The site has a free phase plume. URS initially proposed an extractive bioventing system, a groundwater extraction system and a free product recovery system. But the plan, which was approved by DEC, was never implemented the only feasible location for the treatment system was area which is owned by the New York City Housing Authority, and NYCHA would not grant the necessary permission. In November 2006 URS submitted a report which proposed weekly site visits to the site to recover free product and evaluate the results in three months. If this approach is not effective URS will submit to the DEC a DAR for a permanent free product recovery system. On 4/17/2006 John

- Continued on next page -

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

SPILLS

SEARCH ID: 32 **DIST/DIR:** 0.15 SW **ELEVATION:** 23 **MAP ID:** 22

NAME: ENGINE CO. 058/LADD. CO. 26 FDNY -DDC
ADDRESS: 1367 5TH AVE
MANHATTAN NY
NEW YORK
CONTACT:
SOURCE: NYSDEC

REV: 2/3/11
ID1: 9702345
ID2: 190797
STATUS: ACTIVE
PHONE:

Busse stated that URS will submit to the DEC a plan for the permanent system soon. I stated that, under the existing conditions, free product plume should be addressed immediately and dissolved phase contamination and soil contamination plumes could be assessed later. AZ 6/7/2006 Reviewed a Design Analysis Report for the above referenced site submitted on May 1, 2006. The report states that based on the site monitoring data, free product was detected in MW-11, MW-13 and MW-18. URS proposed to install free product skimmer pumps in these wells. This proposal was approved. The effectiveness of free product recovery system performance should be evaluated in a quarter. A monitoring plan should be implemented. AZ 1/23/2007 At the meeting with DDC/URS on January 10, 2007, the site was discussed. Jane Staten informed that URS performs weekly free product recovery - a few gallons of product are recovered each time. Specs and drawings are being prepared. A contract will be bid in February 2007. AZ 8-13-2007 Reviewed Free Product Recovery Data Report dated April 25, 2007. The report stated that free product thickness ranged from 0.14 to 2.69 in MW-13. Manual bailing has had little impact on product levels. A permanent recovery system will be installed and operational by the end of summer 2007. AZ 2-20-2008 Reviewed Free Product Recovery Data through October 2007 submitted in November 2007. The Report stated that to date the effort to remove free product from wells MW-11, MW-13 and MW-18 has had little to no impact on product levels. The free product thickness ranged from 0.59 in MW-18 to 0.82 in MW-13. The report stated that the free product recovery system should be operational by the end of 2007. An e-mail was sent to DDC/URS: ...The report stated that the permanent free product recovery system should be operational by the end of 2007. The previous report dated April 2007 stated that the system will be installed and operational by the end of summer 2007. However, the system has yet to be installed. DEC requests that the permanent free product recovery system should be installed without delay. Several monitoring wells should be installed on Fifth Avenue west of monitoring wells MW-13, MW-18 and MW-11 to delineate the free phase plume. Site wells which do not contain free product should be sampled for dissolved VOCs and SVOCS. AZ 3-5-2008 Discussed the site with Jane Staten: two additional wells should be installed between MW-14 and WM-15 if utilities and structures allow. All wells should be gaged. AZ 8-13-2008 Reviewed Summary of Well Installation and Latest Groundwater Results. dated 6/11/2008. Wells MW-22 and MW-23 were installed across the street from EC 58. There is no dissolved groundwater contamination at the site. Wells MW-11, MW-13, and MW-18 contain free product. Franklin is currently constructing the product recovery system at the site. It is anticipated, according to URS, that the system will be operational by the end of June 2008. Three product recovery wells were installed at the locations of the wells that historically exhibited free product, including MW-11, MW-13, and MW-18. URS does not anticipate visiting the site to collect gw samples or gauge wells. I requested, via e-mail, that semi-annual site-wide free product gauging and groundwater sampling be performed to monitor site conditions and off-site plume migration. The results of monitoring and sampling should be included in the remediation system performance reports. 1-8-2009 Reviewed System Performance Monitoring data for July-October 2008. Franklin constructed the product recovery system that consisted of PetroXtractor oil skimmer pump installed in three wells. On July 25, 2008, URS re-installed well RW-02 (MW-13). On July 25, 2008, system began operating. After one week of operation, no product was detected in any recovery wells. 2 gallons of product was recovered from wells RW-01 and RW-03. URS recommended that the system be shut down temporarily. URS will gauge the wells monthly and if product is detected will resume system operation. AZ 5-19-09 Reviewed System Performance Monitoring data for November 2008 - February 2009.On January 31, 2009 the system began operating; however, the motors failed in two wells. Franklin has ordered new motors. Currently, only well RW-03 is exhibiting free product. AZ 1-6-09 Reviewed System Performance Monitoring data for November 2008 - February 2009.PetroXtractor oil skimmer pumps are installed in 3 three recovery wells RW-1 (formerly MW-11), RW-2(MW-13), RW-3(MW-18).On April 29, 09, Franklin operated W-1 and RW-2 every other week, RW-3 was operated continuously. All pumps were operated continuously beginning June 2009. AZ 2-9-2010 Reviewed System Performance Monitoring data for June - August 2009. No product was measured during this monitoring period. AZ 3-22-2010 Reviewed System Performance Monitoring data for September - November 2009. On September 9, 09 032 feet of product was detected in MW-8 which is located about 40 feet sidegradient of the extraction wells.Vacuum truck visited the site on September 17, 09. MW-8 exhibited free product of five occasions between 2001 and 2002 with measurements ranging from a sheen to 2.6 . AZ 6-30-2010 Reviewed System Performance Monitoring data for December 2009 - February 2010. Product was measured in RW-01 on January 13, 2010 (0.19). Product is consistently detected in the holding tank for RW-1. Also product was detected in holding tank for RW-02. AZ

THERE MAYBE MORE DEC REMARKS AVAILABLE, PLEASE CONTACT THE NY DEC (518) 402-9549 FOR FURTHER INFORMATION

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

SPILLS

SEARCH ID: 22 **DIST/DIR:** 0.16 NE **ELEVATION:** 28 **MAP ID:** 26

NAME: 63 W.119TH ST
ADDRESS: 63 W 119TH ST
NEW YORK NY
NEW YORK
CONTACT:
SOURCE: NYSDEC

REV: 2/3/11
ID1: 0107880
ID2: 263902
STATUS: ACTIVE
PHONE:

SITE INFORMATION

SPILL DATE: 11/1/2001
DATE REPORTED: 11/1/2001
CLOSED DATE:
INSP DATE:
MATERIAL SPILLED: 2 FUEL OIL
MATERIAL CLASS: PETROLEUM
AMOUNT SPILLED: 50 G
AMOUNT RECOVERED: 0 G

RESOURCE AFFECTED

SOIL: True
INDOOR AIR: False
SURFACE WATER: False
SEWER: False
SUBWAY: False
AIR: False
GROUNDWATER: False
DRINKING WATER: False
IMPERVIOUS SURFACE: False
UNDERGROUND UTILITIES: False

CAUSE OF SPILL: UNKNOWN
WATERBODY AFFECTED:
SOURCE OF SPILL: TANK TRUCK
REPORTED BY: FIRE DEPARTMENT
REGION:
UST TRUST? NO

SPILL INVESTIGATOR: SFRAHMAN
SPILL CONTACT: NYC HOUSING OP 171
TELEPHONE: (212) 824-4328 0

SPILLER: UNK

ADDRESS: UNK
UNK, ZZ
TELEPHONE:

REPORTED BY: FIRE DEPARTMENT

LAST DEC UPDATE: 10/8/2010
CLEAN UP MEET STANDARDS? NO
PENALTY RECOMMENDED? NO

CALLER REMARKS: DELIVERY OF FUEL TODAY MAYTERILA IS LOCATED IN BASEMENT UNK AT THIS POINT IF ANY CONTAMINATION LEFT THE BASEMENT FD ON SCENE NOW PUMPING SOME OF THE MATERIAL OUT WAITING FOR NYC HOUSING TO RESPOND NYC HOUSING COMP 1519000

DEC REMARKS:
Prior to Sept, 2004 data translation this spill Lead_DEC Field was TIPPLE 11/02/2001 DEMEO REFERRED THE FOLLOWUP TO TIPPLE. VERNON ROBERTS PRIOR SUPER 718-861-2480 DAUGHTER AND FORMER OWNER CHERYL ROBERTS 212-926-6274 THE PROPERTY WAS TAKEN BACK BY HPD FOR NON-PAYMENT OF TAXES AS PER CONVERSATIONS WITH BOTH VERNON AND CHERYL. THEY BOTH EITHER HAVE NO KNOWLEDGE OF OR REFUSE TO REVEAL THE NAME OF THE OIL COMPANY THAT OVERFILLED THE TANK. JIM GALLAGHER 212-863-8638 EMERGENCY REPAIR BUREAU OF HPD WAS CALLED IN AN ATTEMPT TO FIND THE OIL COMPANY.
2/6/03 - AUSTIN, DDO - CALL FROM LORETTA METRO FUEL(718-383-1400) - SHE WANTS TO CLOSE OUT THE SPILL FOR A CLIENT - I TOLD HER TO FOIL RECORDS, PROVIDE AN UPDATE TO US FOR CLOSURE 10/10 03 TIPPLE SENT REQUEST FOR DOCUMENTATION
10/8/10 - Austin - Reassigned from Tang to Spills staff - end

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Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

SPILLS

SEARCH ID: 22 **DIST/DIR:** 0.16 NE **ELEVATION:** 28 **MAP ID:** 26

NAME: 63 W.119TH ST
ADDRESS: 63 W 119TH ST
NEW YORK NY
NEW YORK
CONTACT:
SOURCE: NYSDEC

REV: 2/3/11
ID1: 0107880
ID2: 263902
STATUS: ACTIVE
PHONE:

THERE MAYBE MORE DEC REMARKS AVAILABLE, PLEASE CONTACT THE NY DEC (518) 402-9549 FOR FURTHER INFORMATION

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

SPILLS

SEARCH ID: 25 **DIST/DIR:** 0.18 NE **ELEVATION:** 28 **MAP ID:** 35

NAME: APARTMENT BUILDING
ADDRESS: 42 W 120TH ST
NEW YORK NY
NEW YORK
CONTACT:
SOURCE: NYSDEC

REV: 2/3/11
ID1: 9411587
ID2: 295950
STATUS: ACTIVE
PHONE:

SITE INFORMATION

SPILL DATE: 11/30/1994
DATE REPORTED: 11/30/1994
CLOSED DATE:
INSP DATE:
MATERIAL SPILLED: 4 FUEL OIL
MATERIAL CLASS: PETROLEUM
AMOUNT SPILLED: 100 G
AMOUNT RECOVERED: 0 G

RESOURCE AFFECTED

SOIL:	True	**AIR:**	False
INDOOR AIR:	False	**GROUNDWATER:**	False
SURFACE WATER:	False	**DRINKING WATER:**	False
SEWER:	False	**IMPERVIOUS SURFACE:**	False
SUBWAY:	False	**UNDERGROUND UTILITIES:**	False

CAUSE OF SPILL: EQUIPMENT FAILURE
WATERBODY AFFECTED:
SOURCE OF SPILL: INSTITUTIONAL, EDUCATIONAL, GOV., OTHER
REPORTED BY: OTHER
REGION:
UST TRUST? NO

SPILL INVESTIGATOR: HRAHMED
SPILL CONTACT:
TELEPHONE:

SPILLER: APARTMENT BUILDING
BOB DECK
ADDRESS: 42 WEST 120 STREET
MANHATTAN, NY
TELEPHONE:

REPORTED BY: OTHER

LAST DEC UPDATE: 8/19/2008
CLEAN UP MEET STANDARDS? NO
PENALTY RECOMMENDED? NO

CALLER REMARKS: SPEEDY DRY USED-WILL PUT INTO DRUMS ETC.

DEC REMARKS:
Information request letter sent to Tahl-Propp Equities 11/04/05. Heitzman Spill transferred back to R-2 3/7/08 - Austin - Assigned to Ketani for further investigation - end 7/15/08 - Raphael Ketani. The spill happened on 11/30/94. About 100 gal. of 4 oil was spilled. The oil was cleaned up and the spent absorbent was put into drums. There is just one letter in the paper file. It is dated November 4, 2005 and is the same letter that I found in the E-docs. There were no other documents available. There is no PBS record. The site is block and lot 1718 and 53. Alternate addresses are 42-44 W. 120 Street. The owner of record is 40-44 West 120 Street Associates, LLC, c/o Tahl-Propp Equities, 405 Park Avenue, Ste 1103, NY, 10022-9410. I tried the alternate address and still couldn t find a PBS record. I sent a CSL. 8/18/08 - Raphael Ketani. The case is being prepared for transfer due to a case realignment within the unit. The case manager should find out whether a site investigation is taking place or whether an investigation plan has been written. The owners need to submit a PBS registration for the tanks.

THERE MAYBE MORE DEC REMARKS AVAILABLE, PLEASE CONTACT THE NY DEC (518) 402-9549 FOR FURTHER

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Environmental FirstSearch
Site Detail Report

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

SPILLS

SEARCH ID: 25 **DIST/DIR:** 0.18 NE **ELEVATION:** 28 **MAP ID:** 35

NAME: APARTMENT BUILDING
ADDRESS: 42 W 120TH ST
NEW YORK NY
NEW YORK
CONTACT:
SOURCE: NYSDEC

REV: 2/3/11
ID1: 9411587
ID2: 295950
STATUS: ACTIVE
PHONE:

INFORMATION

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

SPILLS

SEARCH ID: 37 **DIST/DIR:** 0.20 SW **ELEVATION:** 26 **MAP ID:** 41

NAME: KING TOWERS -NYCHA
ADDRESS: 70 LENOX AVE
NEW YORK CITY NY
NEW YORK
CONTACT:
SOURCE: NYSDEC

REV: 2/3/11
ID1: 9102023
ID2: 319307
STATUS: ACTIVE
PHONE:

SITE INFORMATION

SPILL DATE: 5/20/1991
DATE REPORTED: 5/21/1991
CLOSED DATE:
INSP DATE:
MATERIAL SPILLED: 6 FUEL OIL
MATERIAL CLASS: PETROLEUM
AMOUNT SPILLED: 50 G
AMOUNT RECOVERED: 0 G

RESOURCE AFFECTED

SOIL:	False	**AIR:**	False
INDOOR AIR:	False	**GROUNDWATER:**	False
SURFACE WATER:	False	**DRINKING WATER:**	False
SEWER:	True	**IMPERVIOUS SURFACE:**	False
SUBWAY:	False	**UNDERGROUND UTILITIES:**	False

CAUSE OF SPILL: UNKNOWN
WATERBODY AFFECTED:
SOURCE OF SPILL: INSTITUTIONAL, EDUCATIONAL, GOV., OTHER
REPORTED BY: RESPONSIBLE PARTY
REGION:
UST TRUST? NO

SPILL INVESTIGATOR: jkkann
SPILL CONTACT:
TELEPHONE:

SPILLER: NYCHA

ADDRESS: 250 BROADWAY
NEW YORK, NY
TELEPHONE:

REPORTED BY: RESPONSIBLE PARTY

LAST DEC UPDATE: 9/21/2010
CLEAN UP MEET STANDARDS? NO
PENALTY RECOMMENDED? NO

CALLER REMARKS: POSSIBLE SEEPAGE FROM UNDERGROUND TANK,MAY BEING OVERFLOWING DUE TO FLOOD IN BOILER ROOM, EPA,NYCFD HAZ MAT NOTIFIED,WILL BE CONTRACTING TO CLEAN UP SPILL.

DEC REMARKS:
01/23/06: This spill transferred from J.Kolleeny to S.Kraszewski. Two 25K tanks installed in 1954. TTF in 1989 followed by installation of some MWs. TTF in 1991 followed by Phase II Investigation. A passive recovery system was installed in the boiler room to collect fuel oil seepage. Unsure about monitoring records for wells and recovery system. Need to contact NYCHA for an update. - SK 9/22/06: Spill transferred from Kraszewski to Kann. 7/31/07: J.Kann - WP submitted 7/27/07 and is under review. 7/20/10: J.Kann - WP received on 7/15/10. 9/21/10: J.Kann - Quarterly Report Rcvd 9/1/10.

THERE MAYBE MORE DEC REMARKS AVAILABLE, PLEASE CONTACT THE NY DEC (518) 402-9549 FOR FURTHER INFORMATION

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Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

SPILLS

SEARCH ID: 37 **DIST/DIR:** 0.20 SW **ELEVATION:** 26 **MAP ID:** 41

NAME:	KING TOWERS -NYCHA	**REV:**	2/3/11
ADDRESS:	70 LENOX AVE	**ID1:**	9102023
	NEW YORK CITY NY	**ID2:**	319307
	NEW YORK	**STATUS:**	ACTIVE
CONTACT:		**PHONE:**	
SOURCE:	NYSDEC		

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

UST

SEARCH ID: 67 **DIST/DIR:** 0.08 NE **ELEVATION:** 32 **MAP ID:** 10

NAME: DUNLEVY MILBANK CHLDRNS CNTR
ADDRESS: 14-32 W 118TH ST
NEW YORK NY 10026
NEW YORK
CONTACT:
SOURCE: NY DEC

REV: 2/3/11
ID1: PBS2-341487
ID2:
STATUS: ACTIVE
PHONE:

PETROLEUM BULK STORAGE FACILITY INFORMATION

SITE STATUS: ACTIVE
EXPIRATION DATE: 2012/11/16

CONTACT INFORMATION

COMPANY NAME: THE CHILDRENS AID SOCIETY
CONTACT : GARY DAWYOT

,NN,

(212) 254-3074

COMPANY NAME: DUNLEVY MILBANK CHLDRNS CNTR
CONTACT : THE CHILDRENS AID SOCIETY

,NN,

(212) 369-1223

COMPANY NAME: THE CHILDRENS AID SOCIETY
CONTACT : GARY DAWYOT
DIRECTOR OF FACILITIEA
105 EAST 22ND STREET
NEW YORK,NY, 10010

(212) 949-4800

TANK INFORMATION

TANK NUMBER: 001
TANKS STATUS: IN SERVICE
CAPACITY(GAL): 10000
NEXT TEST: 11/20/2012
REGISTERED: YES
TANK LOCATION: UNDERGROUND, VAULTED, WITH ACCESS

TANK ID: 31764
INSTALL DATE: 4/1/1958
DATE OF TEST: 11/20/2007
CLOSED DATE:
TANK TYPE: STEEL/CARBON STEEL

HISTORIC TANK INFORMATION FROM 2007

TANK NUMBER: 001
ACTIVE STATUS: ACTIVE
CLOSED:
PRODUCT: 2 FUEL OIL

TANK STATUS: IN SERVICE
INSTALLED: 4/1/1958
TANK CAPACITY: 10000 GALLONS

- Continued on next page -

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

UST

SEARCH ID: 67 **DIST/DIR:** 0.08 NE **ELEVATION:** 32 **MAP ID:** 10

NAME: DUNLEVY MILBANK CHLDRNS CNTR
ADDRESS: 14-32 W 118TH ST
NEW YORK NY 10026
NEW YORK
CONTACT:
SOURCE: NY DEC

REV: 2/3/11
ID1: PBS2-341487
ID2:
STATUS: ACTIVE
PHONE:

TANK TYPE: STEEL/CARBON STEEL/IRON
TANK LOCATION: UNDERGROUND
INTERNAL PROTECTION: NONE
EXTERNAL PROTECTION: PAINTED/ASPHALT COATING
EXTERNAL PROTECTION 2:

PIPE TYPE: STEEL/CARBON STEEL/IRON
PIPE LOCATION: ABOVEGROUND/UNDERGROUND COMBINATION
EXTERNAL PROTECTION: NONE
EXTERNAL PROTECTION 2:

SECONDARY CONTAINMENT: NONE
SECONDARY CONTAINMENT 2:
LEAK DETECTION: NONE
LEAK DETECTION 2:

OVERFILL PROTECTION: PRODUCT LEVEL GAUGE (A/G)
OVERFILL PROTECTION 2:
DISPENSER: SUCTION
SPILL PREVENTION:
DATE TESTED: 11/20/2007
NEXT TEST: 11/20/2012
TEST METHOD: HORNER EZY3/EZY3 LOCATOR PLUS

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

UST

SEARCH ID: 68 **DIST/DIR:** 0.08 NE **ELEVATION:** 31 **MAP ID:** 11

NAME: PUBLIC SCHOOL 149 - MANHATTAN
ADDRESS: 34 W 118TH ST
NEW YORK NY 10026
NEW YORK
CONTACT:
SOURCE: NY DEC

REV: 2/3/11
ID1: PBS2-353752
ID2:
STATUS: ACTIVE
PHONE:

PETROLEUM BULK STORAGE FACILITY INFORMATION

SITE STATUS: ACTIVE
EXPIRATION DATE: 2013/06/28

CONTACT INFORMATION

COMPANY NAME: NEW YORK CITY DEPARTMENT OF EDUCATION
CONTACT : JAMES A. MERLO

FIELD OPERATIONS-FUEL DIVISION 44-36 VERNON BOULEVARD
LONG ISLAND CITY,NY, 11101

COMPANY NAME: NEW YORK CITY DEPARTMENT OF EDUCATION
CONTACT : JAMES A. MERLO
MANAGER, FUEL DIVISION
44-36 VERNON BOULEVARD
LONG ISLAND CITY,NY, 11101

COMPANY NAME: NEW YORK CITY DEPARTMENT OF EDUCATION
CONTACT : SCHOOL SAFETY

,NN,

(718) 935-3300

COMPANY NAME: PUBLIC SCHOOL 149 - MANHATTAN
CONTACT : PLANT OPERATIONS

,NN,

(718) 349-5400

TANK INFORMATION

TANK NUMBER:	001	**TANK ID:**	34402
TANKS STATUS:	IN SERVICE	**INSTALL DATE:**	1/1/1968
CAPACITY(GAL):	10000	**DATE OF TEST:**	
NEXT TEST:		**CLOSED DATE:**	
REGISTERED:	YES	**TANK TYPE:**	STEEL/CARBON STEEL
TANK LOCATION:	ABOVEGROUND: 10% OR MORE BELOW GROUND		

TANK NUMBER:	002	**TANK ID:**	34403
TANKS STATUS:	IN SERVICE	**INSTALL DATE:**	1/1/1968
CAPACITY(GAL):	10000	**DATE OF TEST:**	

- Continued on next page -

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

UST

SEARCH ID: 68 **DIST/DIR:** 0.08 NE **ELEVATION:** 31 **MAP ID:** 11

NAME: PUBLIC SCHOOL 149 - MANHATTAN
ADDRESS: 34 W 118TH ST
NEW YORK NY 10026
NEW YORK
CONTACT:
SOURCE: NY DEC

REV: 2/3/11
ID1: PBS2-353752
ID2:
STATUS: ACTIVE
PHONE:

NEXT TEST:
REGISTERED: YES
TANK LOCATION: ABOVEGROUND: 10% OR MORE BELOW GROUND

CLOSED DATE:
TANK TYPE: STEEL/CARBON STEEL

HISTORIC TANK INFORMATION FROM 2007

TANK NUMBER: 001
ACTIVE STATUS: ACTIVE
CLOSED:
PRODUCT: 6 FUEL OIL
TANK STATUS: IN SERVICE
INSTALLED:
TANK CAPACITY: 10000 GALLONS

TANK TYPE: STEEL/CARBON STEEL/IRON
TANK LOCATION: ABOVEGROUND ON CRIB, RACK, OR CRADLE
INTERNAL PROTECTION: NONE
EXTERNAL PROTECTION: NONE
EXTERNAL PROTECTION 2:

PIPE TYPE: STEEL/CARBON STEEL/IRON
PIPE LOCATION: NO PIPING
EXTERNAL PROTECTION: NONE
EXTERNAL PROTECTION 2:

SECONDARY CONTAINMENT: VAULT (W/O ACCESS)
SECONDARY CONTAINMENT 2:
LEAK DETECTION: NONE
LEAK DETECTION 2:

OVERFILL PROTECTION: PRODUCT LEVEL GAUGE (A/G)
OVERFILL PROTECTION 2:
DISPENSER: SUCTION
SPILL PREVENTION:
DATE TESTED:
NEXT TEST:
TEST METHOD: TESTING NOT REQUIRED

TANK NUMBER: 002
ACTIVE STATUS: ACTIVE
CLOSED:
PRODUCT: 6 FUEL OIL
TANK STATUS: IN SERVICE
INSTALLED:
TANK CAPACITY: 10000 GALLONS

TANK TYPE: STEEL/CARBON STEEL/IRON
TANK LOCATION: ABOVEGROUND ON CRIB, RACK, OR CRADLE
INTERNAL PROTECTION: NONE
EXTERNAL PROTECTION: NONE
EXTERNAL PROTECTION 2:

PIPE TYPE: STEEL/CARBON STEEL/IRON
PIPE LOCATION: NO PIPING
EXTERNAL PROTECTION: NONE
EXTERNAL PROTECTION 2:

SECONDARY CONTAINMENT: VAULT (W/O ACCESS)

- Continued on next page -

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

UST

SEARCH ID: 68 **DIST/DIR:** 0.08 NE **ELEVATION:** 31 **MAP ID:** 11

NAME: PUBLIC SCHOOL 149 - MANHATTAN
ADDRESS: 34 W 118TH ST
NEW YORK NY 10026
NEW YORK
CONTACT:
SOURCE: NY DEC

REV: 2/3/11
ID1: PBS2-353752
ID2:
STATUS: ACTIVE
PHONE:

SECONDARY CONTAINMENT 2:
LEAK DETECTION: NONE
LEAK DETECTION 2:

OVERFILL PROTECTION: PRODUCT LEVEL GAUGE (A/G)
OVERFILL PROTECTION 2:
DISPENSER: SUCTION
SPILL PREVENTION:
DATE TESTED:
NEXT TEST:
TEST METHOD: TESTING NOT REQUIRED

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

UST

SEARCH ID: 66 **DIST/DIR:** 0.09 NE **ELEVATION:** 32 **MAP ID:** 14

NAME: CANAAN HOUSES
ADDRESS: 8 W 118TH ST
NEW YORK NY 10026
NEW YORK
CONTACT:
SOURCE: NY DEC

REV: 2/3/11
ID1: PBS2-600905
ID2:
STATUS: ACTIVE
PHONE:

PETROLEUM BULK STORAGE FACILITY INFORMATION

SITE STATUS: ACTIVE
EXPIRATION DATE: 1997/10/07

CONTACT INFORMATION

COMPANY NAME: CANAAN HOUSES ASSOCIATES
CONTACT : LISA CHESTON-WALKER

C/O SHINDA MANAGEMENT CORP 217-02 JAMAICA AVENUE
QUEENS VILLAGE,NY, 11428

(718

COMPANY NAME: CANAAN HOUSES ASSOCIATES
CONTACT : LISA WALKER

,NN,

(718) 740-0416

COMPANY NAME: CANAAN HOUSES ASSOCIATES
CONTACT :

8 WEST 118TH STREET
NEW YORK,NY, 10026

(212) 369-6655

COMPANY NAME: CANAAN HOUSES
CONTACT : JEFFREY COPPIN

,NN,

(212) 722-8441

TANK INFORMATION

TANK NUMBER:	001	**TANK ID:**	44571
TANKS STATUS:	IN SERVICE	**INSTALL DATE:**	
CAPACITY(GAL):	5000	**DATE OF TEST:**	7/1/1991
NEXT TEST:	7/1/1996	**CLOSED DATE:**	
REGISTERED:	YES	**TANK TYPE:**	STEEL/CARBON STEEL
TANK LOCATION:	UNDERGROUND, VAULTED, WITH ACCESS		

- Continued on next page -

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

UST

SEARCH ID: 66 **DIST/DIR:** 0.09 NE **ELEVATION:** 32 **MAP ID:** 14

NAME: CANAAN HOUSES
ADDRESS: 8 W 118TH ST
NEW YORK NY 10026
NEW YORK
CONTACT:
SOURCE: NY DEC

REV: 2/3/11
ID1: PBS2-600905
ID2:
STATUS: ACTIVE
PHONE:

HISTORIC TANK INFORMATION FROM 2007

TANK NUMBER:	001	**TANK STATUS:**	IN SERVICE
ACTIVE STATUS:	ACTIVE	**INSTALLED:**	
CLOSED:		**TANK CAPACITY:**	5000 GALLONS
PRODUCT:	2 FUEL OIL		

TANK TYPE:	STEEL/CARBON STEEL/IRON
TANK LOCATION:	UNDERGROUND
INTERNAL PROTECTION:	NONE
EXTERNAL PROTECTION:	NONE
EXTERNAL PROTECTION 2:	
PIPE TYPE:	STEEL/CARBON STEEL/IRON
PIPE LOCATION:	UNDERGROUND/ON-GROUND
EXTERNAL PROTECTION:	NONE
EXTERNAL PROTECTION 2:	
SECONDARY CONTAINMENT:	NONE
SECONDARY CONTAINMENT 2:	
LEAK DETECTION:	OTHER
LEAK DETECTION 2:	
OVERFILL PROTECTION:	PRODUCT LEVEL GAUGE (A/G)
OVERFILL PROTECTION 2:	
DISPENSER:	SUCTION
SPILL PREVENTION:	
DATE TESTED:	7/1/1991
NEXT TEST:	7/1/1996
TEST METHOD:	HORNER EZ CHECK I OR II

Environmental FirstSearch
Street Name Report for Streets within .25 Mile(s) of Target Property

Target Property: 1428 FIFTH AVE
NEW YORK NY 10035

JOB: LM09015.11

Street Name	Dist/Dir	Street Name	Dist/Dir
5th Ave	0.07 SE	W 112 St	0.20 SW
E 112 St	0.21 SW	W 112th St	0.20 SW
E 112th St	0.21 SW	W 113 St	0.19 SW
E 115 St	0.09 SE	W 113th St	0.19 SW
E 115th St	0.09 SE	W 114 St	0.16 SW
E 116 St	0.07 SE	W 114th St	0.16 SW
E 116th St	0.07 SE	W 115 St	0.05 SW
E 117 St	0.09 NE	W 115th St	0.05 SW
E 117th St	0.09 NE	W 116 St	0.00 --
E 118 St	0.13 NE	W 116th St	0.00 --
E 118th St	0.13 NE	W 117 St	0.06 NE
E 119 St	0.17 NE	W 117th St	0.06 NE
E 119th St	0.17 NE	W 118 St	0.10 NE
E 120 St	0.22 NE	W 118th St	0.10 NE
E 120th St	0.22 NE	W 119 St	0.15 NE
Lenox Ave	0.12 NW	W 119th St	0.15 NE
Luis Munoz Marin Blv	0.07 SE	W 120 St	0.20 NE
Madison Ave	0.17 SE	W 120th St	0.20 NE
Malcolm X Blvd	0.12 NW	W 121 St	0.25 NE
Mount Morris Park W	0.20 NE	W 121st St	0.25 NE
St Nicholas Ave	0.25 NW	West 120th St	0.20 NE
W 111 St	0.25 SW		
W 111th St	0.25 SW		

HISTORICAL FIRE INSURANCE MAPS

MAPS AVAILABLE

04-05-11
LM09015.11
1428 FIFTH AVE
NEW YORK NY 10035

A search of FirstSearch Technology Corporation's proprietary database of historical fire insurance map availability confirmed that there is a high probability that MAPS ARE AVAILABLE for the Subject Location as shown above.

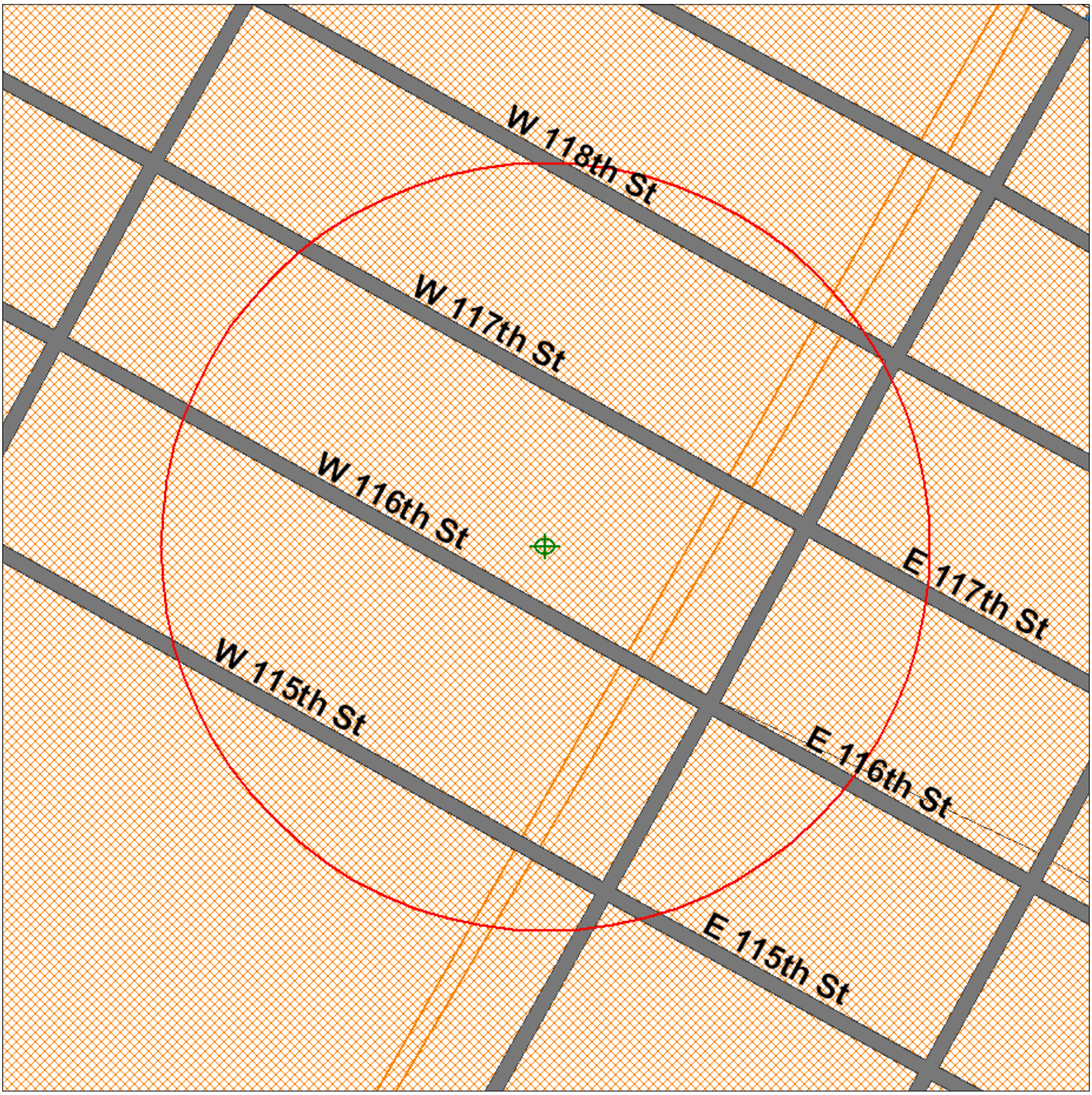
FirstSearch Technology Corporation's proprietary database of historical fire insurance map availability represents abstracted information from the Sanborn® Map Company obtained through online access to the U.S. Library of Congress via local libraries.

Environmental FirstSearch

.12 Mile Radius

Historical Fire Insurance Coverage Map

1428 FIFTH AVE, NEW YORK NY 10035



Source: 2005 U.S. Census TIGER Files

Target Site (Latitude: 40.80127 Longitude: -73.947306) .....

Historical Fire Insurance Coverage Map .....

Railroads .....

Black Rings Represent 1/4 Mile Radius; Red Ring Represents 500 ft. Radius

Environmental FirstSearch

1 Mile Radius

ASTM Map: NPL, RCRACOR, STATE Sites

1428 FIFTH AVE, NEW YORK NY 10035

Source: 2005 U.S. Census TIGER Files

Target Site (Latitude: 40.80127 Longitude: -73.947306) .....

Identified Site, Multiple Sites, Receptor .....

NPL, DELNPL, Brownfield, Solid Waste Landfill (SWL), Hazardous Waste

Triballand.....

Railroads .....

Black Rings Represent 1/4 Mile Radius; Red Ring Represents 500 ft. Radius

Environmental FirstSearch

.5 Mile Radius

ASTM Map: CERCLIS, RCRATSD, LUST, SWL

1428 FIFTH AVE, NEW YORK NY 10035

Source: 2005 U.S. Census TIGER Files

Target Site (Latitude: 40.80127 Longitude: -73.947306) .....

Identified Site, Multiple Sites, Receptor .....

NPL, DELNPL, Brownfield, Solid Waste Landfill (SWL), Hazardous Waste

Triballand.....

Railroads .....

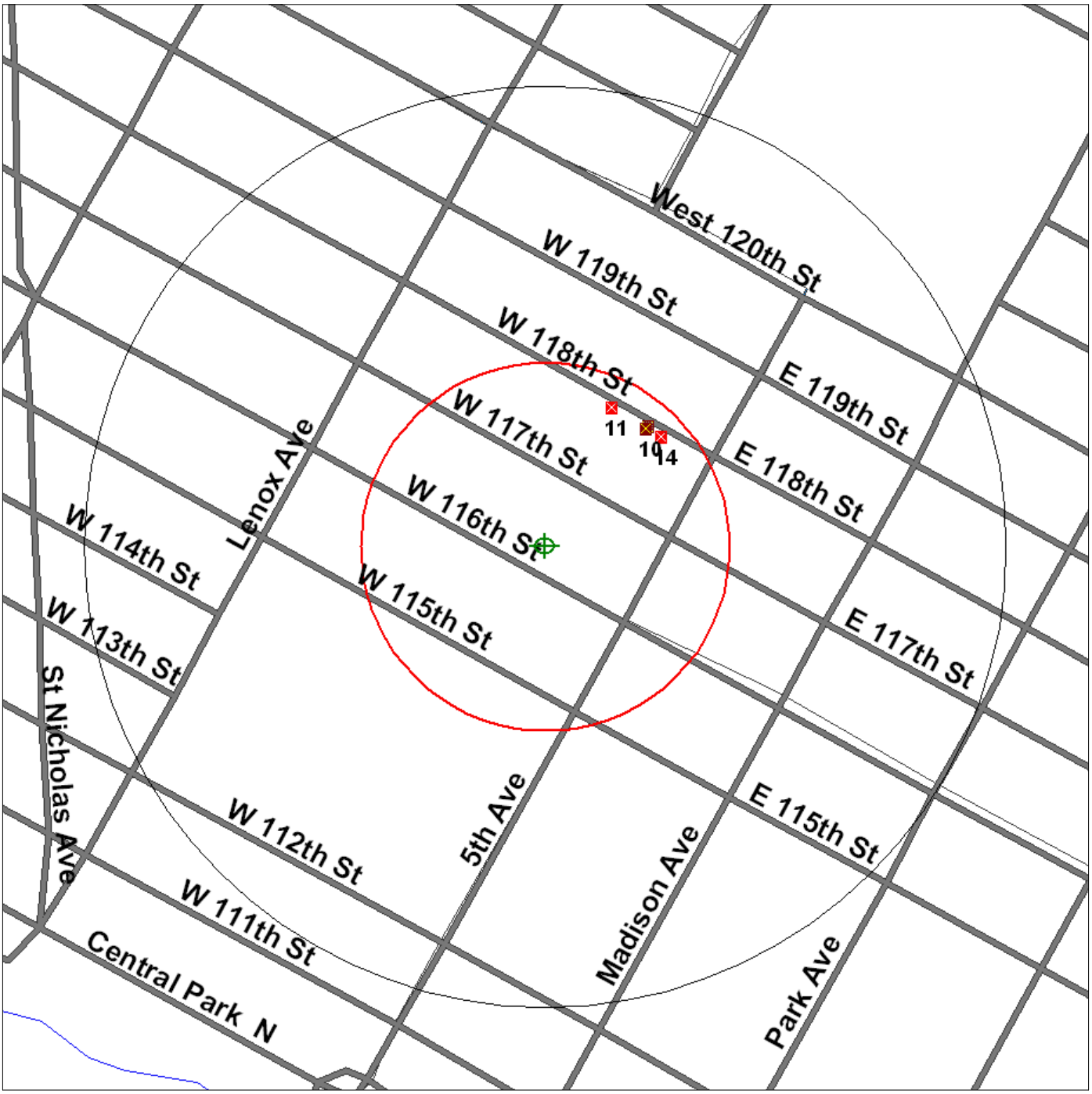
Black Rings Represent 1/4 Mile Radius; Red Ring Represents 500 ft. Radius

Environmental FirstSearch

.25 Mile Radius

ASTM Map: RCRAGEN, ERNS, UST, FED IC/EC, METH LABS

1428 FIFTH AVE, NEW YORK NY 10035



Source: 2005 U.S. Census TIGER Files

Target Site (Latitude: 40.80127 Longitude: -73.947306) .....

Identified Site, Multiple Sites, Receptor .....

NPL, DELNPL, Brownfield, Solid Waste Landfill (SWL), Hazardous Waste

Triballand.....

Railroads .....

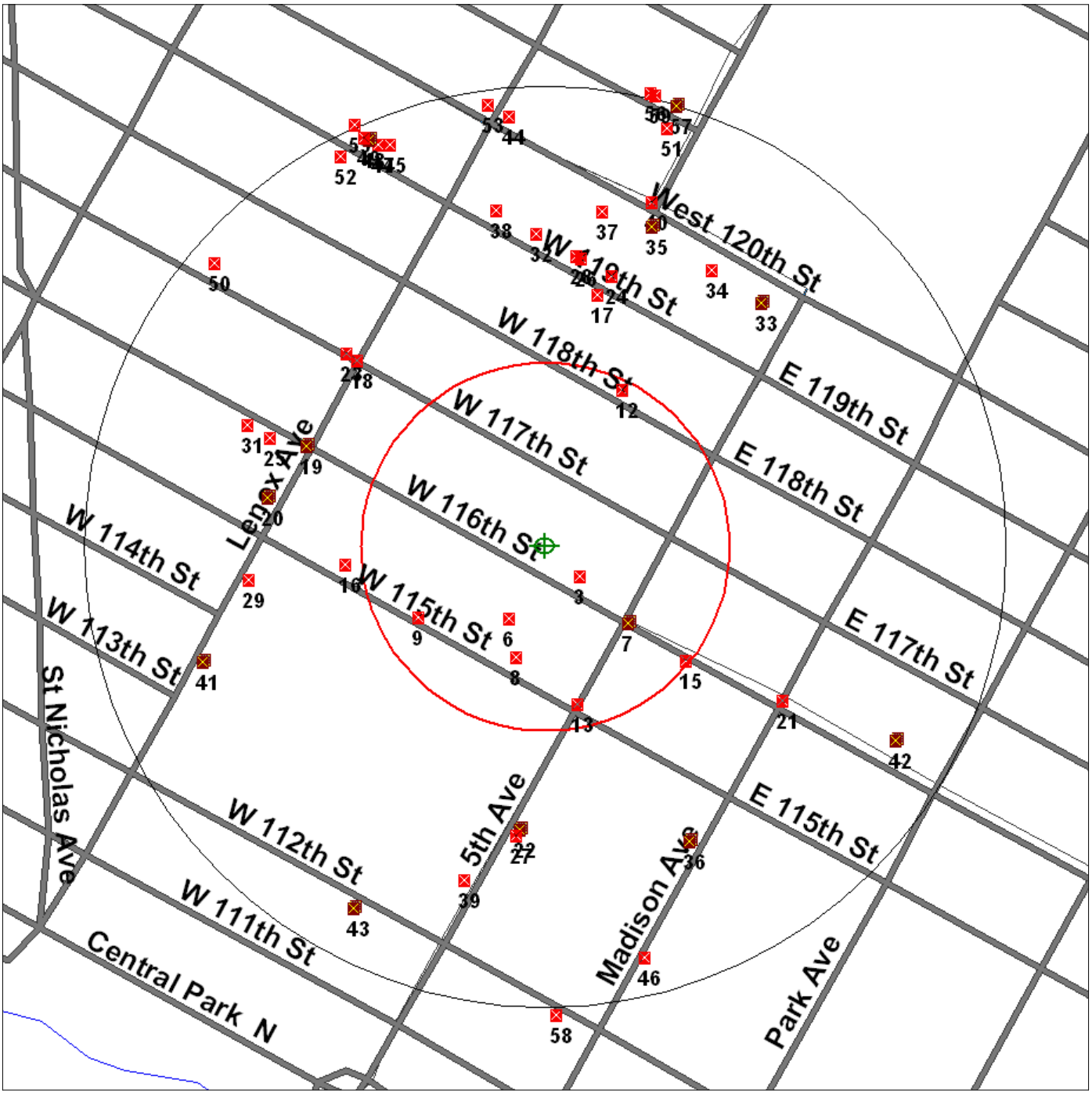
Black Rings Represent 1/4 Mile Radius; Red Ring Represents 500 ft. Radius

Environmental FirstSearch

.25 Mile Radius

Non-ASTM Map: Spills 90, Spills 80, Other

1428 FIFTH AVE, NEW YORK NY 10035



Source: 2005 U.S. Census TIGER Files

Target Site (Latitude: 40.80127 Longitude: -73.947306) .....

Identified Site, Multiple Sites, Receptor .....

NPL, DELNPL, Brownfield, Solid Waste Landfill (SWL), Hazardous Waste

Triballand.....

National Historic Sites and Landmark Sites .....

Railroads .....

Black Rings Represent 1/4 Mile Radius; Red Ring Represents 500 ft. Radius

APPENDIX G

Qualifications of Environmental Professional(s)

Ecosystems Strategies, Inc.

Paul H. Ciminello, CEM, CAQS
PRESIDENT
paul@ecosystemsstrategies.com

EDUCATION

Master of Environmental Management, 1986
School of the Environment, Duke University, Durham, North Carolina

Master of Arts in Public Policy Sciences, 1986
Institute of Policy Sciences and Public Affairs, Duke University, Durham, North Carolina

Bachelor of Arts, 1980
Tufts University, Medford, Massachusetts

CERTIFICATIONS AND TRAINING

Certified Environmental Manager, Environmental Assessment Association, 2006
Certified Air Quality Specialist, Environmental Assessment Association, 2007
NJ Dept. of Environmental Protection Licensed Subsurface Evaluator (License Number: 0014686)
NYS Dept. of Labor Certified Asbestos Building Inspector (Cert. Number: AH92-14884)
NYS Department of State, Division of Licensing Services, Real Estate Instructor
In compliance with OSHA Hazardous Materials Safety (29 CFR 1910) requirements

PROFESSIONAL EXPERIENCE

President, Ecosystems Strategies, Inc., Poughkeepsie, New York *1992 to present*

Coordinates corporate strategic planning, financial management and marketing activities. Oversees corporate work on state and federal superfund sites and manages education/training services. Responsible for technical services in areas of pollution prevention, contaminant delineation and site remediation. Twenty years experience in the investigation and remediation of petroleum contamination at commercial and residential properties. Major recent projects of relevance include:

- Irvington Waterfront Park (Irvington, NY): Project Manager for site investigation and remedial design of abandoned industrial riverfront properties. Documented soil and groundwater contamination and designed remediation including soil removal and site capping. Project completed in 2000; project awarded the 2000 Gold Medal Award by Consulting Engineers Council of New York State.

- Greyston Bakery Site (Yonkers, NY): Project Manager for site investigation and remedial design of former manufactured gas plant site for future use as a bakery. Documented soil, groundwater and soil gas contamination. Remedial systems included installations of a DNAPL collection system, a barrier layer, a subslab depressurization system under the building, and groundwater monitoring. Project completed in 2004.

- 400 Block Redevelopment (Poughkeepsie, NY): Project Manager for site investigation and remedial design of multi-use industrial development property (boiler repair, clothing manufacturer, auto repair) for future retail/residential use. Documented soil (petroleum, PCBs, metals) and groundwater (petroleum) contamination. Remedial systems include: soil (and tank) removal, installation of a barrier, and groundwater monitoring. Project completed in 2006.

- Parkview Commons Site (Bronx, NY): Project Manager for site investigation and remedial design of former gas station/auto repair facility for future use as a residential/commercial building. Remedial investigation and design is currently on-going. Project completed in 2006.

Senior Hazardous Waste Specialist, U.S. Hydrogeologic, Inc., Poughkeepsie, New York 1986 to 1992

Supervisor for corporate hazardous and solid waste investigatory and remedial services. Major projects included:

- Coordination of subsurface investigations at a New York State Superfund site (former industrial facility); project manager in charge of site reclassification (delisted as of January, 1991).
- Coordination of petroleum storage tank management plan for Dutchess County (NY) Department of Public Works, including an assessment of regulatory compliance, product utilization and physical conditions of more than 100 tanks at over 20 facilities.
- Environmental compliance Audit of 42,000-square foot printing facility with specific remediations for solvent handling/disposal, inks storage and metal recovery processes.

Adjunct Professor, (various institutions) *1991 to Present*

Dutchess Community College, Poughkeepsie, New York
*M*arist College, Poughkeepsie, New York
Vassar College, Poughkeepsie, New York

Courses: Macroeconomics, Environmental Economics (DCC)
Introduction to Environmental Issues (Marist)
Environmental Geology (Vassar)

Policy Intern, Southern Growth Policies Board, North Carolina *1985*

Prepared several in-depth and short analyses of environmental and economic issues, with specific concern for their impact on Southern state policies. Analyses included: hazardous waste facility setting policies and environmental impacts of "high tech" industries on host communities.

Research Assistant, University of Oregon, Eugene, Oregon *1983*

Analyzed (with Dr. John Baldwin, Chairman of the Department of Planning, Public Policy and Management, U. of Oregon) the "Oregon Riparian Tax Incentive Program". Designed survey, conducted interviews and analyzed data. Summary paper with programmatic recommendations, was presented at the Annual Conference of the National Association of Environmental Educators.

PRESENTATIONS

- "Environmental Risks in Lending" Training Session for Pawling Savings Bank employees, December 18 and 19, 1989; and July 1, 1993.
- "Identifying Environmental Concerns in Appraisals", Workshops for Lakewood Appraisal Corporation, October, and November, 1989 and April, 1990.
- "State and Local Groundwater Protection Strategies", Annual meeting of the New York State Association of Towns, February, 1990.
- "Environmental Audits on Orchards and Agricultural Properties", Resource Education Institute, Inc., Real Estate Site Assessment and Environmental Audits Conference, December 4, 1990.
- "Environmental Audits on Orchards and Agricultural Properties", National Water Well Association Annual Conference, July 29-31, 1991.
- "Principles of Environmental Economics for Ground Water Professionals", National Groundwater Association Outdoor Action Conference, May 27, 1993.
- “Impact of Environmental Liabilities on Real Estate Transactions”, a NYS Department of Education approved course for licensed real estate professionals, March 1995; April 1995; May 1995; October 1995.
- “Brownfields Redevelopment in New York: A Discussion of Two Case Studies”, New England Environmental Conference 1996, March, 1996.
- “Quantifying Environmental Liabilities”, a NYS Department of Education approved course for licensed real estate professionals, March 1997.
- “Environmental Assessments in Urban Settings”, Vassar College, Fall 1999 and Fall 2000.
- “Navigating Property Contaminant Problems”, Land Trust Alliance Rally 2001, Oct 2001

ARTICLES

Ciminello, P. 1993. A Primer on Petroleum Bulk Storage Tanks and Petroleum Contamination of Property, ASHI Technical Journal, Volume 3, No. 1

Ciminello, P. 1991. Environmental Audits on Orchard and Other Agricultural Properties, Proceedings of the National Water Well Association Annual Conference

Ciminello, P. 1991. Property Managers Should Carefully Examine Current Fuel Storage Practices, NYS Real Estate Journal, Vol. 3, No. 9

Ciminello, P. 1991. New DEC Regulations Affect Development of Agricultural Lands, NYS Real Estate Journal, Vol. 3, No. 6

Ciminello, P., Hodges-Copple, J. 1986. Managing Toxic Risks From High Tech Manufacturing, Growth and Environmental Management Series (Southern Growth Policies Board)

Ciminello, P. 1986. State Assistance in Financing Water Treatment Facilities, Growth and Environmental Management Series (Southern Growth Policies Board)

Ciminello, P. 1985. Plants Amid Plantings: The Future Role of Environmental Factors in Business Climate Ratings, Southern Growth ALERT (Southern Growth Policies Board)

Ciminello, P., J. Baldwin, N. Duhnkrack,1984, An Incentive Approach to Riparian Lands Conservation, Monographs in Environmental Education and Environmental Studies (North American Association of Environmental Educators)

PROFESSIONAL AFFILIATIONS

American Water Resources Association
National Groundwater Association
Hazardous Materials Control Research Institute
Environmental Assessment Association

ADDITIONAL INFORMATION

Member, Dutchess County (NY) Youth Board (1987-1992); Chairman, 1992
Member, City of Poughkeepsie (NY) School District Ad Hoc Committee on Teen Parents and Pregnancy Prevention (1991)
Member, City of Poughkeepsie School District Budget Advisory Committee (1994 to 2000)
Member, City of Poughkeepsie PTA and Middle School Building Level Team

Ecosystems Strategies, Inc.

Kimberly Punchar
Senior Project Manager and Senior Quality Control Manager
Kimberly@ecosystemsstrategies.com

EDUCATION

Marist College, Poughkeepsie, New York
Bachelor of Science in Environmental Science

CERTIFICATIONS AND TRAINING

- Permit Required Confined Space Training Competencies; Attendant, Entrant, Entry Supervisor [Title 29 CFR Part 1910.146(g)(1)
- Completed EA Engineering, Science and Technology Project Managers Training
- Excellent interpersonal, customer, research & analysis and decision-making skills
- Completed Hydric Soils and Methodology for Delineating Wetlands continuing education courses and received Rutger's University Wetland Delineator Program Certification.
- Licensed New York State Wildlife Rehabilitator

PROFESSIONAL EXPERIENCE

Senior Project Manager and Senior Quality Control Manager,
Ecosystems Strategies, Inc., (ESI) Poughkeepsie, New York *Present*

Management and quality review of environmental site assessments and Phase II technical environmental investigations, and remedial projects including Brownfield sites. Conducts research to obtain field and regulatory information about the environmental status of a designated area. Reviews all documents prepared by ESI to ensure consistency and technical accuracy. Responsibilities associated with the preparation of site assessments include: investigating site histories, conducting facility inspections, reviewing regulatory agency records, documenting facility compliance with relevant State and Federal regulations, and preparing reports. Management of complex technical environmental investigations (including sites currently on the NYSDEC Registry of Inactive Hazardous Waste Sites), involved with: coordinating subcontractors; overseeing fieldwork; designing and implementing material, soil, and water sampling plans, preparing technical reports, and interfacing with regulatory agency personnel.

Director of Office & Environmental Services, Associate Environmental Scientist/Project Manager,
Spectra Environmental Group, Inc., Spectra Engineering, Architecture & Surveying, PC.
Poughkeepsie, New York *2003 – 2011*

- **Management** - Supervised a team of up to 15 Environmental, Engineering and Surveying professionals who managed projects with values that exceeded $1,000,000 or more (e.g. large subdivisions, industrial engineering – asphalt plant relocation design).
- **Petroleum/Chemical** - Extensive experience with Petroleum Bulk Storage Regulations (PBS – Title 6 NYCRR Parts 612-614), Spill Prevention Control and Countermeasure plan development (SPCC – Title 40 CFR Part 112), Chemical Bulk Storage Regulations (CBS – Title 6 NYCRR Parts 595-599), Spill Prevention Report (SPR) development and Emergency Response Plan development. Completed PBS and CBS storage tank inspections and conducted secondary containment (soil) permeability testing at an MOSF facility.

- **Stormwater/SPDES** - Developed and managed the preparation of Stormwater Pollution Prevention Plans (SWPPP) in accordance with Section 402 of the Clean Water Act for stormwater discharges from numerous industrial facilities. Prepared Annual Certification Reports and Discharge Monitoring Reports.
- **Phase I** - Prepared and managed numerous Phase I Environmental Site Assessments (ESAs) for various residential, commercial and industrial sites to assess the presence or absence of recognizable environmental conditions. Prepared reports that summarized the findings and which provided recommendations with related cost estimates for additional sampling/investigative work, as appropriate.
- **Phase II** - Managed numerous Phase II Environmental Site Investigations as a result of Phase I ESA findings, petroleum and chemical spills and leaking underground storage tanks. Performed soil and ground-water monitoring and landfill investigation oversight. Prepared reports based on field monitoring/sampling data; which provided recommendations for cleanup/remediation with related cost estimates, as appropriate.
- **Phase III** - Managed numerous Phase I II Remediation projects involving the cleanup of petroleum contaminated soil and groundwater, including the cleanup of a mercury spill. Prepared reports that summarized cleanup/remedial activities and which provided recommendations for spill closure or additional long-term monitoring (with related cost estimates, as appropriate).
- **LTM/Spill Closure** - Developed Long-Term Monitoring Plans and Spill Closure Reports that describe a site's history, outline regulatory requirements, and define the monitoring/reporting program and/or spill cleanup activities completed for various commercial/industrial facilities**.**
- **Solid Waste** - Developed solid waste management facility operation and maintenance manuals which include a general operating plan, a staffing plan, a personnel training plan, a waste control plan, a contingency plan and a closure plan in accordance with Title 6 NYCRR Part 360.
- **Training/Presentations** - Developed training programs for SPCC/ SWPPP and conducted annual training classes for various industrial facilities.
- **SEQRA** - Prepared Environmental Assessment Forms (EAFs), developed Scoping Documents and Environmental Impact Statements (EIS) in accordance with the State Environmental Quality Review Act (SEQR).
- **Health & Safety** - Prepared work plans; sampling plans; quality assurance project plans; and safety and health, and emergency response plans for working at hazardous sites.
- **Mentoring** - Mentored junior staff with regard to conducting Phase I ESAs, Phase II investigation work, Phase III remediation/cleanup and environmental compliance auditing for PBS, CBS and Stormwater Pollution Prevention.

Environmental Scientist/Project Manager
Ea Engineering, Science And Technology, *1999 – 2003*
Newburgh, New York

- **Management** - Independently managed projects, provided support to secure multiple long-term contracts, and developed significant company proposals under an existing term contract. Developed Project Number Request Budgets, reviewed project pre-bill charges and prepared invoice spreadsheets for multiple projects awarded under a long-term environmental service term contract with a New York State Agency. Successfully managed company resources with respect to staff allocation, maximizing equipment usage recovery, demonstrating cost savings/innovations, meeting project milestones with respect to scheduling field events, personnel and deliverables, and performing subcontractor procurement.
- **Mentoring** - Served as a supervisor for multiple people and mentored junior staff.
- **Petroleum/Chemical** - Extensive experience with PBS (Title 6 NYCRR Parts 612-614) and Chemical Bulk Storage (CBS – Title 6 NYCRR Part 595-599) management, SPR development (Title 6 NYCRR Part 598), and SPCC (Title 40 CFR Part 112) plan development and training.

- **Solid Waste** - Performed oversight for various landfill investigations and ground-water contamination investigations in accordance with 6 NYCRR Part 360.
- **Health & Safety** - Developed work plans and safety and health plans for various environmental investigations as required.
- **Phase I & II** - Conducted a Phase I ESA and a Phase II Environmental Site Investigation for a 62+ acre parcel in order to identify areas of environmental concern and to determine if further removal or cleanup actions were necessary. Developed and implemented a long-term monitoring / spill closure plan for a local state facility. Provided oversight for the operation and maintenance of a soil vapor extraction system.
- **Pollution Prevention** - Updated a Pollution Prevention Plan for a Naval Base.
- **Stormwater** - Developed SWPP plans in accordance with Section 402 of the Clean Water Act for stormwater discharges from construction activities that disturb one or more acres of land (Phase II).
- **ISO** - Assisted with Environmental Management System, ISO 14001, 900 1/2, and OHSAS 18001 research for a renowned pharmaceutical company.

Environmental Scientist
Lawler, Matusky And Skelly Engineers,
Wappingers Falls, New York *1994 – 1999*

- **Engineering Support** - Provided engineering support to comply with State, Federal, and Corporate regulations/requirements for industrial facilities.
- **Petroleum/Chemical** - Experienced with New York State PBS regulations Title 6 NYCRR Part 612 – 614. Experienced with New York State CBS regulations Title 6 NYCRR Part 595 – 599 and in the development of SPRs. Experienced in the interpretation and development of Federal SPCC Plans and Facility Response Plans (FRPs) in accordance with Title 40 CFR Part 112.
- **RCRA** - Assisted with Resource Conservation Recovery Act (RCRA) third party auditing.
- **SPDES** - Experienced with State Pollutant Discharge Elimination System (SPDES) sampling, preparation of discharge monitoring reports and flow meter calibration verification.

APPENDIX H

Scope of Services

Ecosystems Strategies, Inc.

Phase I Environmental Site Assessment
Scope of Services

Task 1.0: Description of Subject Property and Surrounding Area Physical Settings

1.1 Description of property location, topography, geology, hydrogeology, surface hydrology and wetlands
1.2 Identification of adjoining and surrounding area properties

Task 2.0: Historic Investigation (Review of Applicable, Reasonably Ascertainable Sources)

2.1 Review of historic maps and plans (to the earliest date of available maps)
2.2 Review of aerial photographs
2.3 Review of local records (e.g., building department), including cursory ownership information
2.4 Interviews with User, Key Site Manager, and other knowledgeable individuals
2.5 Review of User or property owner provided documents and/or analytical results

Task 3.0: Federal and State Regulatory Agency Records Review

3.1 Review of ASTM-required federal, state, and/or tribal databases at required search distances and analysis of the relationship of each Site (e.g., upgradient, downgradient) to the Subject Property;
- Federal NPL (1.0 mile) and delisted NPL sites (0.5 mile)
- Federal CERCLIS list and CERCLIS NFRAP site list (0.5 mile)
- Federal RCRA CORRACTS facilities list (1.0 mile)
- Federal RCRA non-CORRACTS TSD facilities list (0.5 mile)
- Federal RCRA generators list (subject/adjoining properties)
- Federal ERNS list (subject property)
- Federal, state, and tribal institutional control/engineering control registries (subject property)
- State- and tribal-equivalent NPL (1.0 mile)
- State- and tribal-equivalent CERCLIS (0.5 mile)
- State and tribal Brownfield and voluntary cleanup sites (0.5 mile)
- State and tribal leaking storage tank lists (0.5 mile)
- State (including locally administered) and tribal registered storage tank lists (subject/adjoining)
- State and tribal landfill and/or solid waste disposal site lists (0.5 mile)

3.2 Review of additional federal and state environmental databases:
- State spill file records (0.5 mile)
- State MOSF list (0.5 mile)
- State radon data (by local municipality as available)
- Federal and state wastewater discharge permits (subject/adjoining properties)

3.3 Interviews (as applicable) with government representative regarding regulatory compliance

Task 4.0: Physical Inspection

4.1 Inspection of property and structures for potential contamination and contaminant sources, including:
- Hazardous/medical/radioactive waste storage and disposal areas
- Petroleum and/or chemical storage (including tanks and associated piping)
- Overt indications of asbestos-containing materials and lead-based paint
- Wastewater and stormwater discharge systems
- Equipment potentially containing polychlorinated biphenyls (PCBs)

4.2 Inspection of property for the following:
- Presence of contamination (e.g., debris, soil staining)
- Evidence of prior structures and uses
- Unusual or man-made topographical formations (e.g., berms, sinkholes)
- On-site surface water quality
- Evidence and location of wells
- Vegetative stress

4.3 Identification of overt on-site sensitive environmental receptors (e.g., wetlands)
4.4 Limited inspection of adjoining and nearby properties for:
- Potential off-site sources of contamination
- Sensitive environmental receptors

4.5 If appropriate, interviews with owners/tenants/operators and other available knowledgeable individuals present during physical inspection

Task 5.0: Preparation of Written Summary Report

5.1 Summary of findings of Tasks 1.0 through 4.0
5.2 Identification of any Recognized Environmental Conditions and/or other potential concerns
5.3 Conclusions and Recommendations, including any specific additional investigatory or remedial work
5.4 Production and transmission of up to two (2) copies of the final Phase I ESA to Client.

R E P O R T

GEOTECHNICAL EVALUATION

WEST 116TH RESIDENTIAL
NEW YORK, NEW YORK

Prepared for

West 116 Residential LLC
1865 Palmer Avenue, Suite 203
Larchmont, NY 10535

August 15, 2011

Prepared by:

URS

201 Willowbrook Blvd.
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Project No: 11100377

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EXECUTIVE SUMMARY

This report provides geotechnical recommendations for the design and construction of the proposed buildings at West 116th and West 117th Streets in Manhattan, New York. It is proposed to construct a 9-story tower along West 116th Street and a 12-story tower along West 117th Street. There will be one cellar level throughout with a depth of approximately 11 ft.

Based on the performance of 16 test borings, the subsurface conditions vary significantly across the site. The subsurface conditions along West 116th Street generally consist of approximately 20 feet of fill, 10 feet of gravel and sand, 30 to 60 feet of varved fine sand, silt, and clay, and rock at depths of approximately 75 to 95 feet. Along West 117th Street the subsurface conditions generally consist of approximately 10 to 20 feet of fill, 5 to 10 feet of sand, 0 to 5 feet of peat, 0 to 10 feet of gravel and sand, 0 to 45 feet of varved fine sand, silt, and clay and rock at depths of approximately 25 to 90 feet. The groundwater level in June and July 2011 was measured at approximately el. +4.5 to +5.5 feet [1].

Based on shear wave velocity measurements, the seismic site classification is Site Class D. A site specific seismic ground motion study was performed that resulted in the development of a design response spectrum that is somewhat lower than the Site Class D response spectrum. Based on this design response spectrum, the Seismic Design Category is B if the Seismic Use Group of the building is I or II. The potential for liquefaction is not a concern at this site.

It is possible to support the buildings on a mat foundation; however, there are some limitations and complications associated with this foundation type that should be considered. Bearing the mat on the natural soils below the fill may require excavations up to 20 ft deep, significant backfilling operations, and extensive dewatering. Therefore, supporting the mat on the soils below the fill is not recommended. The mat foundation could bear on the fill material with a maximum allowable bearing pressure of 2 tsf. However, test pits and additional test borings will be required to confirm that the fill is free of voids and organics or compressible materials. The number of additional test borings is dependent on the building footprint and the column spacing. For an approximate 20 ft column spacing, 18 additional test borings for the tower on West 116th Street and 30 additional test borings for the tower on West 117th Street will be required. Dewatering may also be required to prepare an adequate subgrade for the mat.

If a mat foundation is not feasible or desired, it is recommended that the building be supported on piles. For the north east building areas, where the rock is relatively shallow, it is recommended that the building be supported on 150 ton piles bearing on the rock. For the remaining building areas, where the rock is relatively deep, the building could be supported on 150 ton pile foundations bearing on rock, or 100 ton friction piles bearing in the varved fine sand, silt, and clay. It is estimated that a total of three static compression load tests will be required. It is recommended that test piles be installed and that they be monitored during installation using a Pile Driving Analyzer.

Below-grade walls should be designed for a static lateral soil pressure based on an equivalent fluid pressure of 45 pcf, assuming that full drainage conditions exist. Below-grade walls should also be designed for a seismic lateral soil force of $6H^2$ (lb/ft of wall), where H is the total vertical

[1] Elevations are referenced to the Manhattan Datum which is 2.75 ft above mean sea level at Sandy Hook, NJ.

height of the wall, in feet. A uniform lateral pressure distribution of 0.40 times the surcharge pressure is also recommended.

The recommended design groundwater elevation is el. +9.0. If the bottom elevation of the cellar slab is at or below this elevation, the cellar slab should be designed to resist groundwater pressures and the slab and below grade walls should be waterproofed. If the bottom elevation of the cellar slab is above this elevation, it is recommended that damproofing of the below grade walls and the cellar floor be performed.

The report includes additional information regarding the subsurface conditions and foundation design recommendations and additional recommendations regarding excavation considerations, temporary groundwater control, underpinning, subgrade preparation, backfill and compaction requirements, pre-construction condition surveys and monitoring, and construction inspection and monitoring.

1.1 GENERAL

This report presents the results of a geotechnical evaluation for proposed buildings along West 116th Street and West 117th Street between Fifth Avenue and Lenox Avenue in Manhattan. Our understanding of the project requirements is based on information contained in the site plan developed by Greenberg Farrow dated June 29, 2010. Authorization to proceed with this work was obtained in the form of an agreement between West 116 Residential LLC and URS Corporation, dated June 9, 2011. The geotechnical evaluations and recommendations presented herein are in general accordance with the 2008 NYC Building Code (Code).

1.2 PROJECT BACKGROUND AND PROPOSED CONSTRUCTION

The project site is located on Block 1600, Lot 20 in in Manhattan between W 116th and W 117th Streets and between 5th and Lenox Avenues (see Figure 1). The site is currently occupied by an asphalt parking lot, a basketball court, and a landscaped area. A 9 story residential building that faces south on West 116th street is on the adjacent lot to the east. The east half of Lot 20 is currently occupied by a 6-story brick residential building that faces on West 117th St and 5th Avenue. Both existing buildings have cellars but the cellar depth and foundation type is unknown. The ground surface elevation on site varies from approximately el. +19.6 to el. +21.0 ft.

The proposed building will have a 12-story tower along 117th Street and a 9-story tower along 116th Street. The east building line of the proposed building will adjoin the 6-story residential building and the 9-story residential building. The towers will be connected at street level by a one story retail/community facility space. There will be one cellar level throughout with a depth of approximately 11 ft. The footprint of the proposed buildings is estimated to be approximately 37,400 square feet.

1.3 REPORT ORGANIZATION

This report is divided into five sections. Following this section is Section 2, which includes a description of the subsurface investigation methods and results. Section 3 summarizes the engineering evaluations performed for the site and our recommendations, including seismic site classification. Construction considerations are addressed in Section 4. The limitations of this study are discussed in Section 5. Tables and figures are provided at the end of text. The boring logs, geophysical test results, and laboratory test results are included in the appendices.

2.1 GENERAL

The subsurface investigation consisted of a field investigation and geotechnical laboratory testing. The field investigation included a test boring program to identify soil, rock, and groundwater conditions at the site and a geophysical survey to obtain shear wave velocities of the subsurface materials. Details of the subsurface investigation are presented in the following sections.

2.2 SUBSURFACE INVESTIGATION

2.2.1 Test Boring Program

A total of sixteen borings, designated B-1 through B-16, were drilled at the site between June 20 and June 30, 2011 with full-time inspection by a qualified URS engineer, under the direction of Mr. Thomas Thomann, P.E. Drilling was performed by Craig Test Boring Company, Inc. of May's Landing, New Jersey using two truck-mounted CME-75 drill rigs. The test boring locations are shown in Figure 2.

The test borings were advanced using the mud rotary technique with 3-7/8-inch diameter tricone roller and rotary drag bits. Four-inch diameter steel casing was driven as needed to stabilize the sides of the borehole. Soil samples were obtained using a 2-inch O.D. split-spoon sampler in accordance with American Society for Testing and Materials (ASTM) Standard Specification D1586-Standard Penetration Test (SPT). The SPT consists of driving a 2-in O.D. split-spoon for a depth of 24 inches with repeated blows of a 140-lb hammer free-falling 30 inches. The standard penetration or N-value is defined as the number of blows required to drive the sampler for a 12-in interval after an initial 6 inches of penetration.

The soil samples obtained from the borings were visually classified by the URS field inspector using the Unified Soil Classification System and the Code system. The recovered split-spoon samples were placed in glass jars, labeled with the project name and number, boring number, sample number, depth, SPT blow counts and the amount of recovery and retained by URS for subsequent laboratory tests.

Considering that the proposed buildings may have to be on piles that extend to bedrock, it was proposed to advance six test borings (three per building) to bedrock and perform a minimum of 5 ft of rock coring to confirm the presence and quality of the bedrock. The remaining borings were extended 25 ft into nominally satisfactory bearing material below the proposed depth of the foundations. However, in the case of B-4 and B-11, bedrock was encountered within the first 25 ft of nominally satisfactory bearing material, therefore additional rock cores were taken at these locations.

Rock coring was performed using a 5-foot long NX (2-1/8 in. O.D.) double tube core barrel. The top of bedrock was estimated based on the drilling operations (e.g., excessive rig chatter, difficult penetration) and practical spoon refusal as indicated by blow counts greater than 100 for a 6-inch

interval on the split spoon sampler. Percent recovery and rock quality designation (RQD) were determined for each core run.[2,3]

Two 25-ft groundwater observation wells were installed in completed test boring B-7 and B-14. The well was constructed of nominally 2-inch diameter Schedule 40 PVC pipe with a 10 ft long slotted screen at the bottom and 15 ft long solid riser pipe to the ground surface. The annulus between the pipe and the wall of the borehole was backfilled with sand to a minimum of two ft above the screened section of pipe. The remainder of the annulus was backfilled with bentonite.

The test boring logs are included in Appendix A.

2.2.2 Geophysical Testing

Geophysical testing, consisting of the passive shear wave velocity (pVs) and Multichannel Analysis of Surface Waves (MASW) methods, was performed by Hager-Richter Geoscience, Inc. of Fords, New Jersey on June 30, 2011 to obtain the in-situ shear and compression wave velocities of the subsurface materials. These methods consist of placing multiple geophones along the ground surface in a line to collect information about the Rayleigh waves using the ambient noise (pVs) or from a vibration source (MASW). The data is then interpreted and shear wave velocities are estimated. Measurements were obtained along two survey lines at the project site and average shear wave velocity profiles were developed.

More details regarding the geophysical methods and the results are included in the geophysical testing report included in Appendix B.

2.2.3 Laboratory Testing

Laboratory testing was conducted on representative soil samples to determine physical index and engineering properties of the subsurface materials, in order to confirm field classifications and assist with engineering evaluations. Tests performed included grain size (sieve) analyses, Atterberg Limits test, and organic content tests. The results of the laboratory tests are included in Appendix C.

2.3 GENERALIZED SUBSURFACE CONDITIONS

The generalized subsurface conditions described in this section are based on our interpretation of the test borings. Generalized subsurface profiles, based on the cross-section A-A and B-B shown in Figure 2, are presented in Figures 3 and 4. The following strata were encountered in the test borings (listed from the ground surface down):

[2] Percent recovery (REC) is the length of recovered core divided by the length of the core run, expressed as a percentage.

[3] For an NX diameter rock core, RQD is defined as the sum of core pieces a minimum of 4 inches in length between natural breaks divided by the length of the core run and expressed as a percentage.

Stratum 1 : Sandy FILL [7][4]

This stratum consists of sandy FILL with varying amounts of silt, gravel, brick, concrete, and other miscellaneous construction debris. The thickness of this stratum, for the majority of the site, varies from approximately 10 to 20 ft. The SPT N-values in this stratum range from approximately 1 to over 100 bpf, but were generally between 4 and 22 bpf indicative of a loose to medium dense material.

Stratum 2 : SAND (3b)

This stratum was encountered underneath Stratum 1 in the northern portion of the site in borings B-1 to B-7. The material in this stratum consists of gray to brown coarse to fine sand with some silt and trace amounts of gravel. The thickness of this stratum is approximately 5 to 10 ft. The SPT N-values in this stratum range from 8 to over 100 bpf; however, they typically range from 10 to 30 bpf, indicative of a medium dense material.

Stratum 3 : PEAT (6)

This stratum was encountered beneath Stratum 2 in borings B-2, B-3, B-5, B-6, B-8, B-9, B-10, B-11, and B-16. This stratum consists of brown to dark brown to black PEAT with some silt. The thickness of this stratum varies from approximately 3 to 6 ft. The SPT N-values in this stratum typically range from 3 to 10 bpf.

Stratum 4 : GRAVEL – Gravelly SAND (2a-3a)

This stratum was encountered beneath stratum 3 and stratum 2 in locations where the peat layer was not encountered. This stratum was encountered in all borings except B-3, B-4, B-7 and B-11. The material in this stratum consists of a gray and brown medium to fine gravel with traces of coarse gravel and varying amounts of coarse to fine sand. The thickness of the stratum varies from approximately 7 to 14 ft. The SPT N-values varied from 20 to more than 100 bpf, but were typically greater than 30 bpf indicative of a dense to very dense material.

Stratum 5 : SAND (3b)

This stratum was only encountered in the south-west corner of the site directly underneath stratum 4 in borings B-8, B-12, B-14, and B-15. The material in this stratum consists of reddish brown medium to fine sand with trace amounts of silt. The thickness of this layer generally ranged from 5 to 10 ft. The SPT N-Values for this stratum varied from 12 to 30 bpf, indicative of a medium dense material.

Stratum 6 : Silty f. SAND, SILT, and CLAY Varves (6-3b-5b)

This stratum was encountered beneath stratum 5 and stratum 4 in locations where stratum 5 was not encountered. This stratum was encountered in all borings except B-3, B-4, B-7 and B-11. The material in this stratum consists of thinly varved reddish brown silty fine sand, silt, and gray clay. The thickness of the stratum generally varies from approximately 10 ft in the northeast portion of the site to 60 ft. in the southwest portion of the site. This stratum is thicker in areas where the rock is deeper. The SPT N-values vary from 5 to 30 bpf, but were generally between

[4] Number in parentheses are the 2008 NYC Building Code soil classification designation.

10 and 25 bpf, indicative of a medium dense sand or silt and a soft to stiff clay material. Most borings were terminated in this layer.

Stratum 7 : TILL (3a)

This stratum was encountered directly above the bedrock in all borings that were advance to rock, except boring B-12. The material consists of a gray and brown coarse to fine sand with varying amounts of gravel and traces silt and decomposed rock. The thickness of the stratum generally varied from approximately 5 to 10 ft. The SPT N-values vary from 40 to more than 100 bpf, indicative of a very dense material.

Stratum 8 : ROCK (1b-1c)

The rock is described as moderately weathered, moderately fractured medium hard to intermediate hard GNEISS. The percent recovery typically varied from 70% to 100%. The Rock Quality Designation (RQD) was generally 35 and 80%. The top of rock (defined as the elevation at which rock coring started) was encountered between approximately 25 to 95 ft below existing grade, which corresponds to approximately el. –5 ft to el. –75 ft. The rock generally slopes downward from the northeast corner of the site to the southwest corner of the site.

2.4 GROUNDWATER LEVEL

The groundwater measurements, which were taken during the field investigation and one time after the field investigation was completed, are as follows:

Date	Well B-7		Well B-14	
	Depth (ft)	Elevation (ft)	Depth (ft)	Elevation (ft)
June 27, 2011	14.4	+5.6	15.6	+4.4
July 18, 2011	15.0	+5.0	15.4	+4.6

It should be noted that the groundwater measurements were not taken over an extended period of time; therefore, they do not adequately reflect potential seasonal variations in the groundwater level.

3.1 GENERAL

This section presents the engineering evaluation results and recommendations based on the results of the subsurface investigation and the information provided to date on the design requirements for the proposed building. The following sections present recommendations regarding seismic ground motions, foundation type and capacity, lateral pressures on below-grade walls, and permanent groundwater control measures.

3.2 SITE SPECIFIC SEISMIC EVALUATION

3.2.1 Methodology

A seismic ground motion study was performed to develop a site specific response spectrum for the proposed building and consisted of the following:

1. Development of a rock response spectrum and rock acceleration time histories;
2. Evaluation of the site stratigraphy and estimation of key soil parameters (e.g., shear wave velocity) for the various subsurface strata;
3. Performance of site response analyses to estimate how the site soils will modify the motions emanating from the rock level;
4. Development of a site specific response spectrum in accordance with the Code requirements.

Based on the shear wave velocity measurements, the seismic site classification, in accordance with the Code is Site Class D.

3.2.2 Rock Motions

The site specific rock response spectrum is developed using the 2008 earthquake ground motion maps provided by the United States Geological Survey (USGS), which are the basis for national building codes and standards. The USGS values have a return period of approximately 2,500 years. The values are multiplied by 2/3 to be consistent with the seismic portion of the Code. The design rock response spectrum for the project site is shown in Figure 5.

A rock acceleration time history is also needed to evaluate the effect of the soil conditions on the motions emanating from the bedrock. This time history is developed by matching the response spectra from an actual earthquake acceleration time history with the design response spectrum shown in Figure 5. The earthquake acceleration time history that is used as the “seed” time history is a record obtained from the magnitude 6.5 Saguenay earthquake in Quebec, Canada that occurred in October 1988. The actual acceleration time history and the spectrally matched time history are shown in Figure 6.

3.2.3 Soil Profile

The site soils can result in amplification of the rock motions as the seismic waves travel through the soils. In order to evaluate this effect, it is necessary to develop an idealized soil profile consisting of layer thickness, dynamic soil properties, and soil unit weight. The idealized soil profile is shown in Figure 7. The shear wave velocity is based on the results of the geophysical testing. There are uncertainties in the geophysical testing methods and there could be spatial variation in the shear wave velocities of the soil and rock across the site. It is very difficult to estimate the actual uncertainty; however, it is typical to perform analyses using the best estimate shear wave velocity values and 1.2 and 0.8 times the best estimate shear wave velocity values. The USGS maps are based on a material with a shear wave velocity of approximately 2,500 fps. Based on our experience at other sites in the vicinity, the shear wave velocity of the rock is likely to be at least 2,500 fps; therefore, the half space of the seismic model is placed at a depth of 100 ft.

3.2.4 Site Response Analysis Results

The site specific response spectrum corresponding to 2/3 of the 2,500 year return period event are shown in Figure 8. The Code generic response spectrum for Site Class D and the response spectrum corresponding to 80% of the Site Class D response spectrum are also shown in Figure 8. In accordance with the NYCBC, the design response spectrum cannot be less than 80% of the code specified response spectra for the specified seismic site classification. In addition, the code specifies that the site specific S_{ds} value (spectral acceleration at 0.2 sec) cannot be less than 90% of the peak acceleration at any period and the site specific S_{d1} value (spectral acceleration at 1.0 sec) shall be taken as the greater of the spectral acceleration at a period of 1 sec or two times the spectral acceleration as a period of 2 sec.

The recommended design response spectrum is shown in Figure 9 and the corresponding spectral acceleration values are provided in Table 1. Based on the recommended S_{ds} and S_{d1} values of 0.33 g and 0.09 g, respectively, and if the Seismic Use Group of the building is I or II (to be confirmed by others), the Seismic Design Category is B.

3.2.5 Liquefaction

The potential for liquefaction at the site was evaluated using the liquefaction assessment diagram from the Code. As shown in Figure 10, some of the boring results indicate that liquefaction may be a concern. Additional analyses were performed to evaluate the factor of safety against liquefaction. These analyses, as shown in Figure 11, indicate that the factor of safety against liquefaction is greater than approximately 1.5. A factor of safety greater than approximately 1.4 is not likely to result in the generation of significant excess pore pressures that could result in liquefaction triggering. Therefore, the potential for liquefaction is not a concern at this site.

3.3 FOUNDATION RECOMMENDATIONS

3.3.1 Mat Foundation

It is possible to support the buildings on a mat foundation; however, there are some limitations and complications associated with this foundation type that should be considered prior to selecting a mat foundation.

The mat foundation could bear on Stratum 2 or Stratum 4, which is located below the fill layer (i.e., Stratum 1). The thickness of Stratum 1 is estimated to be 20 ft thick at some locations. Assuming that the bottom of the mat foundation will be at a depth of approximately 13 ft, a significant amount of fill will need to removed and replaced with structural backfill. In addition, since the groundwater is at a depth of approximately 15 ft, a significant dewatering operation will need to be implemented. Considering these factors, supporting a mat foundation on Stratum 2 and 4 does not seem practical.

The mat foundation could bear on Stratum 1. In accordance with the Code, the maximum allowable bearing pressure on fill material is 2 tsf. In addition, further subsurface explorations will be required to confirm that the fill material is free of voids and extensive amounts of organics or compressible materials. The number of additional test borings will be dependent on the footprint area of each tower and the column spacing. For an approximate 20 ft column spacing, it is estimated that 18 additional test borings for the tower on West 116th Street and 30 test borings for the tower on West 117th Street will be required. Continuous sampling using a 3-inch diameter sampler will need to be performed from the proposed bottom of the mat to the bottom of the fill. In addition, it is recommended that 6 test pits be performed at various locations around the site to a depth of at least 10 ft below the bottom of the mat to observe the quality of the fill. Considering an 11 ft deep cellar and assuming a mat thickness of 3 ft, the bottom of the mat will be at a depth of approximately 14 ft. This is very close to the measured groundwater level. Therefore, it should be anticipated that dewatering will be required to prepare an adequate subgrade for the mat foundation.

It is recommended that a 4-inch thick minimum layer of ¾ inch gravel or crushed stone be placed on the subgrade prior to pouring the mat foundation. See Section 4.6 for the proper preparation of the subgrade.

3.3.2 Pile Foundation

If a mat foundation is not feasible or desired, it is recommended that the buildings be supported on piles. For the north east building areas, where the rock is relatively shallow, it is recommended that the building be supported on piles bearing on the rock. For the remaining building areas, where the rock is relatively deep, the building could be supported on pile foundations bearing on rock, or friction piles bearing in Stratum 6.

The following pile types and sizes were evaluated for the design capacities shown below.

Pile Type	Pile Size	Estimated Length (ft)	Estimated Bearing Stratum	Estimated Allowable Compression Capacity (tons)
H-Pile	HP 12 x 63	25-95	Rock	150
Open-ended steel pipe pile	Min. OD = 13-5/8" Min. Thickness = 5/8"	25-95	Rock	150
Tapertube (tower on West 116th Street only)	10" x 16" x 15' x 3/8"	40	Stratum 6	100

Notes:

1. Open ended steel pipe piles should have a minimum yield strength of 45 ksi. H piles should have a minimum yield strength of 50 ksi.
2. An HP 12x63 H-pile may not be readily available; a HP12x74, which is more readily available, may be required.

The minimum pile spacing should be two times the pile diameter of the butt of the pile for round piles (1.75 times the diagonal for H-piles), but not less than 2 ft.

Pile load testing will be required in accordance with the Code.

The Code allows for a 1-ton lateral design load without performing additional lateral pile analyses or lateral load tests. If a higher lateral capacity is needed, it is recommended that lateral pile analyses or load tests be performed to determine if the selected pile(s) can resist the lateral loads.

Driving of piles close to adjacent structures may lead to excessive vibrations and/or possible settlement of the structures. The distance at which vibrations and/or settlements will become a concern is dependent on many factors and should be determined in the field based on the results of vibration and settlement measurements made during the driving of the initial piles. For the purpose of developing drawings, it is recommended that two pile cap alternatives be developed for new foundations located within 20 ft of adjacent structures. One pile cap alternate should include driven piles and one pile cap alternate should include drilled caissons. It is recommended that a hydraulic pile driving hammer be used because the stroke of the hammer can be varied thereby having some control over the potential vibrations. It may be possible to reduce the stroke at the beginning of pile driving to minimize the vibrations and when the pile is at a depth where vibrations are acceptable or the pile is close to the rock, the stroke can be increased to achieve the proper driving criteria. Vibration and settlement monitoring should be performed during the driving of the test piles to assist in estimating which pile alternative will be possible. The use of vibratory hammers should not be allowed.

If the vibrations exceed the threshold levels during the driving of any piles, it may be necessary to install drilled foundations (i.e., caissons). The compression capacity of caissons can vary

significantly depending on the diameter and thickness of the casing and the steel reinforcement. For the purpose of evaluating costs, several options are presented in the following table:

Maximum Allowable Compression Capacity (tons)	Steel Casing Outside Diameter (in.)	Steel Casing Thickness (in.)	Yield Strength of Reinforc. Bar (ksi)	Reinforc. Bar Size	Maximum Allowable Uplift Capacity (tons)	Min. Rock Socket Length (ft)
150	7.0	0.408	75	#8	18	10
250	9.625	0.375	75	#16	70	10

Please note the following regarding the design parameters given above:

1. The rock socket shall be installed in Class 1c rock or better.
2. The steel casing shall consist of minimum N-80 (80 ksi) steel conforming to API specifications.
3. The grout shall have a minimum compressive strength of 6,000 psi.

Use of a lateral capacity greater than 1 ton per caisson will require the performance of lateral pile analyses or lateral load tests.

3.3.3 Floor Slab

The depth of the cellar will be 11 ft. The subgrade material at this depth will likely be fill (i.e. Stratum 1). If the subgrade is properly prepared, as given in Section 4.6, and the floor slabs are above the recommended groundwater elevation (see Section 3.5), the floor slabs can be designed as a slab-on-grade. The slab-on-grade should bear on a minimum of 4 inches of crushed stone.

3.4 LATERAL PRESSURES ON BELOW-GRADE WALLS

The design lateral pressures for permanent below-grade walls include static and seismic pressures that are influenced by the thickness and type of overburden material. It is recommended that the below-grade walls be designed for a static lateral soil pressure based on an equivalent fluid pressure of 45 pcf, assuming that full drainage conditions exist (i.e., hydrostatic pressures do not develop against the walls). It is also recommended that the below-grade walls be designed for a seismic lateral soil force of $6H^2$ (lb/ft of wall), where H is the total vertical height of the wall, in feet. This force is in addition to the static force and should be applied at a distance of H/3 from the top of the wall (i.e., the wall pressure is an inverted triangle).

The recommended lateral pressure does not include any surcharge loads adjacent to the walls or at the ground surface. A uniform (i.e., rectangular) lateral pressure distribution of 0.40 times the surcharge is recommended to be added to the lateral soil pressure distribution. The structural engineer should determine the magnitude of the surcharge loads (i.e., live loads).

3.5 PERMANENT GROUNDWATER CONTROL

Considering the groundwater measurement and the potential for seasonal fluctuations in the groundwater, the recommended design groundwater elevation is el. +9.0.

If the bottom elevation of the cellar slab is at or below el. +9.0, the cellar slab should be designed to resist groundwater pressures and the slab and below grade walls should be waterproofed. Waterproofing materials should be installed on the outside of the perimeter walls (Grace Construction Products Bituthene 3000 for two-sided form applications and Preprufe 160R for blind side applications, or approved equivalent) and directly beneath the cellar/sub-cellar floor slab (Grace Construction Products Preprufe 300R, or equivalent). The waterproofing on the perimeter walls should be installed to the ground surface. In order to ensure that the waterproofing performs as intended, the installation should be inspected on a full time basis to ensure that the waterproofing is being applied as per the manufacturer's specifications and recommendations. It is also recommended that the project team consider the benefits of a "sandwich" slab, which consists of the pressure slab, a gravel filled layer with perforated pipes, and a wearing slab. This system minimizes penetrations through the pressure slab and provides a way to handle water from any leaks that might occur.

If the bottom elevation of the cellar slab is above el. +9.0, permanent groundwater control is not required. However, it is recommended that damproofing of the below grade walls and the cellar floor be performed. Damproofing of the cellar walls should be performed at the bottom of the slab by installing a membrane that has a thickness of not less than 6-mil (0.006 inches), such as the Grace Construction Products Florprufe, or approved equal. Damproofing of the below grade walls should be performed with a liquid applied membrane (LAM), such as Grace Construction Products Procor, or approved equal, for 2-sided forms, or a membrane, such as Grace Construction Products Preprufe, or approved equal, for blind-sided forms.

4.1 GENERAL

This section presents some foundation construction related recommendations that should be addressed in the development of the specifications and during discussions with the foundation contractor. The following sections provide recommendations on pile load testing, excavation considerations, temporary support of excavation systems, underpinning evaluations, temporary groundwater control, subgrade preparations, backfill and compaction requirements, pre-construction structural condition surveys, and monitoring of adjacent structures.

4.2 PILE LOAD TESTING AND INSTALLATION

In accordance with the Code, static axial load tests are required for any pile with a design load greater than 40 tons (30 tons for timber piles), excluding caissons. At least one pile should be statically load tested in each area of uniform subsoil conditions. Additionally, the code requires that a minimum of two load tests be conducted for a building footprint of between 5,000 and 30,000 square feet (sf), with one additional load test for each additional 20,000 sf of footprint area. Therefore, based on the proposed building footprint, it is estimated that three static load tests will be required for the 100 or 150 ton piles. The maximum test load for the 150 ton piles should be maintained for a minimum of 24 hours. It is also recommended that test piles be installed and that they be monitored during installation using a Pile Driving Analyzer (PDA). A PDA provides real-time information regarding pile capacity and stresses during pile driving and will assist in deciding which piles to perform static load tests.

4.3 EXCAVATION CONSIDERATIONS

Local temporary soil excavations above the natural groundwater level can have cut slopes as steep as 1H:1V, provided that they are approved by the engineer responsible for the design of the support of excavation (SOE) system.

All vertical soil faces will require temporary support until the new cellar walls and foundations are constructed and the area is properly backfilled. A feasible support system may consist of soldier piles and wood lagging or sheet piles with sufficient lateral restraint (e.g., anchors, rakers, bracing, etc.), as required. It is recommended that a hydraulic hammer be used to install the soldier piles. This type of hammer can control the stroke of the ram and therefore can provide some control over the vibrations that are generated when driving the soldier piles. Sheet piles may be required where the excavations will be performed below the groundwater.

Measurements of vibration levels should be made in selected adjacent structures during the installation of the support system. The vibration threshold levels should be established as part of the pre-construction survey and shown on the SOE drawings. If the vibration threshold level is exceeded during the driving of the soldier piles, it may be necessary to drill temporary casing, install the soldier piles inside the casing, and grout the portion of the soldier piles below the excavation level, and remove the casing.

4.4 UNDERPINNING

Underpinning will be required at locations where the foundations of existing adjacent structures are above the proposed excavation levels. Underpinning of the adjacent structures should transfer the foundation loads from their present bearing level to a level below the lowest excavation elevation of the proposed building. No information regarding the depth and type of the adjacent building foundations is available. Therefore, it is recommended that a site visit be performed to determine the depth and extent of any cellar levels and it is recommended that exterior test pits be performed next to the adjacent buildings to estimate the foundation depth and the presence of any below grade encroachments. This information should be obtained for the purpose of estimating underpinning needs and for determining potential impacts to the new building design. The underpinning designer should review all of the subsurface investigation results and adjacent building information and take this information into account to ensure that appropriate underpinning methods are selected and designed.

4.5 TEMPORARY GROUNDWATER CONTROL

The groundwater level should be maintained at least 2 ft below the bottom of the excavation to ensure that the bearing surfaces can be adequately prepared. The need for temporary groundwater control will be dependent on the groundwater level at the time of construction and the proposed elevation of the cellar. The measured groundwater elevation was apprpoximately el. +5.0; therefore, if the lowest excavation subgrade is below this elevation, dewatering of the site will likely be required. If the final cellar depth is less than approximately 15 ft, a properly designed wellpoint system should be adequate to dewater the site. If the final cellar depth is greater than approximately 15 ft, a deep well dewatering system will likely be required. In addition, localized dewatering with sump pits and pumps may be required for the excavation of pile caps and to handle collected water from rainfall or surface runoff.

4.6 SUBGRADE PREPARATION

Subgrade surfaces for the floor slab or mat foundation, if selected, should be level, clean of loose soil, mud and other material (such as concrete, brick, wood, debris, etc.) that can have a negative impact on the performance of the floor slab or mat. If a mat foundation is selected, the bearing surface should be inspected and approved by a geotechnical engineer to ensure that the material encountered at the bearing level is the anticipated bearing material.

The subgrade should be proof-rolled with a minimum of 6 passes of a smooth drum vibrating roller with a minimum 10 ton static weight, or approved equipment having similar energy. Any unstable areas encountered which cannot be stabilized by additional compaction should be excavated to competent material and the area backfilled with compacted structural fill. The proof-rolling should not be performed when the subgrade is wet, muddy, or frozen.

After approval and proof-rolling of the subgrade, a minimum of 4-inches of compacted coarse aggregate, commonly known as 3/4” gravel or crushed stone, should be placed beneath the mat or floor slab.

If the mat or floor slab is constructed in the winter, the subgrade should be protected from frost action to limit possible subgrade deterioration resulting from freezing and thawing cycles. The concrete for the mat or floor slab should not be poured if the subgrade is wet, muddy, or frozen.

4.7 BACKFILL AND COMPACTION REQUIREMENTS

Select backfill or structural backfill should be granular soils free of cinder, brick, asphalt, ash, and other unsuitable materials. Such material should not contain any boulders or cobbles larger than about 4 inches across, and should have a fines content (material passing the No. 200 sieve) less than 15 percent. It is recommended that structural backfill or select backfill beneath the proposed building foundation be compacted to a minimum of 95% of the maximum dry density, as determined by ASTM D1557-88, Method C. All backfill should be placed in lifts not exceeding 8 in. in loose thickness. The subgrade underneath the backfill should be satisfactorily proof-rolled prior to the placement of backfill. Backfill placed beneath slabs-on-grade, behind below-grade walls, and underneath sidewalks should be compacted to a minimum of 90% of the maximum dry density. Backfill placed in landscaped areas should be compacted to a minimum of 85% of the maximum dry density.

4.8 PRE-CONSTRUCTION CONDITION SURVEY AND MONITORING

A pre-construction condition survey of any adjacent structure or utility that is within 50 ft of the construction site should be performed for the protection of the new building owner in the event of a future damage claim. The report should include detailed documentation and photographs of the existing conditions of the structures. Based on the survey results, a monitoring program should be developed for the purpose of checking the performance of the adjacent structures or utilities and for monitoring construction procedures. This monitoring program should include recommendations for the location of survey points to monitor vertical and horizontal movements, locations for crack gauges, and locations for monitoring vibrations during key construction activities. The monitoring program should also include criteria for allowable movements and vibrations, and the procedures to be implemented if the criteria are exceeded during construction.

4.8 CONSTRUCTION MONITORING

It is recommended that a geotechnical engineer familiar with the subsurface conditions and foundation design criteria review and approve the foundation contractors procedures and provide inspection services during excavation and foundation construction. Geotechnical related inspection services should include:

- Observation and documentation of all phases of excavation and foundation construction.
- Special inspection of the test piles and production piles.
- Special inspection of the mat foundation subgrade.
- Special inspection of underpinning (if required) and support of excavation.
- Obtaining and/or reviewing monitoring data during foundation construction.

Professional judgments were necessary in relation to determining stratigraphy and soil properties from the subsurface investigations. Such judgments were based partly on the evaluation of the technical information gathered, and partly on our experience with similar projects. If further investigation reveals differences in the subsurface conditions and/or groundwater level, or if the proposed building design or elevations are different from those indicated herein, or are changed, it is recommended that we be given the opportunity to review this new information and modify our recommendations, if deemed appropriate.

The results presented in this report are applicable only to the present study, and should not be used for any other purpose without our review and consent. This study has been conducted in accordance with the standard of care commonly used as state-of-the-practice in the profession. No other warranties are either expressed or implied.

TABLES

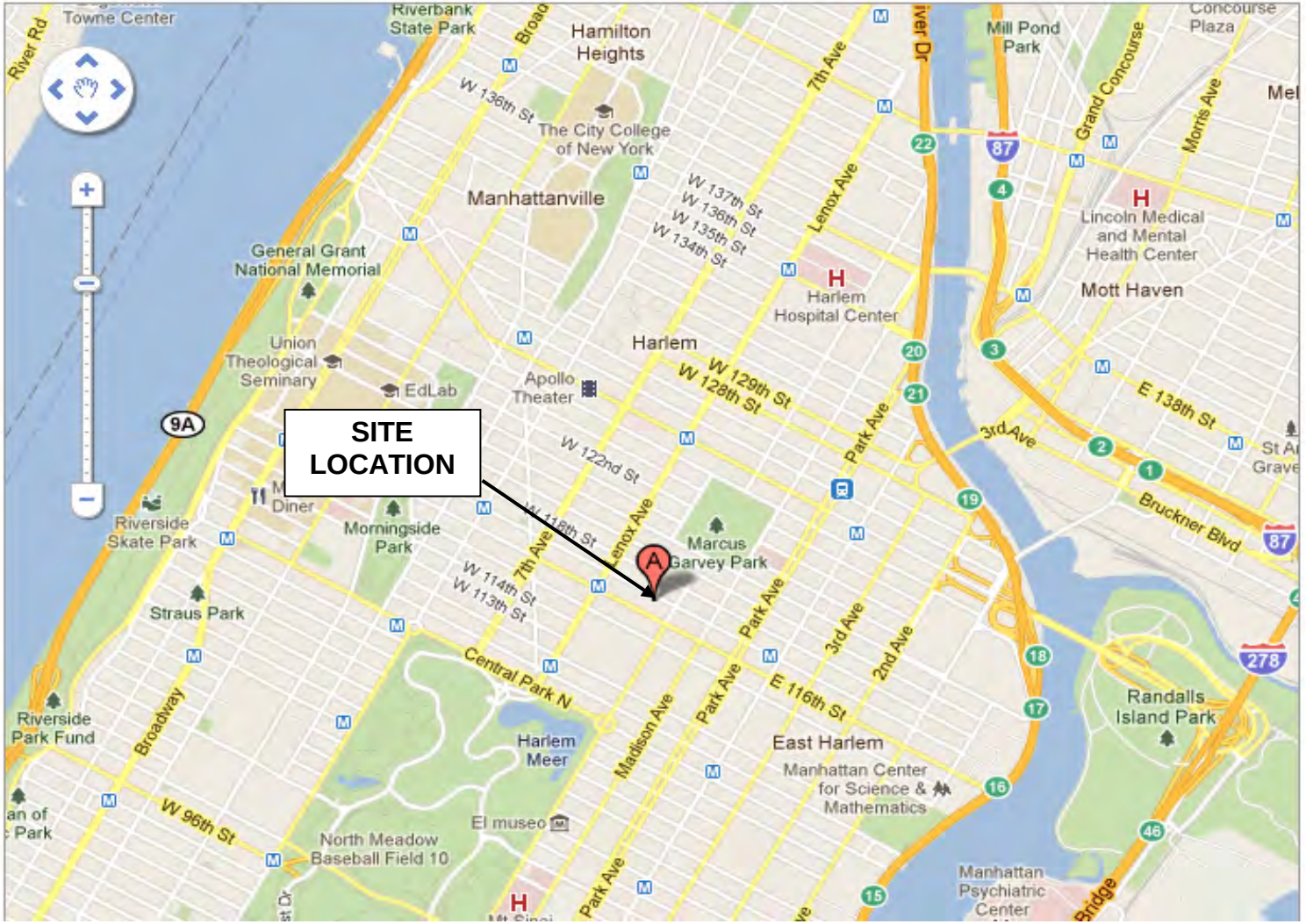
TABLE 1
RECOMMENDED DESIGN RESPONSE SPECTRUM
WEST 116TH RESIDENTIAL

Period (sec)	Spectral Acceleration (g)
0.010	0.146
0.020	0.175
0.030	0.200
0.040	0.230
0.050	0.260
0.060	0.290
0.070	0.310
0.080	0.330
0.090	0.330
0.100	0.330
0.200	0.330
0.300	0.330
0.350	0.330
0.400	0.260
0.500	0.190
0.600	0.150
0.700	0.130
0.800	0.114
0.900	0.101
1.000	0.091
2.000	0.045
3.000	0.030
4.000	0.023
5.000	0.018
6.000	0.015

S_{ds} = 0.33 g

S_{d1} = 0.09 g

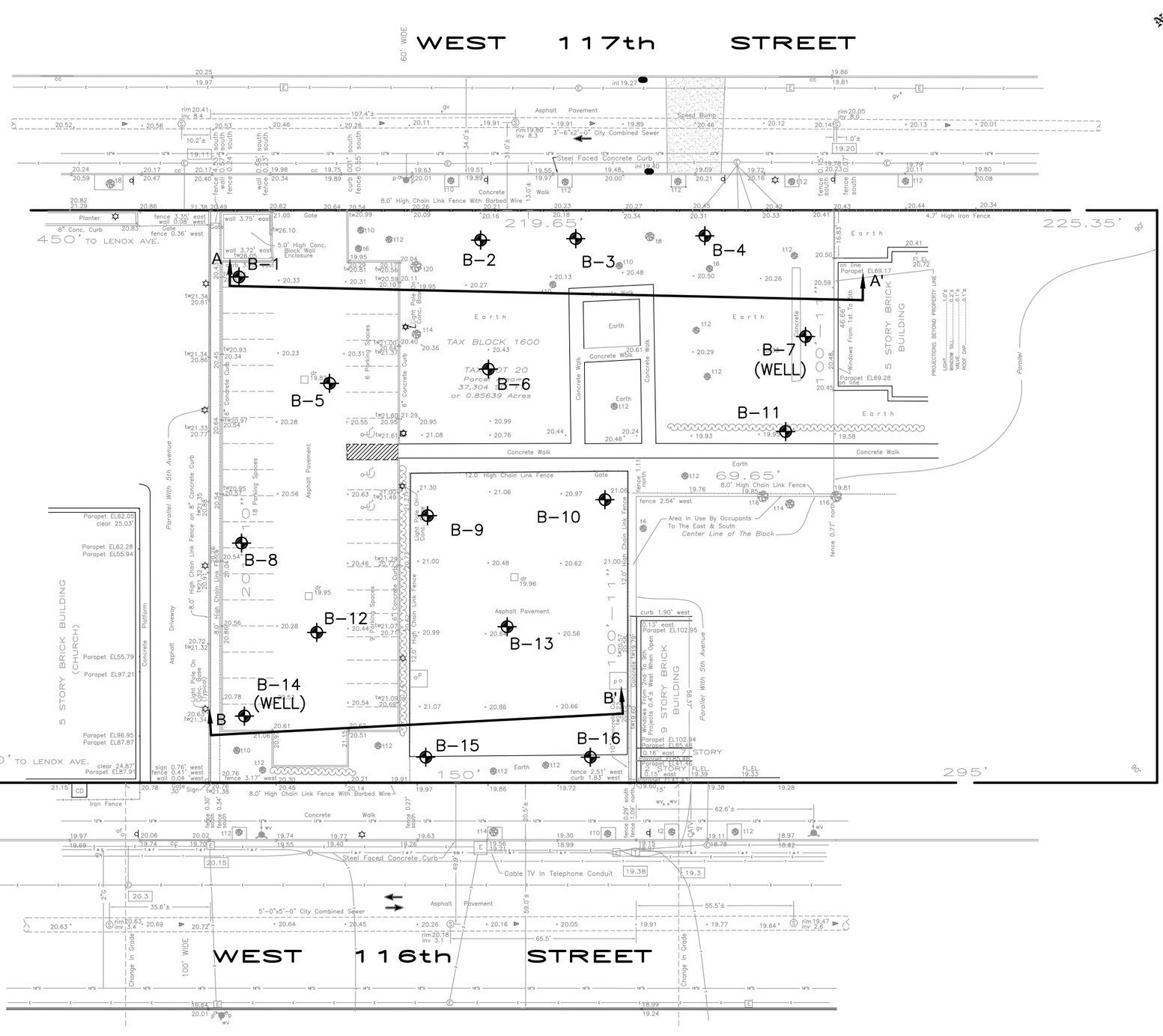
FIGURES



Site Location Map
West 116th Residential
New York, New York

URS
WAYNE, NEW JERSEY

DR. BY: TGT	SCALE: NA	PROJ: 11100377
	DATE: July 2011	FIG NO: 1



5th AVENUE

LEGEND:

B-1	BORING LOCATION AND IDENTIFICATION NUMBER
B-14 (WELL)	INSTALLED OBSERVATION WELL
A — A'	GEOLOGIC SECTION

NOTES:

1. BASEMAP DRAWING OBTAINED FROM SURVEY PREPARED BY MONTROSE SURVEYING CO., LLP AND DATED JULY 9, 2010.
2. ELEVATIONS REFER TO BOROUGH OF MANHATTAN DATUM, WHICH IS 2.75 FEET ABOVE THE UNITED STATES COAST AND GEODETIC SURVEY DATUM OF JULY 23, 1964, MEAN SEA LEVEL AT SANDY HOOK, NJ.
3. BORING LOCATIONS SHOULD BE CONSIDERED APPROXIMATE.

0 20 40 80

SCALE (FEET)

AREAS DESIGNATED AS F FLOODING) AGENCY

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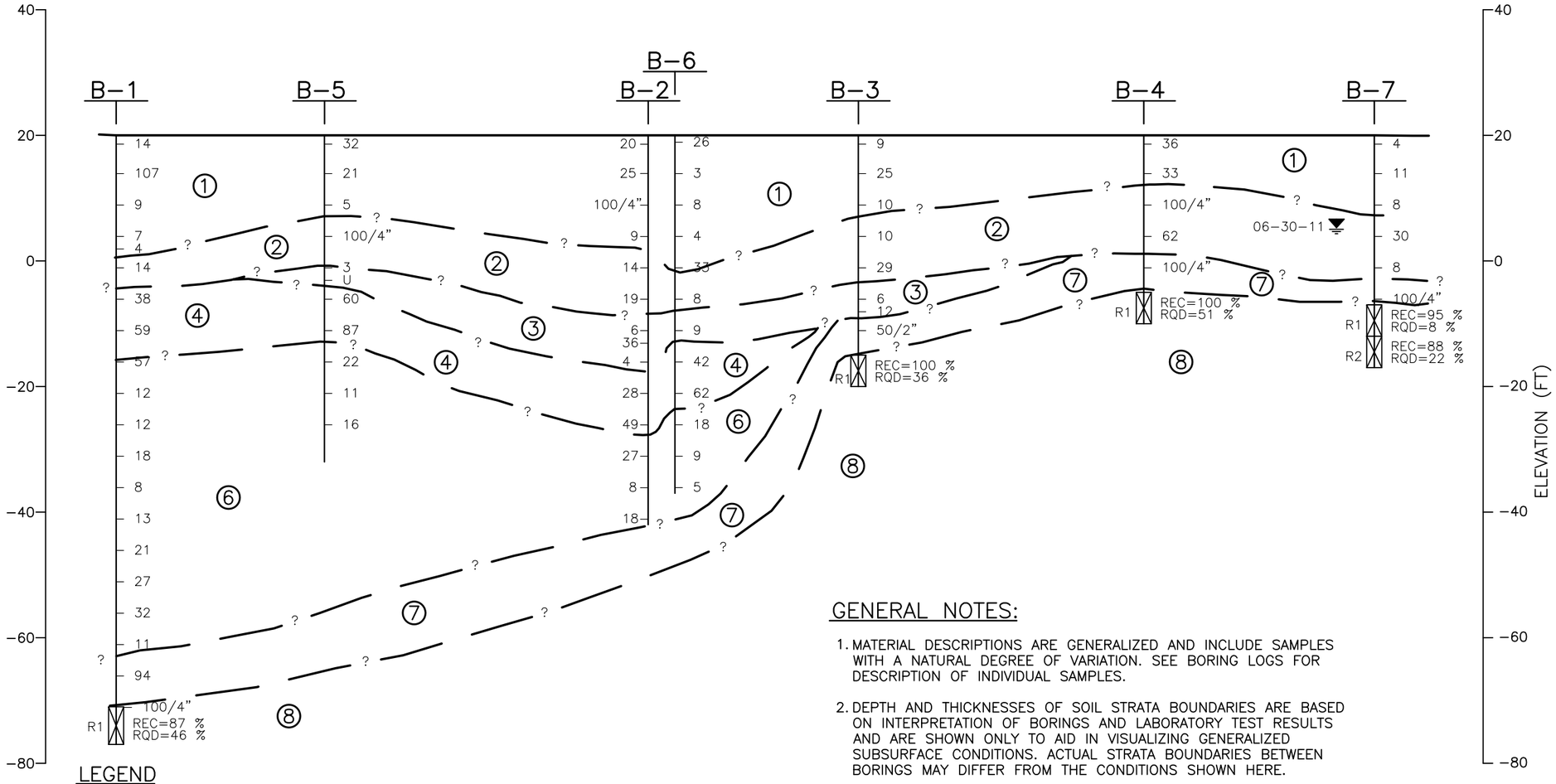
BORING LOCATION PLAN
WEST 116TH AND 117TH STREETS
NEW YORK, NEW YORK

URS
WAYNE, NEW JERSEY

DR. BY	KM	SCALE	AS SHOWN	DWG. NO. 00377001	PROJ. NO. 11100377
CK'D. BY	TT	DATE	JULY 25, 2011	FIG. NO.	2



LEGEND

B–1 — GEOTECHNICAL BORING DRILLED BY CRAIG TEST BORING INC., UNDER URS SUPERVISION.

CORE RUN NUMBER

RUN 1 / REC 100 / RQD 38 — ROCK CORE RECOVERY, EXPRESSED AS A RATIO OF TOTAL LENGTH OF RECOVERED CORE TO THE LENGTH CORED, IN PERCENT

ROCK QUALITY DESIGNATION DEFINED AS THE TOTAL LENGTH OF ALL THE PIECES OF CORE 4–INCH OR LARGER DIVIDED BY TOTAL LENGHT OF CORE RUN, IN PERCENT

32 — N–VALUE, DEFINED AS NUMBER OF BLOWS OF A 140–LB HAMMER FREE FALLING FOR 30 INCHES REQUIRED TO ADVANCE A STANDARD SPLIT SPOON SAMPLER 12 INCHES AFTER INITIAL 6 INCH PENETRATION

? — APPROXIMATE STRATA BOUNDARY

06–30–11 — WATER LEVEL IN THE OBSERVATION WELL AND DATE OF OBSERVATION

GENERAL NOTES:

1. MATERIAL DESCRIPTIONS ARE GENERALIZED AND INCLUDE SAMPLES WITH A NATURAL DEGREE OF VARIATION. SEE BORING LOGS FOR DESCRIPTION OF INDIVIDUAL SAMPLES.
2. DEPTH AND THICKNESSES OF SOIL STRATA BOUNDARIES ARE BASED ON INTERPRETATION OF BORINGS AND LABORATORY TEST RESULTS AND ARE SHOWN ONLY TO AID IN VISUALIZING GENERALIZED SUBSURFACE CONDITIONS. ACTUAL STRATA BOUNDARIES BETWEEN BORINGS MAY DIFFER FROM THE CONDITIONS SHOWN HERE.
3. ELEVATIONS REFER TO MANHATTAN BOROUGH DATUM.

GENERALIZED SOIL DESCRIPTIONS:

① SANDY FILL WITH SILT, GRAVEL, BRICK, CONCRETE, AND OTHER MISC. CONSTRUCTION DEBRIS (7)
② GRAY TO BROWN COARSE TO FINE SAND WITH SOME SILT AND TRACE AMOUNTS OF GRAVEL (3B)
③ BROWN TO DARK BROWN TO BLACK PEAT WITH SOME SILT (6)
④ GRAY AND BROWN MEDIUM TO FINE GRAVEL WITH COARSE TO FINE SAND (2A–3A)
⑤ REDDISH BROWN MEDIUM TO FINE SAND WITH TRACE AMOUNTS OF SILT (3B)
⑥ REDDISH BROWN SILTY FINE SAND, SILT, AND GRAY CLAY VARVES (6–3B–5B)
⑦ GRAY AND BROWN COARSE TO FINE SAND WITH VARYING AMOUNTS OF GRAVEL, SILT, AND DECOMPOSED ROCK (3A)
⑧ GNEISS BEDROCK (1B–1C)

0 10 20 40
HORIZONTAL SCALE (FEET)

0 10 20 40
VERTICAL SCALE (FEET)

GENERALIZED SUBSURFACE PROFILE A–A'
WEST 116TH & WEST 117TH STREET
NEW YORK, NEW YORK

URS
WAYNE, NEW JERSEY

DR. BY	ET	SCALE	AS SHOWN	DWG. NO. 00377002–AA	PROJ. NO. 11100377
CK'D. BY	AF	DATE	AUGUST 8, 2011	FIG. NO.	3

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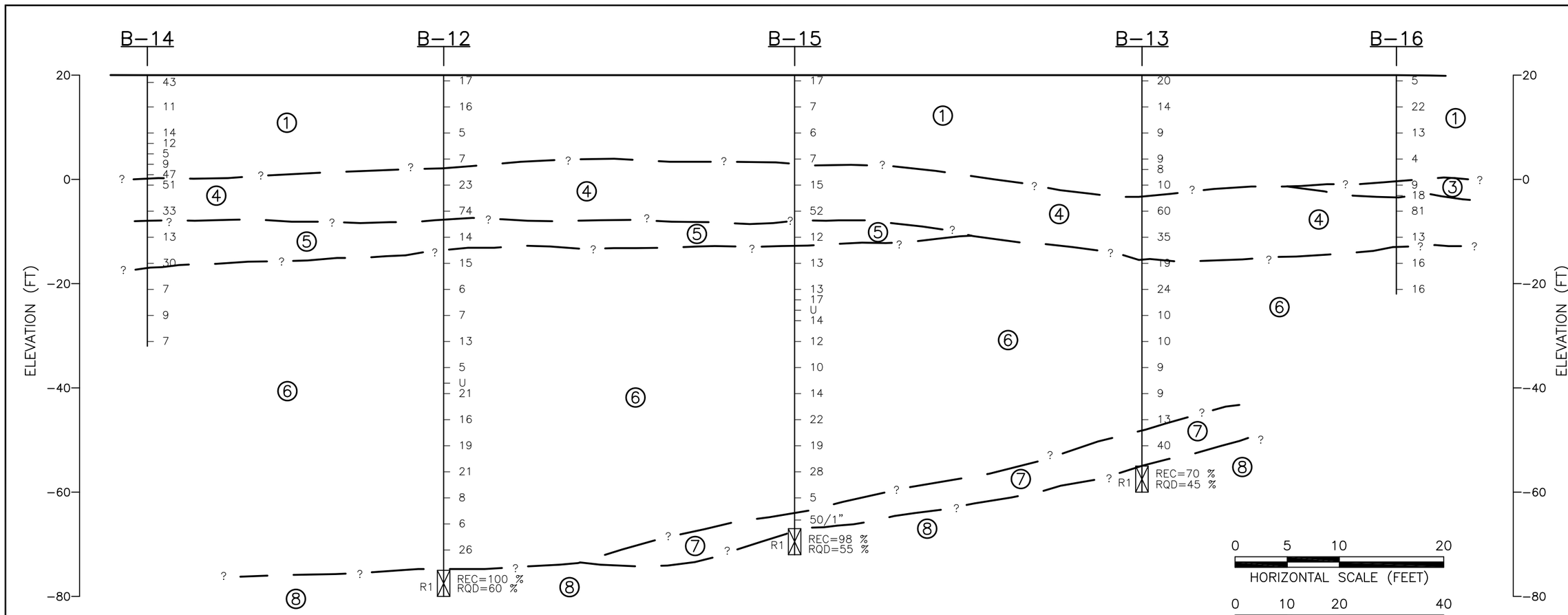

LEGEND

B-1 — GEOTECHNICAL BORING DRILLED BY CRAIG TEST BORING INC., UNDER URS SUPERVISION.

CORE RUN NUMBER

RUN 1 / REC 100 / RQD 38 — ROCK CORE RECOVERY, EXPRESSED AS A RATIO OF TOTAL LENGTH OF RECOVERED CORE TO THE LENGTH CORED, IN PERCENT

ROCK QUALITY DESIGNATION DEFINED AS THE TOTAL LENGTH OF ALL THE PIECES OF CORE 4-INCH OR LARGER DIVIDED BY TOTAL LENGHT OF CORE RUN, IN PERCENT

32 — N-VALUE, DEFINED AS NUMBER OF BLOWS OF A 140-LB HAMMER FREE FALLING FOR 30 INCHES REQUIRED TO ADVANCE A STANDARD SPLIT SPOON SAMPLER 12 INCHES AFTER INITIAL 6 INCH PENETRATION

? — APPROXIMATE STRATA BOUNDARY

06-30-11 — WATER LEVEL IN THE OBSERVATION WELL AND DATE OF OBSERVATION

GENERALIZED SOIL DESCRIPTIONS:

① SANDY FILL WITH SILT, GRAVEL, BRICK, CONCRETE, AND OTHER MISC. CONSTRUCTION DEBRIS (7)

② GRAY TO BROWN COARSE TO FINE SAND WITH SOME SILT AND TRACE AMOUNTS OF GRAVEL (3B)

③ BROWN TO DARK BROWN TO BLACK PEAT WITH SOME SILT (6)

④ GRAY AND BROWN MEDIUM TO FINE GRAVEL WITH COARSE TO FINE SAND (2A-3A)

⑤ REDDISH BROWN MEDIUM TO FINE SAND WITH TRACE AMOUNTS OF SILT (3B)

⑥ REDDISH BROWN SILTY FINE SAND, SILT, AND GRAY CLAY VARVES (6-3B-5B)

⑦ GRAY AND BROWN COARSE TO FINE SAND WITH VARYING AMOUNTS OF GRAVEL, SILT, AND DECOMPOSED ROCK (3A)

⑧ GNEISS BEDROCK (1B-1C)

GENERAL NOTES:

1. MATERIAL DESCRIPTIONS ARE GENERALIZED AND INCLUDE SAMPLES WITH A NATURAL DEGREE OF VARIATION. SEE BORING LOGS FOR DESCRIPTION OF INDIVIDUAL SAMPLES.
2. DEPTH AND THICKNESSES OF SOIL STRATA BOUNDARIES ARE BASED ON INTERPRETATION OF BORINGS AND LABORATORY TEST RESULTS AND ARE SHOWN ONLY TO AID IN VISUALIZING GENERALIZED SUBSURFACE CONDITIONS. ACTUAL STRATA BOUNDARIES BETWEEN BORINGS MAY DIFFER FROM THE CONDITIONS SHOWN HERE.
3. ELEVATIONS REFER TO MANHATTAN BOROUGH DATUM.

GENERALIZED SUBSURFACE PROFILE B-B'
WEST 116TH & WEST 117TH STREET
NEW YORK, NEW YORK

URS
WAYNE, NEW JERSEY

DR. BY	ET	SCALE	AS SHOWN	DWG. NO. 00377003-BB	PROJ. NO. 11100377
CK'D. BY	AF	DATE	AUGUST 8, 2011	FIG. NO.	4

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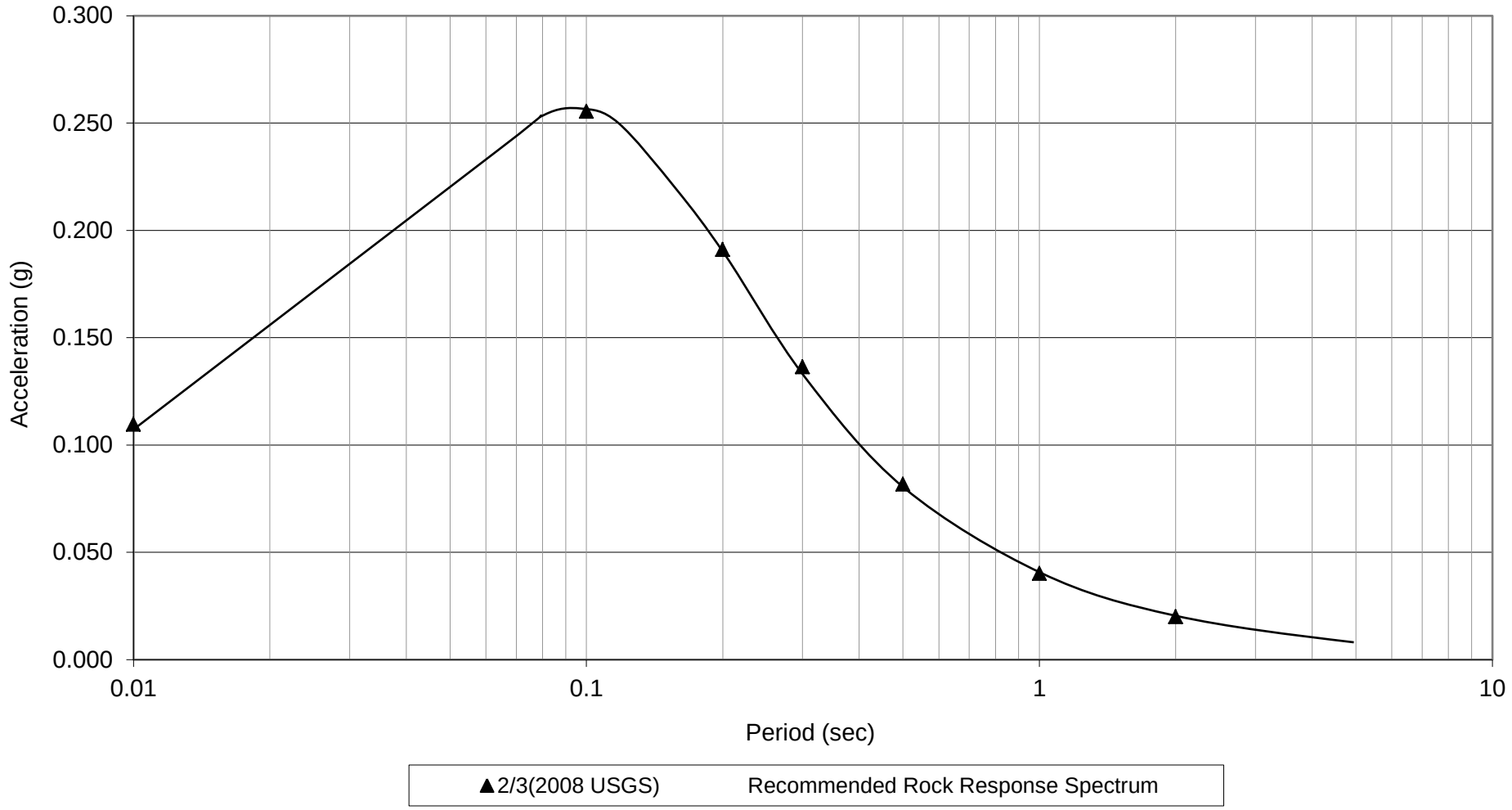
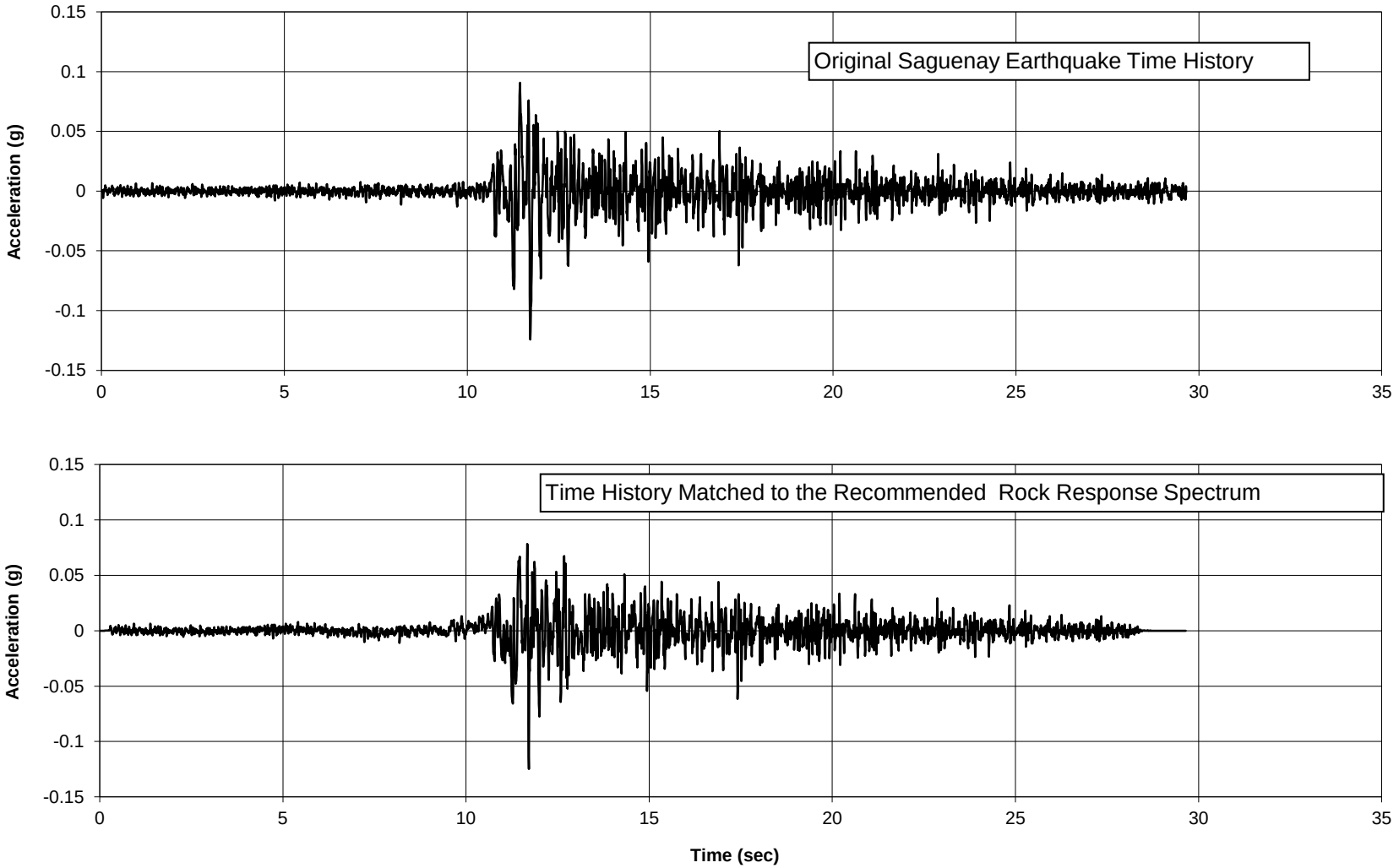


Rock Response Spectrum
West 116th Residential
New York, New York

URS
WAYNE, NEW JERSEY

DR. BY: TGT	SCALE: As shown	PROJ: 11100377
	DATE: July 2011	FIG NO: 5

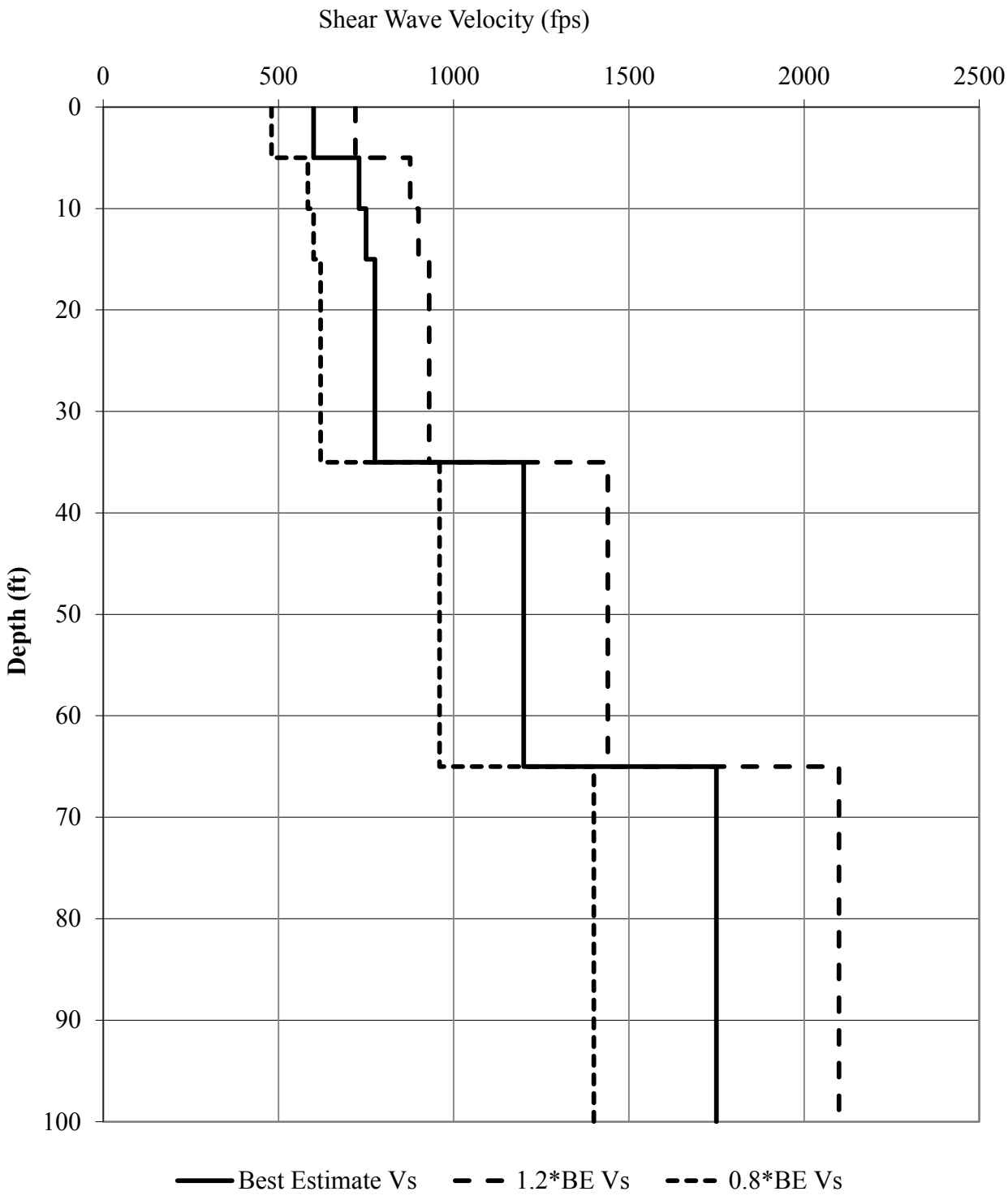
I:\Projects\11100377 (West 116th &117th)\Seismic\Bedrock Spectra - time history.xlsx



Rock Acceleration Time Histories
2/3(2500-Year Return Period) - 2008 USGS Data
West 116 Residential, New York, NY

URS
WAYNE, NEW JERSEY

DR. BY: TGT	SCALE: As Shown	PROJ: 11100377
	DATE: July 2011	FIG NO: 6



Shear Wave Velocity Profile for Site Response Analysis
West 116th Residential
New York, NY

URS

WAYNE, NEW JERSEY

DR. BY: TGT	SCALE: As shown	PROJ NO: 11100377
CHK'D BY:	DATE: August 2011	FIG NO: 7

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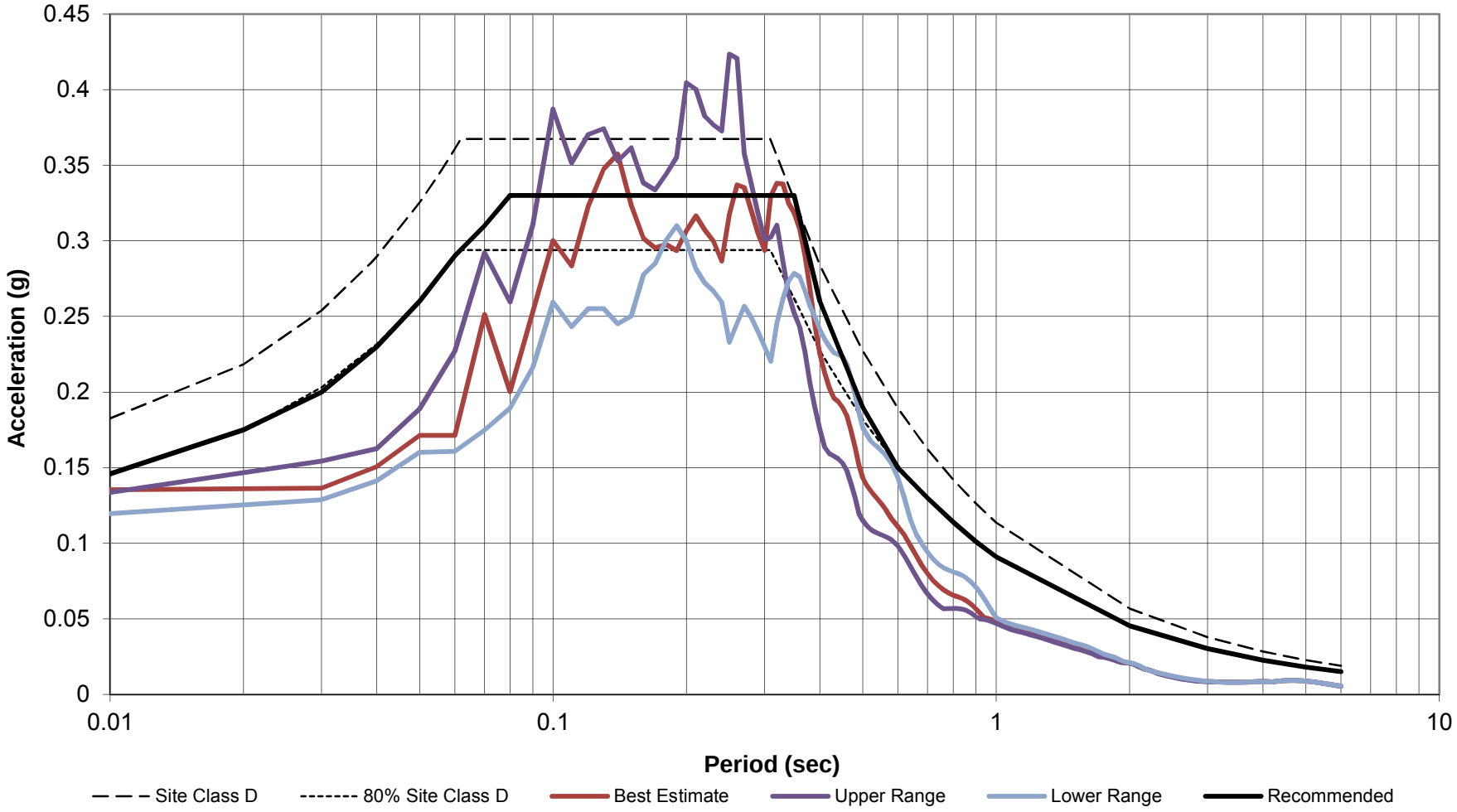
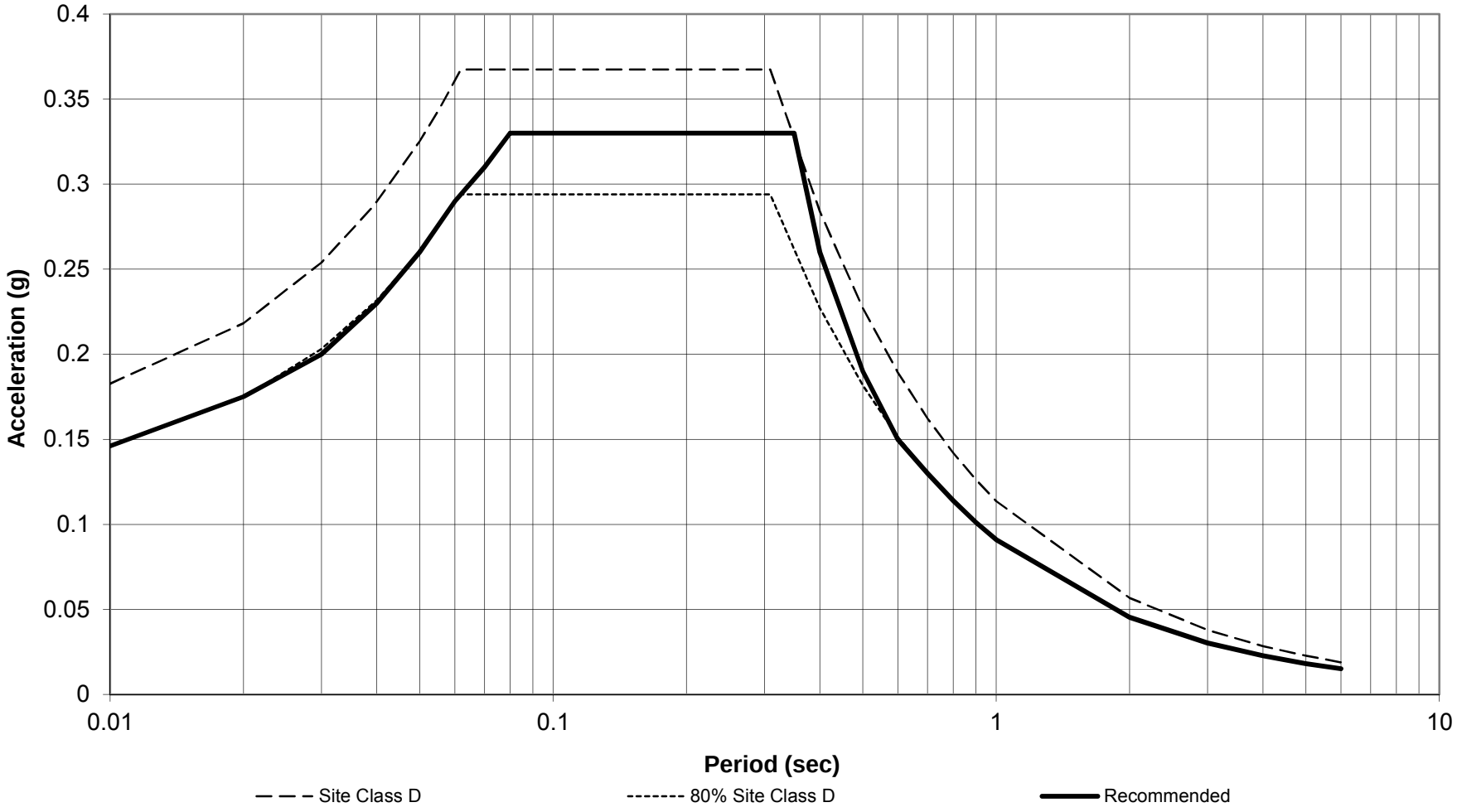


5% Damping

Site Response Analysis Results West 116th Residential New York, New York		
URS WAYNE, NEW JERSEY		
DR. BY: AR	SCALE: As shown	PROJ: 11100377
	DATE: July 2011	FIG NO: 8



5% Damping

Recommended Response Spectrum
West 116th Residential
New York, New York

URS
WAYNE, NEW JERSEY

DR. BY: AR	SCALE: As shown	PROJ: 11100377
	DATE: July 2011	FIG NO: 9

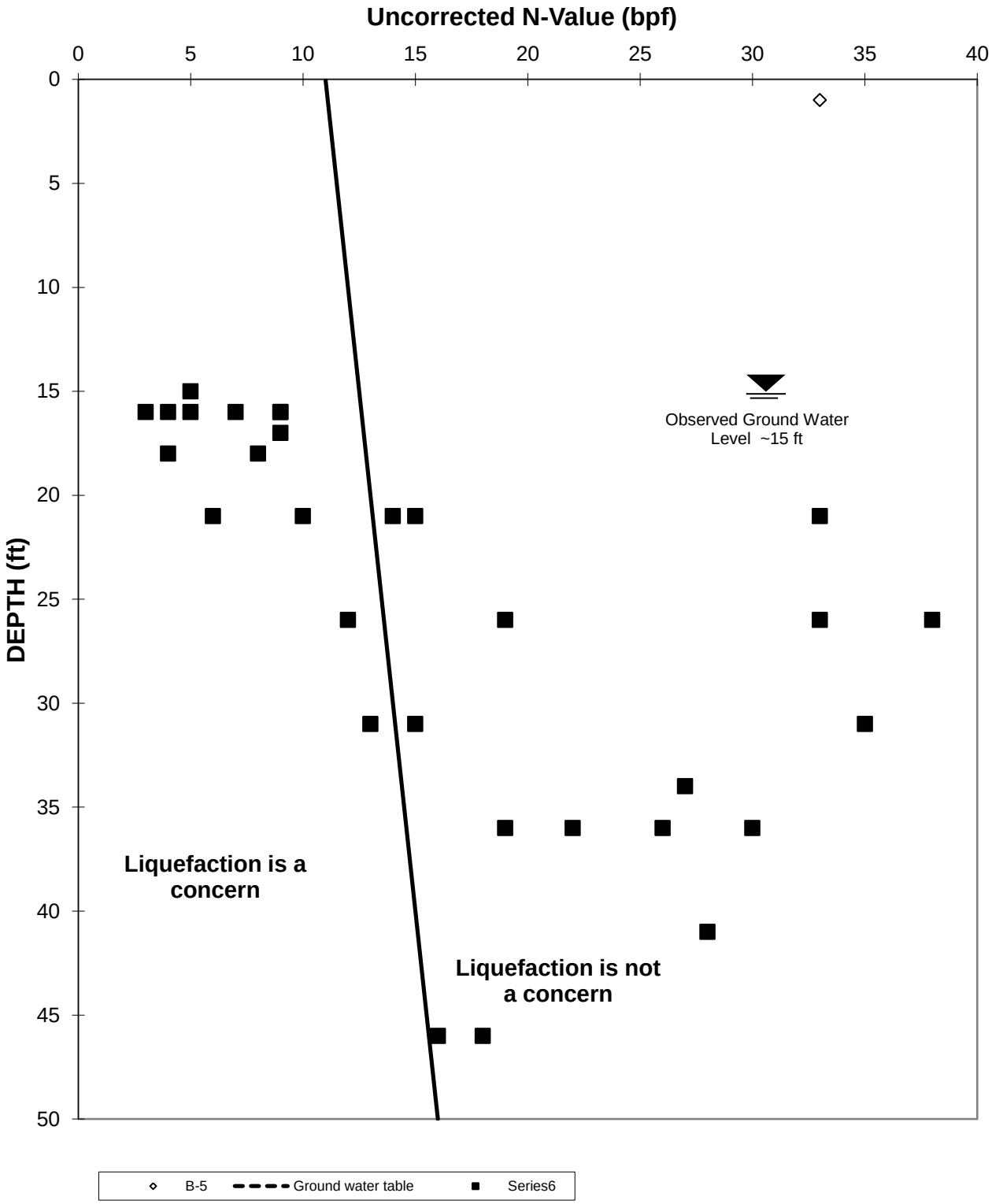


Figure is appropriate for a Standard Occupancy Structure only. Based on the seismic portion of the 2008 NYCBC.

Soil Liquefaction Potential
West 116th Residential
New York, NY

URS
WAYNE, NJ

DR. BY:	SCALE: As Shown	PROJ NO: 11100377
CHK'D BY:	DATE: July 2011	FIG NO: 10

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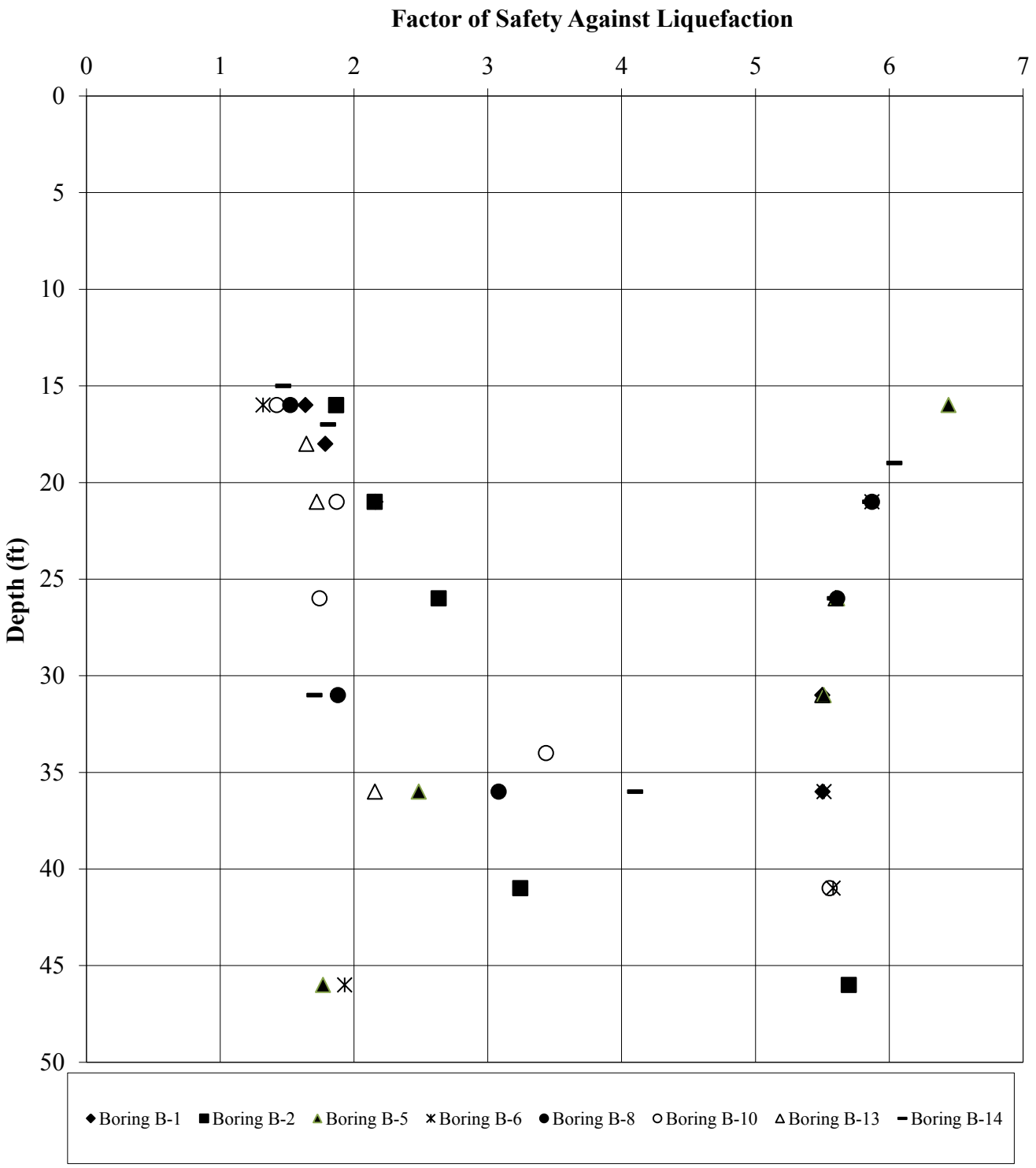

FOS Against Liquefaction
West 116th Residential
New York, NY

URS

WAYNE, NEW JERSEY

	SCALE: As Shown	PROJ NO: 11100377
BY: TGT	DATE: August 2011	FIG NO: 11

i:\projects\9E04032\Liquefaction.xls FOS (500) Plot

APPENDIX A
TEST BORING LOGS

Project: West 116th Street
Project Location: New York, New York
Project Number: 11100377

Log of Boring B-1

Date(s) Drilled	**6/22/11**	Logged By	**A. Felicetta**	Approximate Surface Elevation (feet)	**20.0**
Drilling Method	**Rotary mud**	Drilling Contractor	**CTB**	Coordinates	**North:** **East:**
Casing Size/Type	**4" Steel**	Drill Rig Operator	**Dave Cooke**	Total Depth Drilled (feet) **97.0**	Rock Depth (feet) **91.0**
Drill Rig Type	**CME 75**	Drill Bit Size/Type	**3 7/8" Tricone Bit**	Sampler Type(s)	**2" O.D Spoon Sampler**
Groundwater Level and Date Measured		Hammer Wt/Drop **140 lb / 30" Safety**	Casing Hammer Wt/Drop	Core Barrel Size/Type	**NX**
Boring Location and Comments	**See Boring Location Plan**			No. of Samples **Dist.: 20 Undist.: 0 Core (ft): 5**	

Depth, feet	Soil Samples: Type, Number	Recov. (ft)	Pen. Resist. (blows/6 in)	Rock Coring: Run Number	Recov. (%)	RQD (%)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Water Cont.(%)	% Fines	REMARKS/ OTHER TESTS
0								~3" Asphalt					
	S-1	0.6	8 5 9 14					(FILL) Brown C-F SAND, some brick and silt, trace gravel [7]					
5	S-2	0.7	52 62 45 34					(FILL) Light Gray/Brown C-F SAND, some concrete, trace gravel, silt and brick [7]					
10	S-3	0.0	5 4 5 7					No recovery					
15	S-4	0.8	3 3 4 6					(FILL) Gray C-F SAND, trace gravel, silt, wood, and black organic silt [7]					
	S-5	0.8	4 2 2 2					(FILL) Olive Gray clayey M-F SAND, trace silt [7]			21	48	
20	S-6	0.3	9 5 9 8					(SP-SM) Dark Gray Organic M-F SAND, some silt, trace gravel [3b]					Took another sample w/ 3" spoon to get more recovery
25	S-7	0.3	13 19 19 14					(GP) Brown/Gray c-f sandy M-F GRAVEL, trace silt [2a]					Driller drove casing to 25' therefore could not take another sample at 22' Hard drilling from 24.5' to 30' bgs
30													

Project: West 116th Street
Project Location: New York, New York
Project Number: 11100377

Log of Boring B-1

Depth, feet	Soil Samples: Type, Number	Recov. (ft)	Pen. Resist. (blows/6 in)	Rock Coring: Run Number	Recov. (%)	RQD (%)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Water Cont.(%)	% Fines	REMARKS/ OTHER TESTS
30	S-8	0.3	15 23 36 17					(GP) M-F GRAVEL, some c. sand, trace m-f sand and silt [2a]					Hard drilling 30' to 35' bgs
35	S-9	0.7	42 31 26 11					Top 4": (GP) M-F GRAVEL, some c. sand, trace m-f sand and silt [2a] Bottom 4": (SM) Reddish brown F. SAND, some silt [3a]					
40	S-10	1.3	5 5 7 11					(ML-CL) Brown/Gray SILT, some clay, trace f. sand [5b]	27	21	27	99	
45	S-11	1.4	2 5 7 8					(SM) Brown/Gray silty F. SAND, trace clay [3b]					
50	S-12	1.7	5 7 11 18					(SM) Brown/Gray F. SAND and SILT, trace to some lenses of gray clay [3b]					
55	S-13	1.8	3 4 4 5					(CL) Brown/Gray silty CLAY, trace f. sand [6]	33	18	32	99	
60	S-14	1.3	4 6 7 6					(SM) Brown/Gray F. SAND, some silt, trace clay [3b]					
65													

Project: West 116th Street
Project Location: New York, New York
Project Number: 11100377

Log of Boring B-1

Sheet 3 of 3

Depth, feet	Soil Samples: Type, Number	Recov. (ft)	Pen. Resist. (blows/6 in)	Rock Coring: Run Number	Recov. (%)	RQD (%)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Water Cont.(%)	% Fines	REMARKS/ OTHER TESTS
65	S-15	1.1	5 9 12 12					(SM) Brown/Gray F. SAND, some silt, trace clay [3b]					
70	S-16	1.1	5 12 15 21					(SM) Brown/Gray F. SAND, some silt, trace clay [3b]					
75	S-17	1.6	10 16 16 14					(SM-SC) Brown/Gray silty F. SAND, trace to some clay [3a]					
80	S-18	1.5	6 6 5 6					(ML) Brown-gray clayey SILT, some f. sand [5b]					
85	S-19	0.8	50 45 49 30					(TILL) Dark Gray/Brown C-F SAND, trace gravel and silt, some decomposed rock [2a]					
90	S-20	0.0	100/4"					No recovery					
95				R-1	87	46		GNEISS: moderately fractured, moderately weathered, intermediate rock [1c]					
100								End of boring at 97' below ground level					

Project: West 116th Street
Project Location: New York, New York
Project Number: 11100377

Log of Boring B-10

Date(s) Drilled	**6/27/11**	Logged By	**A. Felicetta**	Approximate Surface Elevation (feet)	**20.0**
Drilling Method	**Rotary mud**	Drilling Contractor	**CTB**	Coordinates	**North:** **East:**
Casing Size/Type	**4" Steel**	Drill Rig Operator	**Mike G**	Total Depth Drilled (feet) **54.0**	Rock Depth (feet)
Drill Rig Type	**CME 75**	Drill Bit Size/Type	**3 7/8" Tricone Bit**	Sampler Type(s)	**2" O.D Spoon Sampler**
Groundwater Level and Date Measured		Hammer Wt/Drop **140 lb / 30" Safety**	Casing Hammer Wt/Drop	Core Barrel Size/Type	
Boring Location and Comments	**See Boring Location Plan**			No. of Samples **Dist.: 12 Undist.: 1 Core (ft): 0**	

Depth, feet	Soil Samples: Type, Number	Recov. (ft)	Pen. Resist. (blows/6 in)	Rock Coring: Run Number	Recov. (%)	RQD (%)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Water Cont.(%)	% Fines	REMARKS/ OTHER TESTS
0								~3" Asphalt					
	S-1	1.1	23 14 8 13					(FILL) Brown C-F SAND, some brick, trace gravel, silt, and glass [7]					
5	S-2	0.6	5 7 4 6					(FILL) Brown C-F SAND, some gravel and brick, trace silt and various construction debris [7]					
10	S-3	0.3	10 4 3 2					(FILL) Brown C-F SAND, trace gravel, silt and brick [7]					
15	S-4	0.0	7 3 2 3					No recovery					
20	S-5	1.0	5 4 2 3					(FILL) Brown silty M-F SAND [7]			19	33	
25	S-6	0.4	5 5 7 6					(SP) Brown/Gray C-F SAND, trace silt and gravel [3b]					
30													

Project: West 116th Street
Project Location: New York, New York
Project Number: 11100377

Log of Boring B-10

Sheet 2 of 2

Depth, feet	Soil Samples: Type, Number	Recov. (ft)	Pen. Resist. (blows/6 in)	Rock Coring: Run Number	Recov. (%)	RQD (%)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Water Cont.(%)	% Fines	REMARKS/ OTHER TESTS
30	S-7	0.8	2 2 3 6					(PT) Black Organic PEAT [6]					
	U-1		P W					(PT) Black Organic PEAT, trace gray clay and gravel					Shelby Tube taken: driller said soil hardened up and didn't want to crush the tube so stopped pushing at 1', only 2" recovery in tube therefore put sample in jar
	S-8	0.9	12 12 15 20					(SP) Black/Gray C-F SAND, trace gravel, clay and silt, piece of gravel in tip of spoon [3b]					
35													
40	S-9	0.0	41 50/2"					No recovery					
45	S-10	1.1	18 7 7 8					(SM) Gray/Brown silty F. SAND, trace clay [3b]					Hard drilling 48' to 52'
50	S-11	0.0	100/3"					Piece of Gravel in tip of spoon					
	S-12	0.0	100/2"					No recovery					Decomposed rock cuttings
								End of boring at 54' below ground level					
55													
60													
65													

Project: West 116th Street
Project Location: New York, New York
Project Number: 11100377

Log of Boring B-11

Date(s) Drilled	**6/23/11**	Logged By	**A. Felicetta**	Approximate Surface Elevation (feet)	**20.0**
Drilling Method	**Rotary mud**	Drilling Contractor	**CTB**	Coordinates	**North:** **East:**
Casing Size/Type	**4" Steel**	Drill Rig Operator	**Dave Cooke**	Total Depth Drilled (feet) **37.0**	Rock Depth (feet) **33.0**
Drill Rig Type	**CME 75**	Drill Bit Size/Type	**3 7/8" Tricone Bit**	Sampler Type(s)	**2" O.D Spoon Sampler**
Groundwater Level and Date Measured		Hammer Wt/Drop **140 lb / 30" Safety**	Casing Hammer Wt/Drop	Core Barrel Size/Type	**NX**
Boring Location and Comments	**See Boring Location Plan**			No. of Samples **Dist.: 8** **Undist.: 0**	**Core (ft): 5**

Depth, feet	Soil Samples: Type, Number	Recov. (ft)	Pen. Resist. (blows/6 in)	Rock Coring: Run Number	Recov. (%)	RQD (%)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Water Cont.(%)	% Fines	REMARKS/ OTHER TESTS
0								~3" topsoil					
	S-1	0.8	3 4 5 10					(FILL) Brown C-F SAND, trace gravel, silt and brick [7]					
5	S-2	0.6	10 8 8 6					(FILL) Red BRICK and C-F SAND, some gravel [7]					
10	S-3	0.8	17 19 22 46					(SP) Gray/Brown gravelly C-F SAND, trace silt [3a]					
15	S-4	1.0	8 8 6 7					(SP) Gray/Brown C-F SAND, trace gravel, silt, clay, and shells [3b]					
20	S-5	0.9	4 8 9 11					(SP) Gray/brown C-F SAND, trace organic clay, silt, and gravel [3b]					
25	S-6	0.6	4 4 5 6					(PT) Black Organic PEAT [6]					
	S-7	1.7	7 8 6 5					Top 8": (PT) Black/Brown Organic PEAT [6] Bottom 12": (SP) Light Brown M-F SAND, some organic peat, trace silt and clay [3b]	300	143	206		Organic Content 33.9%
30													

Project: West 116th Street
Project Location: New York, New York
Project Number: 11100377

Log of Boring B-11

Depth, feet	Soil Samples: Type, Number	Soil Samples: Recov. (ft)	Soil Samples: Pen. Resist. (blows/6 in)	Rock Coring: Run Number	Rock Coring: Recov. (%)	Rock Coring: RQD (%)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Water Cont.(%)	% Fines	REMARKS/ OTHER TESTS
30	S-8	0.0	5 50/2"					No recovery					
35				R-1	95	80		GNEISS: slightly fractured, slightly weathered, medium hard rock [1b]					
								End of boring at 37' below ground level					
40													
45													
50													
55													
60													
65													

Project: West 116th Street
Project Location: New York, New York
Project Number: 11100377

Log of Boring B-12

Date(s) Drilled	**6/22/11**	Logged By	**A. Felicetta**	Approximate Surface Elevation (feet)	**20.0**
Drilling Method	**Rotary mud**	Drilling Contractor	**CTB**	Coordinates	**North:** **East:**
Casing Size/Type	**4" Steel**	Drill Rig Operator	**Dave Cooke**	Total Depth Drilled (feet) **100.0**	Rock Depth (feet) **95.0**
Drill Rig Type	**CME 75**	Drill Bit Size/Type	**3 7/8" Tricone Bit**	Sampler Type(s)	**2" O.D Spoon Sampler**
Groundwater Level and Date Measured		Hammer Wt/Drop **140 lb / 30" Safety**	Casing Hammer Wt/Drop	Core Barrel Size/Type	
Boring Location and Comments	**See Boring Location Plan**			No. of Samples **Dist.: 19** **Undist.: 1**	**Core (ft): 5**

Depth, feet	Soil Samples: Type, Number	Recov. (ft)	Pen. Resist. (blows/6 in)	Rock Coring: Run Number	Recov. (%)	RQD (%)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Water Cont.(%)	% Fines	REMARKS/ OTHER TESTS
0	S-1	0.7	8 9 8 14					(FILL) Brown C-F SAND, trace gravel, silt, brick, and asphalt fragments [7]					
5	S-2	0.7	14 9 7 8					(FILL) Brown C-F SAND, trace gravel, silt, brick, and construction debris [7]					No recovery w/ 2" spoon, used 3" spoon to obtain sample
10	S-3	0.5	3 3 2 3					(FILL) Brown to Gray C-F SAND, little silt, trace gravel and brick [7]					
15	S-4	0.8	3 2 5 5					(FILL) Gray silty F. SAND, trace gravel, and lenses of light gray clay [7]			20	40	
													Pieces of cobble washing up in cuttings
20	S-5	1.0	9 13 10 7					(GP) Brown C-F GRAVEL, trace cobble, c-f sand, and silt [2b]					No recovery w/ 2" spoon, used 3" spoon to obtain sample
													Hard drilling/Rig chatter to 25' Water loss
25	S-6	0.5	12 38 36 57					(SP-GP) Brown/Gray C-F SAND, some gravel, trace silt [3a]					Rig chatter, flakes of steel in cuttings - casing may have been damaged while driving
30													

Project: West 116th Street
Project Location: New York, New York
Project Number: 11100377

Log of Boring B-12

Depth, feet	Soil Samples: Type, Number	Recov. (ft)	Pen. Resist. (blows/6 in)	Rock Coring: Run Number	Recov. (%)	RQD (%)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Water Cont.(%)	% Fines	REMARKS/ OTHER TESTS
30	S-7	0.9	3 5 9 9					(SP) Reddish Brown M-F SAND, trace silt [3b]			21	4	Casing to 30'
35	S-8	0.8	6 6 9 13					(SM) Brown silty F. SAND, trace to some clay [3b]					
40	S-9	1.1	3 3 3 7					(CL-ML) Brown CLAY and SILT, trace f. sand [6]			29	91	
45	S-10	1.3	3 3 4 5					(ML-SM) Brown f. sandy SILT, some clay [6]					
50	S-11	1.7	5 6 7 13					(ML-CL) Brown SILT and Gray CLAY, trace f. sand [4b]					
55	S-12	2.0	2 3 2 4					(CL-ML) Gray CLAY interbedded with Brown f. sandy SILT [4c]	27	21	33		
	U-1	1.9	P U S H					Top: (ML) Brown f. sandy SILT Bottom: (CL) Gray CLAY					Shelby Tube taken- lost wax when waxing bottom of tube
60	S-13	1.5	6 9 12 14					(SM) Brown silty F. SAND interbedded with gray clay [3b]					
65													

Project: West 116th Street
Project Location: New York, New York
Project Number: 11100377

Log of Boring B-12

Depth, feet	Soil Samples: Type, Number	Recov. (ft)	Pen. Resist. (blows/6 in)	Rock Coring: Run Number	Recov. (%)	RQD (%)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Water Cont.(%)	% Fines	REMARKS/ OTHER TESTS
65	S-14	1.3	7 6 10 14					(SM) Brown F. SAND, some silt, trace clay and m. sand [3b]					
70	S-15	1.0	5 8 11 15					(SM) Brown/Gray F. SAND, some silt, trace to some clay [3b]					
75	S-16	1.4	6 8 13 17					(CL-SC) Gray CLAY, some brown f. sand, trace silt [4b]					
80	S-17	1.5	4 4 4 6					(CL-ML) Gray/Brown silty CLAY, trace to some f. sand [4c]					
85	S-18	2.0	3 3 3 3					(CL-ML) Gray/Brown silty CLAY, trace to some f. sand [4c]					
90	S-19	1.8	2 8 18 31					(CL-ML) Gray/Brown silty CLAY, some f. sand [4b]					
95				R-1				GNEISS: Gray, moderately fractured, moderately weathered, medium hard rock [1b]					Hard drilling/Rig chatter, decomposed rock in cuttings
100													

Project: West 116th Street
Project Location: New York, New York
Project Number: 11100377

Log of Boring B-12

Depth, feet	Soil Samples: Type, Number	Soil Samples: Recov. (ft)	Soil Samples: Pen. Resist. (blows/6 in)	Rock Coring: Run Number	Rock Coring: Recov. (%)	Rock Coring: RQD (%)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Water Cont.(%)	% Fines	REMARKS/ OTHER TESTS
								End of boring at 100' below ground level					
105													
110													
115													
120													
125													
130													
135													

Project: West 116th Street
Project Location: New York, New York
Project Number: 11100377

Log of Boring B-13

Date(s) Drilled	**6/29/11**	Logged By	**A. Felicetta**	Approximate Surface Elevation (feet)	**20.0**
Drilling Method	**Rotary mud**	Drilling Contractor	**CTB**	Coordinates	**North:** **East:**
Casing Size/Type	**4" Steel**	Drill Rig Operator	**Dave Cooke**	Total Depth Drilled (feet) **80.0**	Rock Depth (feet)
Drill Rig Type	**CME 75**	Drill Bit Size/Type	**3 7/8" Tricone Bit**	Sampler Type(s)	**2" O.D Spoon Sampler**
Groundwater Level and Date Measured		Hammer Wt/Drop **140 lb / 30" Safety**	Casing Hammer Wt/Drop	Core Barrel Size/Type	**NX**
Boring Location and Comments	**See Boring Location Plan**			No. of Samples **Dist.: 16 Undist.: 0 Core (ft): 5**	

Depth, feet	Soil Samples: Type, Number	Recov. (ft)	Pen. Resist. (blows/6 in)	Rock Coring: Run Number	Recov. (%)	RQD (%)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Water Cont.(%)	% Fines	REMARKS/ OTHER TESTS
0	S-1	0.4	17 5 15 13					~4" Asphalt (FILL) Brown C-F SAND, trace gravel, silt, and brick [7]					
5	S-2	0.5	10 5 9 43					(FILL) Brown C-F SAND, trace gravel and silt [7]					
10	S-3	0.8	3 4 5 5					(FILL) Brown C-F SAND, trace gravel and silt [7]					
15	S-4	1.3	6 5 4 3					(FILL) Gray C-F SAND, trace gravel, silt, brick, shell (slight organic odor) [7]					
	S-5	1.3	5 4 4 1					(FILL) Gray C-F SAND, trace gravel, silt, brick [7]					
20	S-6	0.0	4 6 4 5					(FILL) Gray/Light Brown M-F SAND, some clay, little silt and gravel [3b]					No Recovery therefore used 3" split spoon to obtain sample
25	S-7	0.4	22 24 36 50/3"					(SP-GP) Brown m-f gravelly C-F SAND, trace silt [3a]					
30													

Project: West 116th Street
Project Location: New York, New York
Project Number: 11100377

Log of Boring B-13

Depth, feet	Soil Samples: Type, Number	Recov. (ft)	Pen. Resist. (blows/6 in)	Rock Coring: Run Number	Recov. (%)	RQD (%)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Water Cont.(%)	% Fines	REMARKS/ OTHER TESTS
30	S-8	0.4	12 22 13 21					(GP) Brown M-F GRAVEL, some c-f sand, trace silt [2a]					
35	S-9	0.0	14 14 5 8					(GP) Brown M-F GRAVEL, trace c-f sand [2b] (SP-SM) Brown C-F SAND, trace silt and clay [3b]					No Recovery therefore used 3" split spoon to obtain sample
40	S-10	0.9	13 11 13 16					(SM) Brown/Gray F. SAND and SILT, some clay [3b]					
45	S-11	1.5	3 4 6 6					(SM) Brown/Gray silty F. SAND trace clay [3b]					
50	S-12	2.0	3 5 5 6					(SM) Brown/Gray F. SAND and SILT, some clay [3b]					
55	S-13	1.0	3 4 5 6					(ML) Brown/Gray SILT, some f. sand and clay [6]					
60	S-14	1.6	4 5 4 7					(SM) Brown/Gray silty F. SAND, trace clay and c-m sand [6]					
65													

Project: West 116th Street
Project Location: New York, New York
Project Number: 11100377

Log of Boring B-13

Sheet 3 of 3

Depth, feet	Soil Samples: Type, Number	Soil Samples: Recov. (ft)	Soil Samples: Pen. Resist. (blows/6 in)	Rock Coring: Run Number	Rock Coring: Recov. (%)	Rock Coring: RQD (%)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Water Cont.(%)	% Fines	REMARKS/ OTHER TESTS
65	S-15	1.8	5 7 6 9					[ML] Brown/Gray SILT, some f. sand and clay [5b]					
70	S-16	0.8	22 19 21 32					(TILL) Gray/Brown C-F SAND, trace gravel and silt [3a]					Hard Drilling/Rig chatter @ 73' BGS
75				R-1	70	45		GNEISS: moderately weathered, moderately fractured medium hard rock [1b]					
80													
85													
90													
95													
100													

Project: West 116th Street
Project Location: New York, New York
Project Number: 11100377

Log of Boring B-14

Sheet 1 of 2

Date(s) Drilled	**6/21/11**	Logged By	**A. Felicetta**	Approximate Surface Elevation (feet)	**20.0**
Drilling Method	**Rotary mud**	Drilling Contractor	**CTB**	Coordinates	**North:** **East:**
Casing Size/Type	**4" Steel**	Drill Rig Operator	**Dave Cooke**	Total Depth Drilled (feet) **52.0**	Rock Depth (feet)
Drill Rig Type	**CME 75**	Drill Bit Size/Type	**3 7/8" Tricone Bit**	Sampler Type(s)	**2" O.D Spoon Sampler**
Groundwater Level and Date Measured	**15.6' 6/30/11**	Hammer Wt/Drop **140 lb / 30" Safety**	Casing Hammer Wt/Drop	Core Barrel Size/Type	
Boring Location and Comments	**See Boring Location Plan**			No. of Samples **Dist.: 14 Undist.: 0 Core (ft): 0**	

Depth, feet	Soil Samples: Type, Number	Recov. (ft)	Pen. Resist. (blows/6 in)	Rock Coring: Run Number	Recov. (%)	RQD (%)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Water Cont.(%)	% Fines	REMARKS/ OTHER TESTS
0								~3" Asphalt					
	S-1	0.7	14 27 16 19					(FILL) Brown/Gray M-F SAND, some m-f gravel, trace silt, brick [7]					
5	S-2	0.5	7 6 5 5					(FILL) Brown/Gray M-F SAND, trace m-f gravel, silt, and brick [7]					
10	S-3	0.8	7 8 6 8					(FILL) Brown/Gray M-F SAND, trace c. sand, f. gravel, silt, and brick [7]					
	S-4	0.3	4 6 6 7					(FILL) Brown M-F SAND and M-F GRAVEL, trace c. sand, silt, brick [7]					
15	S-5	0.3	8 3 2 3					(FILL) Brown M-F SAND, little m-f gravel and brick, trace c. sand and silt [7]					
	S-6	0.6	3 4 5 15					(FILL) Brown C-F SAND, some m-f gravel, trace silt [7]					
	S-7	0.8	10 20 27 21					(FILL) Brown C-F SAND, some brick, little clay and silt, trace gravel [7]					
20	S-8	0.2	49 30 21 12					(GP) Brown M-F GRAVEL [2a]					Broke trap on spoon
25	S-9	0.8	17 19 14 15					(SP) Brown C-F SAND, some m-f gravel, trace silt [3a]					
30													

Project: West 116th Street
Project Location: New York, New York
Project Number: 11100377

Log of Boring B-14

Sheet 2 of 2

Depth, feet	Soil Samples: Type, Number	Recov. (ft)	Pen. Resist. (blows/6 in)	Rock Coring: Run Number	Recov. (%)	RQD (%)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Water Cont.(%)	% Fines	REMARKS/ OTHER TESTS
30	S-10	0.8	5 6 7 7					(SP) Reddish Brown M-F SAND, trace silt [3b]					
35	S-11	1.1	8 12 18 13					(SP) Reddish Brown F. SAND, trace silt [3a]					
40	S-12	1.3	4 4 3 5					(ML) Brown SILT, some f. sand, little clay [6]					
45	S-13	1.4	3 4 5 4					(ML-SM) Brown/Gray f. sandy SILT, trace to some clay [6]					
50	S-14	1.5	2 3 4 4					(ML-SM) Brown/Gray f. sandy SILT, trace to some clay [6]					
								End of boring at 52' below ground level Installed well to 25' bgs					
55													
60													
65													

Project: West 116th Street
Project Location: New York, New York
Project Number: 11100377

Log of Boring B-15

Date(s) Drilled	**6/28/11**	Logged By	**A. Felicetta**	Approximate Surface Elevation (feet)	**20.0**
Drilling Method	**Rotary mud**	Drilling Contractor	**CTB**	Coordinates	**North:** **East:**
Casing Size/Type	**4" Steel**	Drill Rig Operator	**Mike G.**	Total Depth Drilled (feet) **92.0**	Rock Depth (feet)
Drill Rig Type	**CME 75**	Drill Bit Size/Type	**3 7/8" Tricone Bit**	Sampler Type(s)	**2" O.D Spoon Sampler**
Groundwater Level and Date Measured		Hammer Wt/Drop **140 lb / 30" Safety**	Casing Hammer Wt/Drop	Core Barrel Size/Type	**NX**
Boring Location and Comments	**See Boring Location Plan**			No. of Samples **Dist.: 19** **Undist.: 1** **Core (ft): 5**	

Depth, feet	Soil Samples: Type, Number	Recov. (ft)	Pen. Resist. (blows/6 in)	Rock Coring: Run Number	Recov. (%)	RQD (%)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Water Cont.(%)	% Fines	REMARKS/ OTHER TESTS
0	S-1	0.9	4 8 9 5					3" Topsoil (FILL) Brown C-F SAND, trace gravel, silt, and brick [7]					
5	S-2	0.8	4 3 4 3					(FILL) Brown C-F SAND, little gravel, trace silt and brick [7]					
10	S-3	0.7	5 3 3 3					(FILL) Brown M-F SAND, trace gravel, silt, and construction debris [7]					
15	S-4	0.6	7 4 3 4					(FILL) Brown M-F SAND, little silt and clay [7]					
20	S-5	0.4	3 7 8 10					(GP) Brown M-F GRAVEL, some c-f sand, trace silt [2b]					
25	S-6	0.6	11 29 23 33					(SP-GP) Brown C-F SAND and M-F GRAVEL, trace silt [3a]					
30													

Project: West 116th Street
Project Location: New York, New York
Project Number: 11100377

Log of Boring B-15

Depth, feet	Soil Samples: Type, Number	Recov. (ft)	Pen. Resist. (blows/6 in)	Rock Coring: Run Number	Recov. (%)	RQD (%)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Water Cont.(%)	% Fines	REMARKS/ OTHER TESTS
30	S-7	0.3	7 6 6 4					(SP) Reddish Brown M-F SAND trace silt [3b]					
35	S-8	1.0	9 7 6 8					(SM) Brown/Gray F. SAND, some silt, trace clay [3b]					
40	S-9	0.0	4 6 7 7					No Recovery					
	S-10	1.0	8 8 9 11					(SM) Brown/Gray silty F. SAND, some clay [3b]					Pocket Penetrometer 0.4 tons/sq.ft.
45	U-1	1.1	P U S H					(SM) Brown/Gray silty F. SAND, some clay [3b]					Bottom of tube damaged
	S-11	1.7	4 5 9 9					(SM) Brown/Gray F. SAND, some silt, trace clay [3b]					
50	S-12	1.1	4 6 6 6					(SM) Brown/Gray F. SAND and silt, some clay [3b]					
55	S-13	1.4	5 4 6 9					(ML) Brown/Gray SILT, some f. sand and clay [5b]					
60	S-14	1.3	6 5 9 10					(SM) Brown/Gray F. SAND, some silt, trace clay [3b]					
65													

Project: West 116th Street
Project Location: New York, New York
Project Number: 11100377

Log of Boring B-15

Sheet 3 of 3

Depth, feet	Soil Samples: Type, Number	Recov. (ft)	Pen. Resist. (blows/6 in)	Rock Coring: Run Number	Recov. (%)	RQD (%)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Water Cont.(%)	% Fines	REMARKS/ OTHER TESTS
65	S-15	0.9	7 12 10 9					(SM) Brown/Gray F. SAND, some silt, trace clay [3b]					
70	S-16	1.4	4 6 13 12					(SM) Brown/Gray F. SAND, some silt, trace clay [3b]					
75	S-17	1.5	9 13 15 9					(SM) Brown/Gray silty F. SAND, trace clay [3b]					
80	S-18	2.0	2 3 2 3					(CL) Brown/Gray CLAY, some silt, trace f. sand [4c]					
85	S-19	0.0	50/1"					Decomposed Rock in Tip of Spoon					
90				R-1	98	55		GNEISS: moderately weathered, moderately fractured, medium hard rock [1b]					
								End Boring @ 92' BGS					
95													
100													

Project: West 116th Street
Project Location: New York, New York
Project Number: 11100377

Log of Boring B-16

Sheet 1 of 2

Date(s) Drilled	**6/29/11**	Logged By	**A. Felicetta**	Approximate Surface Elevation (feet)	**20.0**
Drilling Method	**Rotary mud**	Drilling Contractor	**CTB**	Coordinates	**North:** **East:**
Casing Size/Type	**4" Steel**	Drill Rig Operator	**Dave Cooke**	Total Depth Drilled (feet) **42.0**	Rock Depth (feet)
Drill Rig Type	**CME 75**	Drill Bit Size/Type	**3 7/8" Tricone Bit**	Sampler Type(s)	**2" O.D Spoon Sampler**
Groundwater Level and Date Measured		Hammer Wt/Drop **140 lb / 30" Safety**	Casing Hammer Wt/Drop	Core Barrel Size/Type	
Boring Location and Comments	**See Boring Location Plan**			No. of Samples **Dist.: 10 Undist.: 0 Core (ft): 0**	

Depth, feet	Soil Samples: Type, Number	Recov. (ft)	Pen. Resist. (blows/6 in)	Rock Coring: Run Number	Recov. (%)	RQD (%)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Water Cont.(%)	% Fines	REMARKS/ OTHER TESTS
0	S-1	0.8	3 2 3 9					3" TOPSOIL (FILL) Brown C-F SAND, trace brick, gravel, silt [7]					
5	S-2	0.6	6 12 10 11					(FILL) Brown C-F SAND, trace gravel, silt, and brick [7]					
10	S-3	1.1	20 9 4 4					(FILL) Brown C-F SAND, trace gravel, silt, brick and concrete [7]					
15	S-4	0.3	4 2 2 6					(FILL) Brown C-F SAND, little gravel and silt [7]			12	20	
20	S-5	0.6	3 4 5 4					Top 3": (FILL) Brown M-F SAND, trace gravel and silt [7] Bottom 4": (PT) Black Organic PEAT [6]					
	S-6	0.8	4 10 8 7					Top 2": (PT) Black Organic PEAT [6] Bottom 8": (SP-SM) Dark Gray M-F SAND, little silt, trace peat [3b]					
25	S-7	1.0	31 33 48 36					(SP-GP) Gray m-f gravelly C-F SAND, trace silt [3a]					
30													

Project: West 116th Street
Project Location: New York, New York
Project Number: 11100377

Log of Boring B-16

Sheet 2 of 2

Depth, feet	Soil Samples: Type, Number	Recov. (ft)	Pen. Resist. (blows/6 in)	Rock Coring: Run Number	Recov. (%)	RQD (%)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Water Cont.(%)	% Fines	REMARKS/ OTHER TESTS
30	S-8	1.3	10 7 6 8					(SP-GP) Brown gravelly M-F SAND, trace silt [3b]			23	7	
35	S-9	1.5	6 8 8 15					(SM) Brown/Gray silty F. SAND [3b]					
40	S-10	1.7	5 7 9 12					(ML) Brown/Gray f. sandy SILT, trace clay [5b]					
								End Boring @ 42' BGS					
45													
50													
55													
60													
65													

Project: West 116th Street
Project Location: New York, New York
Project Number: 11100377

Log of Boring B-2

Date(s) Drilled	**6/23/11**	Logged By	**A. Felicetta**	Approximate Surface Elevation (feet)	**20.0**
Drilling Method	**Rotary mud**	Drilling Contractor	**CTB**	Coordinates	**North:** **East:**
Casing Size/Type	**4" Steel**	Drill Rig Operator	**Craig**	Total Depth Drilled (feet) **62.0**	Rock Depth (feet)
Drill Rig Type	**CME 75**	Drill Bit Size/Type	**3 7/8" Tricone Bit**	Sampler Type(s)	**2" O.D Spoon Sampler**
Groundwater Level and Date Measured		Hammer Wt/Drop **140 lb / 30" Safety**	Casing Hammer Wt/Drop	Core Barrel Size/Type	
Boring Location and Comments	**See Boring Location Plan**			No. of Samples **Dist.: 14** **Undist.: 0** **Core (ft): 0**	

Depth, feet	Soil Samples: Type, Number	Recov. (ft)	Pen. Resist. (blows/6 in)	Rock Coring: Run Number	Recov. (%)	RQD (%)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Water Cont.(%)	% Fines	REMARKS/ OTHER TESTS
0								~2" topsoil					
	S-1	0.9	3 6 14 12					(FILL) Brown C-F SAND, trace gravel, silt and brick [7]					
5	S-2	0.6	6 8 17 13					(FILL) Brown/Red C-F SAND and BRICK, trace gravel and silt [7]					
10	S-3	0.7	3 100/4"					(FILL) Light Gray/Brown C-F SAND, trace gravel and silt [7]					Used auto hammer to drive spoon all the way down to retrieve sample
15	S-4	0.3	9 6 3 2					(FILL) Light Brown clayey F. SAND [7]					
20	S-5	0.2	5 8 6 3					(SM) Brown silty F. SAND, trace gravel and clay [3b]					
25	S-6	0.4	7 11 8 3					(SP) Brown M-F SAND, trace silt and clay [3b]					
30													

Project: West 116th Street
Project Location: New York, New York
Project Number: 11100377

Log of Boring B-2

Sheet 2 of 2

Depth, feet	Soil Samples: Type, Number	Recov. (ft)	Pen. Resist. (blows/6 in)	Rock Coring: Run Number	Recov. (%)	RQD (%)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Water Cont.(%)	% Fines	REMARKS/ OTHER TESTS
30	S-7	0.4	2 2 4 4					(PT) Black/Dark Gray Organic PEAT [6]	193	92	143		Organic Content 15.8%
	S-8	2.0	18 18 18 16					Top 22": (PT) Dark Gray/Black/Brown Organic PEAT [6] Bottom 2": Light Brown M-F SAND, trace silt and organic peat [3a]					
35	S-9	1.5	2 2 2 2					(CL) Light Brown Organic CLAY, some silt, trace f. sand and black peat [4c]					
40	S-10	0.6	6 14 14 32					(SP) Reddish Brown C-F SAND, trace gravel and silt [3a]					Water loss
45	S-11	0.8	8 18 31 41					(GP) Brown M-F GRAVEL and C-F SAND, trace silt [2a]					
50	S-12	0.3	24 12 15 12					(CL) Brown/Gray CLAY, some silt and f. sand [4b]					
55	S-13	1.6	4 4 4 4					(SM-CL) Brown/Gray clayey F. SAND, some silt [6]					
60	S-14	1.3	9 18 100/3"					(SP) Brown/Gray M-F SAND, trace c. sand, gravel, silt, and clay; decomposed rock in tip of spoon [3a]					
								End of boring at 62' below ground level					
65													

Project: West 116th Street
Project Location: New York, New York
Project Number: 11100377

Log of Boring B-3

Date(s) Drilled	**6/23/11**	Logged By	**A. Felicetta**	Approximate Surface Elevation (feet)	**20.0**
Drilling Method	**Rotary mud**	Drilling Contractor	**CTB**	Coordinates	**North:** **East:**
Casing Size/Type	**4" Steel**	Drill Rig Operator	**Dave Cooke**	Total Depth Drilled (feet) **40.0**	Rock Depth (feet) **35.0**
Drill Rig Type	**CME 75**	Drill Bit Size/Type	**3 7/8" Tricone Bit**	Sampler Type(s)	**2" O.D Spoon Sampler**
Groundwater Level and Date Measured		Hammer Wt/Drop **140 lb / 30" Safety**	Casing Hammer Wt/Drop	Core Barrel Size/Type	**NX**
Boring Location and Comments	**See Boring Location Plan**			No. of Samples **Dist.: 8** **Undist.: 0**	**Core (ft): 5**

Depth, feet	Soil Samples: Type, Number	Recov. (ft)	Pen. Resist. (blows/6 in)	Rock Coring: Run Number	Recov. (%)	RQD (%)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Water Cont.(%)	% Fines	REMARKS/ OTHER TESTS
0								~2" topsoil					
	S-1	0.3	2 4 5 3					(FILL) Brown C-F SAND, trace brick, silt, and gravel [7]					
5	S-2	0.4	8 12 13 10					(FILL) Brown C-F SAND, trace brick, wood, silt and gravel [7]					
10	S-3	0.3	5 4 6 8					(FILL) Brown M-F SAND, little silt, trace gravel [7]					
15	S-4	0.6	2 5 5 10					(SP) Gray C-F SAND, trace gravel and silt [3b]					
20	S-5		6 20 9 8					(SP) Black-gray C-F SAND, trace peat, silt, gravel [3b]					
25	S-6	1.0	2 3 3 4					(PT) Brown Organic PEAT, trace gray clay [6]					
	S-7	1.2	6 5 7 8					(PT) Black/Brown Organic PEAT, brown m-f sand in tip of spoon [6]					
30													

Project: West 116th Street
Project Location: New York, New York
Project Number: 11100377

Log of Boring B-3

Depth, feet	Soil Samples: Type, Number	Soil Samples: Recov. (ft)	Soil Samples: Pen. Resist. (blows/6 in)	Rock Coring: Run Number	Rock Coring: Recov. (%)	Rock Coring: RQD (%)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Water Cont.(%)	% Fines	REMARKS/ OTHER TESTS
30	S-8	0.0	50/2"					No recovery					
													Hard drilling, no chatter 32' to 35'
35				R-1	100	36		GNEISS: moderately weathered, moderately fractured, intermediate rock [1c]					
40								End of boring at 40' below ground level					
45													
50													
55													
60													
65													

Project: West 116th Street
Project Location: New York, New York
Project Number: 11100377

Log of Boring B-4

Sheet 1 of 2

Date(s) Drilled	**6/24/11**	Logged By	**A. Felicetta**	Approximate Surface Elevation (feet)	**20.0**
Drilling Method	**Rotary mud**	Drilling Contractor	**CTB**	Coordinates	**North:** **East:**
Casing Size/Type	**4" Steel**	Drill Rig Operator	**Craig**	Total Depth Drilled (feet) **30.0**	Rock Depth (feet) **25.0**
Drill Rig Type	**CME 75**	Drill Bit Size/Type	**3 7/8" Tricone Bit**	Sampler Type(s)	**2" O.D Spoon Sampler**
Groundwater Level and Date Measured		Hammer Wt/Drop **140 lb / 30" Safety**	Casing Hammer Wt/Drop	Core Barrel Size/Type	**NX**
Boring Location and Comments	**See Boring Location Plan**			No. of Samples **Dist.: 5** **Undist.: 0**	**Core (ft): 5**

Depth, feet	Soil Samples: Type, Number	Recov. (ft)	Pen. Resist. (blows/6 in)	Rock Coring: Run Number	Recov. (%)	RQD (%)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Water Cont.(%)	% Fines	REMARKS/ OTHER TESTS
0								~3" topsoil					
	S-1	0.8	3 10 26 10					(FILL) Brown C-F SAND, trace gravel, silt, and brick [7]					
5	S-2	0.4	11 16 17 14					(FILL) Brown C-F SAND and GRAVEL, trace silt and brick [7]					
10	S-3	0.3	70 100/4"					(SP) Gray C-F SAND and Decomposed rock fragments, trace gravel and silt [3a]					
15	S-4	0.5	7 23 39 40					(SP) Gray C-F SAND, trace gravel and silt [3a]					Hard drilling, no chatter 18' to 19.5'
20	S-5	0.3	15 100/4"					(GP-SP) Gray M-F GRAVEL and C-F SAND, trace silt [2a]					Hard drilling 21' to 23'
25				R-1	100	51		GNEISS: moderately weathered, moderately fractured, medium hard rock [1b]					
30													

Project: West 116th Street
Project Location: New York, New York
Project Number: 11100377

Log of Boring B-4

Depth, feet	Soil Samples: Type, Number	Soil Samples: Recov. (ft)	Soil Samples: Pen. Resist. (blows/6 in)	Rock Coring: Run Number	Rock Coring: Recov. (%)	Rock Coring: RQD (%)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Water Cont.(%)	% Fines	REMARKS/ OTHER TESTS
30								End of boring at 30' below ground level					
35													
40													
45													
50													
55													
60													
65													

Project: West 116th Street
Project Location: New York, New York
Project Number: 11100377

Log of Boring B-5

Date(s) Drilled	**6/23/11**	Logged By	**A. Felicetta**	Approximate Surface Elevation (feet)	**20.0**
Drilling Method	**Rotary mud**	Drilling Contractor	**CTB**	Coordinates	**North:** **East:**
Casing Size/Type	**4" Steel**	Drill Rig Operator	**Dave Cooke**	Total Depth Drilled (feet) **52.0**	Rock Depth (feet)
Drill Rig Type	**CME 75**	Drill Bit Size/Type	**3 7/8" Tricone Bit**	Sampler Type(s)	**2" O.D Spoon Sampler**
Groundwater Level and Date Measured		Hammer Wt/Drop **140 lb / 30" Safety**	Casing Hammer Wt/Drop	Core Barrel Size/Type	
Boring Location and Comments	**See Boring Location Plan**			No. of Samples **Dist.: 11** **Undist.: 1** **Core (ft): 0**	

Depth, feet	Soil Samples: Type, Number	Recov. (ft)	Pen. Resist. (blows/6 in)	Rock Coring: Run Number	Recov. (%)	RQD (%)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Water Cont.(%)	% Fines	REMARKS/ OTHER TESTS
0								~3" asphalt bitumen					
	S-1	0.7	16 15 17 56					(FILL) Brown C-F SAND, trace gravel, silt, and brick [7]					
5	S-2	0.8	8 9 12 56					(FILL) Brown C-F SAND, trace gravel, silt, and brick [7]					
10	S-3	0.3	3 3 2 9					(FILL) Brown C-F SAND, some silt, trace gravel [7]					
15	S-4	0.3	100/4"					(SP) Black/Gray C-F SAND and decomposed schist [3a]					
20	S-5	1.6	3 1 2 2					Top 12": (SC) Brown/Gray clayey M-F SAND, some silt, trace gravel [6] Bottom 7": (PT) Black Organic PEAT [6]					
	U-1	0.2	P U S H					(SM) Dark Gray silty Organic F. SAND, trace clay [6]					Put recovery in jar, tube hit gravel layer
25	S-6	0.5	34 33 27 31					(GP) Gray M-F GRAVEL, some c-f sand, trace silt [2a]					
30													

Project: West 116th Street
Project Location: New York, New York
Project Number: 11100377

Log of Boring B-5

Sheet 2 of 2

Depth, feet	Soil Samples: Type, Number	Recov. (ft)	Pen. Resist. (blows/6 in)	Rock Coring: Run Number	Recov. (%)	RQD (%)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Water Cont.(%)	% Fines	REMARKS/ OTHER TESTS
30	S-7	0.8	8 34 53 60					(GP-SP) Gray/ Brown M-F GRAVEL and C-F SAND, trace silt [2a]					
35	S-8	0.8	8 10 12 13					(SM) Brown F. SAND, some silt [3b]					
40	S-9	1.4	3 5 6 8					(ML) Brown/Gray SILT, some f. sand, trace to some clay [5b]					
45	S-10	1.5	5 7 9 9					(SM) Brown/Gray silty F. SAND, trace clay [3b]					
50								(SM-ML) Brown/Gray F. SAND and SILT, some clay [3b]					
								End of boring at 52' below ground level					
55													
60													
65													

Project: West 116th Street
Project Location: New York, New York
Project Number: 11100377

Log of Boring B-6

Date(s) Drilled	**6/22/11**	Logged By	**A. Felicetta**	Approximate Surface Elevation (feet)	**20.0**
Drilling Method	**Rotary mud**	Drilling Contractor	**CTB**	Coordinates	**North:** **East:**
Casing Size/Type	**4" Steel**	Drill Rig Operator	**Craig**	Total Depth Drilled (feet) **57.0**	Rock Depth (feet)
Drill Rig Type	**CME 75**	Drill Bit Size/Type	**3 7/8" Tricone Bit**	Sampler Type(s)	**2" O.D Spoon Sampler**
Groundwater Level and Date Measured		Hammer Wt/Drop **140 lb / 30" Safety**	Casing Hammer Wt/Drop	Core Barrel Size/Type	
Boring Location and Comments	**See Boring Location Plan**			No. of Samples **Dist.: 12 Undist.: 0 Core (ft): 0**	

Depth, feet	Soil Samples: Type, Number	Recov. (ft)	Pen. Resist. (blows/6 in)	Rock Coring: Run Number	Recov. (%)	RQD (%)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Water Cont.(%)	% Fines	REMARKS/ OTHER TESTS
0	S-1	1.2	7 11 15 29					(FILL) Brown C-F SAND, some brick, trace gravel, silt, and topsoil [7]					
5	S-2	0.2	2 2 1 WOH					(FILL) Red BRICK [7]					
10	S-3	0.6	12 4 4 4					Top 3": (FILL) Gray/Black M-F SAND, some gravel, trace silt [7] Bottom 4": (FILL) Brown M-F SAND, trace gravel and silt [7]					
15	S-4	0.1	2 2 2 2					(FILL) Pieces of GRAVEL with some f. sand and silt in tip of spoon [7]					
20	S-5	0.8	27 13 20 13					Top 4": Wood [7] Bottom 6": (SP) Black C-F SAND and decomposed rock, some silt [3a]					
25	S-6	0.0	3 4 4 4					No recovery					
30													

Project: West 116th Street
Project Location: New York, New York
Project Number: 11100377

Log of Boring B-6

Sheet 2 of 2

Depth, feet	Soil Samples: Type, Number	Recov. (ft)	Pen. Resist. (blows/6 in)	Rock Coring: Run Number	Recov. (%)	RQD (%)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Water Cont.(%)	% Fines	REMARKS/ OTHER TESTS
30	S-7	1.6	4 4 5 7					Top 6": (PT) Black Organic PEAT, some wood [6] Middle 5": (SP) Dark Brown/Gray M-F SAND, some organic peat, trace shells [6] Bottom 8": (SP) Light Brown M-F SAND, trace organic peat, wood, shells [6]					
35	S-8	0.0	36 19 23 26					(GP) Gray C-F GRAVEL, pieces of cobble, trace c-f sand and silt [2a]					Took sample with 3" spoon to get recovery
40	S-9	0.8	21 25 37 47					(GP) Brown c-f sandy M-F GRAVEL, trace silt [2a]					
45	S-10	0.0	6 7 11 14					No recovery					
50	S-11	1.0	6 5 4 6					(SM) Brown/Gray silty F. SAND, trace to some clay [6]					
55	S-12	1.5	3 2 3 4					(ML) Brown/Gray clayey SILT, some f. sand [6]					
60								End of boring at 57' below ground level					
65													

Project: West 116th Street
Project Location: New York, New York
Project Number: 11100377

Log of Boring B-7

Sheet 1 of 2

Date(s) Drilled	**6/23/11**	Logged By	**A. Felicetta**	Approximate Surface Elevation (feet)	**20.0**
Drilling Method	**Rotary mud**	Drilling Contractor	**CTB**	Coordinates	**North:** **East:**
Casing Size/Type	**4" Steel**	Drill Rig Operator	**Craig / Mike**	Total Depth Drilled (feet) **37.0**	Rock Depth (feet) **27.0**
Drill Rig Type	**CME 75**	Drill Bit Size/Type	**3 7/8" Tricone Bit**	Sampler Type(s)	**2" O.D Spoon Sampler**
Groundwater Level and Date Measured	**14.7** **6/30/11**	Hammer Wt/Drop **140 lb / 30"** **Safety**	Casing Hammer Wt/Drop	Core Barrel Size/Type	**NX**
Boring Location and Comments	**See Boring Location Plan**			No. of Samples **Dist.: 6** **Undist.: 0** **Core (ft): 10**	

Depth, feet	Soil Samples: Type, Number	Recov. (ft)	Pen. Resist. (blows/6 in)	Rock Coring: Run Number	Recov. (%)	RQD (%)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Water Cont.(%)	% Fines	REMARKS/ OTHER TESTS
0								~2" topsoil					
	S-1	0.5	1 2 2 3					(FILL) Brown C-F SAND, trace gravel and silt [7]					
5	S-2	0.5	4 8 3 3					(FILL) Brown/Black C-F SAND, trace gravel, silt and brick [7]					
10	S-3	1.3	3 2 6 6					(FILL) Orange Brown M-F SAND, some silt, trace clay and c. sand [3b]					
15	S-4	0.9	6 13 17 7					(SM) Gray C-F SAND, some silt, trace clay, wood, and organic material in center of sample [3b]			16	38	
20	S-5	0.7	3 2 6 50/2"					(SP-PT) Black/Brown C-F SAND and Organic PEAT, trace silt [6]					
25	S-6	0.3	100/4"					(TILL) Gray C-F SAND, trace gravel and silt, decomposed rock in tip of spoon [3a]					
				R-1	95	8		GNEISS: highly weathered, highly fractured, soft rock [1d]					
30													

Project: West 116th Street
Project Location: New York, New York
Project Number: 11100377

Log of Boring B-7

Sheet 2 of 2

Depth, feet	Soil Samples: Type, Number	Soil Samples: Recov. (ft)	Soil Samples: Pen. Resist. (blows/6 in)	Rock Coring: Run Number	Rock Coring: Recov. (%)	Rock Coring: RQD (%)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Water Cont.(%)	% Fines	REMARKS/ OTHER TESTS
30													
				R-2	88	22		GNEISS: highly weathered, highly fractured, soft rock [1d]					
35								End of boring at 37' below ground level					
40													
45													
50													
55													
60													
65													

Project: West 116th Street
Project Location: New York, New York
Project Number: 11100377

Log of Boring B-8

Sheet 1 of 2

Date(s) Drilled	**6/21/11**	Logged By	**A. Felicetta**	Approximate Surface Elevation (feet)	**20.0**
Drilling Method	**Rotary mud**	Drilling Contractor	**CTB**	Coordinates	**North:** **East:**
Casing Size/Type	**4" Steel**	Drill Rig Operator	**Dave Cooke**	Total Depth Drilled (feet) **52.0**	Rock Depth (feet)
Drill Rig Type	**CME 75**	Drill Bit Size/Type	**3 7/8" Tricone Bit**	Sampler Type(s)	**2" O.D Spoon Sampler**
Groundwater Level and Date Measured		Hammer Wt/Drop **140 lb / 30" Safety**	Casing Hammer Wt/Drop	Core Barrel Size/Type	
Boring Location and Comments	**See Boring Location Plan**			No. of Samples **Dist.: 12 Undist.: 0 Core (ft): 0**	

Depth, feet	Soil Samples: Type, Number	Recov. (ft)	Pen. Resist. (blows/6 in)	Rock Coring: Run Number	Recov. (%)	RQD (%)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Water Cont.(%)	% Fines	REMARKS/ OTHER TESTS
0								~3" asphalt bitumen					
	S-1	0.8	6 11 25 24					(FILL) Brown C-F SAND, some brick, trace gravel and silt [7]					
5	S-2	1.0	7 4 6 7					(FILL) Various construction debris: brick, tile, some c-f brown sand, trace m-f gravel and silt [7]					
10	S-3	0.6	5 5 4 6					(FILL) Brown M-F SAND, trace c. sand, f. gravel, and silt [7]					
15	S-4	1.0	2 2 1 7					Top 7": (FILL) Brown M-F SAND, some silt, trace gravel and clay [7] Bottom 5": (FILL) Gray sandy Organic CLAY [7]					
	S-5	1.7	79 36 35 39					Top 6": (PT) Dark Gray Organic PEAT and M-F SAND [7] Bottom 14": Wood [7]					
20	S-6	0.0	43 49 72 39					No recovery					
25	S-7	0.5	69 53 53 31					(GP) Two large pieces of COBBLE, some m-f gravel, trace c-f sand and silt [2a]					Hard Drilling/ Rig Chatter to 28' Hard drilling to 28' bgs, used 3" spoon and auto hammer
30													

Project: West 116th Street
Project Location: New York, New York
Project Number: 11100377

Log of Boring B-8

Sheet 2 of 2

Depth, feet	Soil Samples: Type, Number	Recov. (ft)	Pen. Resist. (blows/6 in)	Rock Coring: Run Number	Recov. (%)	RQD (%)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Water Cont.(%)	% Fines	REMARKS/ OTHER TESTS
30	S-8	0.8	7 6 9 12					(SP) Reddish-Brown M. SAND, trace silt [3b]					
35	S-9	1.0	5 7 19 23					(SP) Reddish-Brown M. SAND, some silt [3b]					
40	S-10	1.5	4 5 7 6					(SM) Brown/Gray F. SAND and SILT, some clay [3b]					
45	S-11	1.2	4 4 6 9					(SM) Brown/Gray F. SAND and SILT, some clay [3b]					
50	S-12	1.1	7 8 14 13					(SM-ML) Brown/Gray F. SAND and SILT, trace to some clay [3b]					
								End of boring at 57' below ground level					
55													
60													
65													

Project: West 116th Street
Project Location: New York, New York
Project Number: 11100377

Log of Boring B-9

Date(s) Drilled	**6/29/11**	Logged By	**A. Felicetta**	Approximate Surface Elevation (feet)	**20.0**
Drilling Method	**Rotary mud**	Drilling Contractor	**CTB**	Coordinates	**North:** **East:**
Casing Size/Type	**4" Steel**	Drill Rig Operator	**Dave Cooke**	Total Depth Drilled (feet) **42.0**	Rock Depth (feet)
Drill Rig Type	**CME 75**	Drill Bit Size/Type	**3 7/8" Tricone Bit**	Sampler Type(s)	**2" O.D Spoon Sampler**
Groundwater Level and Date Measured		Hammer Wt/Drop **140 lb / 30" Safety**	Casing Hammer Wt/Drop	Core Barrel Size/Type	
Boring Location and Comments	**See Boring Location Plan**			No. of Samples **Dist.: 10 Undist.: 0 Core (ft): 0**	

Depth, feet	Soil Samples: Type, Number	Recov. (ft)	Pen. Resist. (blows/6 in)	Rock Coring: Run Number	Recov. (%)	RQD (%)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Water Cont.(%)	% Fines	REMARKS/ OTHER TESTS
0	S-1	1.0	18 4 6 21					5" Asphalt (FILL) Brown C-F SAND, some brick, trace gravel and silt [7]					
5	S-2	0.8	4 7 3 3					(FILL) Brown C-F SAND, trace brick, gravel, and silt [7]					
10	S-3	0.0	5 4 3 50/3"					No Recovery					
15	S-4	1.2	1 1 WOH 5					Top 11" : (FILL) Brown and Black m-f sandy Organic SILT [7] Bottom 3": (FILL) Brown M-F SAND, trace silt, no organics [7]			27	59	Hole collapsed on 6/29/11 6/30/11 - move location to 19.5' from North fence and 6' from West fence. Started sampling at 15' BGS
20	S-5	1.0	2 2 4 5					Top 6": (FILL) Brown M-F SAND, some gray clay [7] Bottom 6": (PT) Black Organic PEAT [6]					
	S-6	0.8	5 7 6 9					(SP-PT) Brown and Gray C-F SAND, little clay, trace gravel and organic peat					
25	S-7	0.9	40 27 36 27					(SP) Gray C-F SAND, some m-f gravel, trace clay and silt [3a]					
30													

Project: West 116th Street
Project Location: New York, New York
Project Number: 11100377

Log of Boring B-9

Sheet 2 of 2

Depth, feet	Soil Samples: Type, Number	Soil Samples: Recov. (ft)	Soil Samples: Pen. Resist. (blows/6 in)	Rock Coring: Run Number	Rock Coring: Recov. (%)	Rock Coring: RQD (%)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Water Cont.(%)	% Fines	REMARKS/ OTHER TESTS
30	S-8	1.0	59 37 22 24					(SP) Brown m-f gravelly C-F SAND trace silt [3a]					
35	S-9	0.0	11 10 12 23					(GP) Brown C-M GRAVEL some c-f sand and silt					No Recovery therefore used 3" split spoon to retrieve sample
40	S-10	0.0	11 12 14 11					(SM) Reddish Brown/ Brown F. SAND, some silt					No Recovery therefore used 3" split spoon to retrieve sample
								End Boring @ 42' BGS					
45													
50													
55													
60													
65													

APPENDIX B
GEOPHYSICAL TESTING RESULTS

HAGER-RICHTER
GEOSCIENCE, INC.

SHEAR WAVE VELOCITY SURVEY
WEST 116TH STREET
MANHATTAN, NEW YORK

Prepared for:

URS Corporation
201 Willowbrook Boulevard, 3rd Floor
Wayne, New Jersey 07474-7005

Prepared by:

Hager-Richter Geoscience, Inc.
846 Main Street
Fords, New Jersey 08863

File 10JCC28
July, 2011

0. EXECUTIVE SUMMARY

Hager-Richter Geoscience, Inc. (Hager-Richter) conducted a shear wave velocity survey at the proposed location of a multi-story building at a site on West 116th Street in the Harlem section of Manhattan, New York for URS Corporation (URS) in June, 2011. The geophysical survey was performed in support of the geotechnical design of the proposed structure at the Site.

Based on boring logs provided by URS, the subsurface stratigraphy consists of 15-30 feet of miscellaneous fill, 5-10 feet of sand and organics, and sand, silt and gravel overlying gneiss bedrock, varying in depth from approximately 25 feet in the eastern portion of the site to about 90 feet deep in the western portion of the site.

The objective of the survey was to obtain shear wave velocity information to be used for the determination of seismic site class based on the NYC Building Code.

The shear wave velocity survey was conducted using the passive shear wave seismic (pVs) method and the Multichannel Analysis of Surface Wave method (MASW) method. Data were acquired along two survey lines identified as Seismic Lines 1and 2.

Based on the results of the pVs survey, the velocity of shear waves V_s varies with depth Z as follows:

ÄZ (ft)	**Line 1 Vs (fps)**	**Line 2 Vs (fps)**
0 - 15	840	768
15 - 26	613	632
26 - 54	768	790
54 - 67	1112	1202
67 - 100	1620	1884

The average value of the velocity of shear waves for Lines 1 and 2 determined using the passive shear wave method for the depth interval of 0-100 ft in accordance with the NYC Building Code and the corresponding Seismic Site Class are:

Survey Line	Vs (fps)	Seismic Site Class
Line 1	959	D
Line 2	993	D

Based on the results of the MASW survey, the average velocity of shear waves V_s varies with depth Z as follows:

Line 1		Line 2	
ÄZ (ft)	Vs (fps)	ÄZ (ft)	Vs (fps)
0 - 1.2	620	0 - 1.2	620
1.2 - 2.8	583	1.2 - 2.6	597
2.8 - 4.7	603	2.6 - 4.4	587
4.7 - 7.1	711	4.4 - 6.7	686
7.1 - 10.2	744	6.7 - 9.5	791
10.2 - 14.0	724	9.5 - 13.0	793
14.0 - 18.7	800	13.0 - 17.4	710
18.7 - 24.6	840	17.4 - 23.0	713
24.6 - 32.0	765	23.0 - 30.0	783
32.0 - 67.0	1190	30.0 - 67.0	1191
67.0 - 100	1620	67.0 - 100	1884

The average value of the velocity of shear waves for Lines 1 and 2 determined using the MASW method for the depth interval of 0-100 ft in accordance with NY Building Code and the corresponding Seismic Site Class are:

Survey Line	Vs (fps)	Seismic Site Class
Line 1	1076	D
Line 2	1109	D

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FIGURES

APPENDIX

1. INTRODUCTION

Hager-Richter Geoscience, Inc. (Hager-Richter) conducted a shear wave velocity survey at the proposed location of a multi-story building at a Site located in the middle of the block framed by West 116th Street, West 117th Street, 5th Avenue, and Malcolm X Blvd. in the Harlem section of Manhattan, New York for URS Corporation (URS) in June, 2011. The objective of the survey was to obtain shear wave velocity information to be used for the determination of seismic site class based on the NYC Building. The geophysical survey was performed in support of the geotechnical design of the proposed structure at the Site.

The Site includes landscaped areas, a parking lot and a basketball court. The general location of the Site is shown in Figure 1, and Figure 2 is a Site Plan showing the locations of the seismic survey lines. Based on boring logs provided by URS, the subsurface stratigraphy consists of 15-30 feet of miscellaneous fill, 5-10 feet of sand and organics, and sand, silt and gravel overlying gneiss bedrock, which varies in depth from approximately 25 feet in the eastern portion of the site to about 90 feet in the western portion of the site.

The shear wave velocity survey was conducted using the passive shear wave seismic (pVs) method and the Multichannel Analysis of Surface Waves method (MASW) method. Data were acquired along two survey lines designated as Seismic Lines 1 and 2.

José Carlos Cambero Calzada and Mikko Aarnio of Hager-Richter conducted the survey on June 30, 2011. The fieldwork was coordinated with Mr. Thomas Thomann, Ph. D., P.E., and Mr. Jonathan P. Ciampi, of URS. Mr. Anthony Felicetta, also of URS, was present during the field operations and indicated the area of interest for the seismic survey. Hager-Richter selected the locations of the seismic lines in consultation with Mr. Felicetta. Data analysis and interpretation were completed at the Hager-Richter offices. Original data and field notes will be retained in the Hager-Richter files for a minimum of three years.

2. EQUIPMENT AND PROCEDURES

2.1 Methods

2.1.1. pVs. The passive shear wave seismic (pVs) method is a geophysical method to determine a shear-wave velocity profile at a single location by analyzing a particular type of seismic wave recorded on a multichannel record. The name pVs is derived from p for passive and Vs for velocity of shear waves. The pVs method, also called the Refraction Microtremor method, or ReMi™, uses Rayleigh waves, a particular kind of wave first described by Lord Rayleigh in 1885. Such waves are dispersive (meaning that the velocity is a function of the wavelength), and the amplitude of such waves decreases with depth. The velocity depends primarily on the shear wave velocities and layering of the subsurface material.

Rayleigh waves are a significant part of the ambient subsurface noise at most, if not all, sites. There are many sources of such noise, including, but not limited to, wind, pedestrian and vehicular traffic, surface and subway trains, and construction activities. Although such noise can be troublesome for most seismic methods, it is the source of signals for the pVs method, and the higher the noise level, the better the results for this method.

Low frequency (4.5 Hz) geophones are installed 4 to 10 ft apart along a straight line and connected to a seismograph. The ambient noise is recorded for 30 seconds two or three times, and examined to be sure that noise of sufficiently low frequency is present. If the noise is sufficient, then 10 to 15 such records are acquired. If the noise spectra do not reach sufficiently low frequencies, then one walks or runs along the survey line during data acquisition to add low frequency noise to the ambient noise. The surface waves used in the pVs method, considered noise in refraction and reflection surveys, are enhanced during data acquisition and processing for the pVs method. The seismic data are analyzed using SeisOpt® ReMi™, a commercially licensed software package developed by Optim, Inc. located at the University of Nevada at Reno.

2.1.2. MASW. The multichannel analysis of surface waves (MASW) method is a seismic method which determines a shear-wave velocity (Vs) profile (i.e., Vs versus depth) by analyzing a particular type of seismic wave on a multichannel record. The MASW method uses Raleigh waves which are elastic waves that travel in the subsurface near the earth's surface. The amplitude of such waves decreases with depth and the phase velocity of the waves is a function of frequency. The method uses multichannel recording and processing concepts widely used in reflection surveying. The MASW method utilizes energy commonly considered noise in refraction and reflection seismic surveys. Ground roll is one of the most troublesome types of source-generated noise on reflection surveys and consists largely of Raleigh waves. However, the ground roll energy is the signal used in the MASW method and is enhanced during data acquisition and processing. The seismic data are analyzed using SurfSeis, a commercially licensed software package developed by the Kansas Geological Survey.

The data are processed using a three-step procedure: preparation of a multichannel record, dispersion-curve analysis, and inversion. The term "multichannel record" indicates a seismic data set acquired by using a recording instrument with at least 12 channels. Once a record is prepared, the dispersion curve analysis is begun. This step is the most critical because it has the greatest influence on the confidence in the final Vs output. The fundamental mode of the surface wave is the signal used for the analysis. To obtain an accurate dispersion curve, it is important to examine, without bias, the spectral content and propagation velocity (called phase velocity) characteristics of both signal and noise waves. Inversion of the calculated dispersion curve is performed with SurfSeis in a fully automated manner in which a most probable solution is sought in an iterative mode. Results can be presented as 2-D color plots or in tabular form showing shear wave velocity as a function of depth at a given station.

2.2 Equipment

We used a 48-channel digital seismograph (Geometrics Geode), coupled to 48 geophones to acquire better data sets. We use 4.5-Hz low natural frequency vertical geophones for most surveys.

2.3 Determination of Average Shear Wave Velocity for Building Code Purposes

The pVs method determines (a) the shear wave velocity at the mid point along a survey line for several layers, averaged over the length of the survey line and (b) the average shear wave velocity V_{avg} for site classification for seismic design in accordance with building codes. Similar calculations can be performed with the results of the MASW survey. The average value V_{avg} is determined for structures in New Jersey using the appropriate equation of the IBC 2006 New Jersey Edition, as follows:

$$V_{avg} = \left(\sum_{i=1}^{N} d_i \right) / \sum_{i=1}^{N} d_i / V_i$$

where d_i is thickness of layer i
V_i is shear wave velocity of layer i
N denotes the total number of layers

2.4 Limitations of the Methods

As with all physical measurements, there is experimental error in the velocities that are determined using the passive and MASW methods. For the passive survey, the accuracy of V_{avg} is stated by Optim, Inc. to be 5-15%. The uncertainty in velocity of shear waves for the MASW method is estimated to be approximately 15%.

The depth of investigation is a function of the noise spectrum, and long wave lengths

(low frequencies) are required to determine velocity at large depths. Noise levels can be improved by a person running along the seismic spread during data acquisition.

2.5 Site Specific

The locations of the survey lines are shown on Figure 2. The pVs and MASW surveys used 48 geophones (data processed for 24 geophones to generate the vertical velocity profile) and a geophone spacing of 5 feet. We used an offset of 10 feet. This arrangement yields velocities as a function of depth for locations along the line of 55 ft to 175 ft,[1] the portions of the seismic lines shown in bold in Figure 2. The seismic source for the pVs survey was ambient noise and random hammer striking while acquiring the data to enhance the high frequency content of the seismic signal. For the MASW survey, the seismic source was a 12-pound sledge hammer striking the asphalt pavement.

[1] For ease of reference, let x, n, p, and Äx denote the distance along the line, the layer number, Station number (and also geophone number), and inter-geophone spacing, respectively. Geophone 1 is located at Station 1, at a distance along the line of x = 0 ft. Geophone p is located at Station p, at a distance along the line of x = (p-1) * Äx. The data acquired for geophones numbered 1 through 24 are processed as discussed above in the text to determine the shear wave velocity as a function of depth for discrete layers, and the velocity of each layer $V_s(x,n)$ is assigned to the midpoint of the line between Stations 1 and 24, i.e. x = 55 ft. The data acquired for geophones numbered 2 through 25 yield the vertical velocity profile at the midpoint of the line between stations 2 and 25, i.e. x = 60 ft. By processing the data for geophones m through m+24 and assigning the vertical profiles to the midpoints, the velocity of each layer is generated as a function of horizontal distance. The end point for the velocity determined with a 48 geophone spread using data acquired with 24 geophones is located at x = 175 ft.

3. RESULTS AND DISCUSSION

The shear wave velocity survey was conducted along two seismic lines designated as Lines 1 and 2. The locations of the lines are shown in Figure 2. Based on boring logs provided by URS, the subsurface stratigraphy consists of 15-30 feet of miscellaneous fill, 5-10 feet of sand and organics, and sand, silt and gravel overlying gneiss bedrock, which varies in depth from approximately 25 feet in the eastern portion of the site to about 90 feet in the western portion of the site.

The results of the pVs survey and the MASW survey are reported in Tables 1 and 2. For modeling purposes, the subsurface stratigraphy was broken into discrete units. The velocities for the units are shown in Tables 1 and 2.

The average value of the velocity of shear waves determined using the passive shear wave method for the depth interval of 0-100 ft in accordance with the NYC Building Code and the corresponding Seismic Site Class are:

Survey Line	Vs (fps)	Seismic Site Class
Line 1	959	D
Line 2	993	D

For this site, the MASW signal penetration was limited to a depth of approximately 40 feet due to the presence of fill materials and organics. The pVs survey provided information to a depth of approximately 100 feet. In order to determine the average value of the velocity of shear waves using the MASW method for the depth interval of 0-100 ft, the shear wave velocity values determined using the passive method for the deeper discrete unit, 67 - 100 ft deep, were included to calculate the average velocity of shear waves for the depth interval of 0-100 ft using MASW. Therefore, the average value of the velocity of shear waves calculated by using the MASW method, and determined for the depth interval of 0-100 ft in accordance with the NYC Building Code, and the corresponding Seismic Site Class are:

Survey Line	Vs (fps)	Seismic Site Class
Line 1	1076	D
Line 2	1109	D

4. LIMITATIONS

This report was prepared for the exclusive use of URS Corporation (URS). No other party shall be entitled to rely on this Report or any information, documents, records, data, interpretations, advice or opinions given to Client by Hager-Richter Geoscience, Inc. (H-R) in the performance of its work. The Report relates solely to the specific project for which H-R has been retained and shall not be used or relied upon by Client or any third party for any variation or extension of this project, any other project or any other purpose without the express written permission of H-R. Any unpermitted use by Client or any third party shall be at Client's or such third party's own risk and without any liability to H-R.

H-R has used reasonable care, skill, competence and judgment in the preparation of this Report consistent with professional standards for those providing similar services at the same time, in the same locale, and under like circumstances. Unless otherwise stated, the work performed by H-R should be understood to be exploratory and interpretational in character and any results, findings or recommendations contained in this Report or resulting from the work proposed may include decisions which are judgmental in nature and not necessarily based solely on pure science or engineering. It should be noted that our conclusions might be modified if subsurface conditions were better delineated with additional subsurface exploration including, but not limited to, test pits, soil borings with collection of soil and water samples, and laboratory testing.

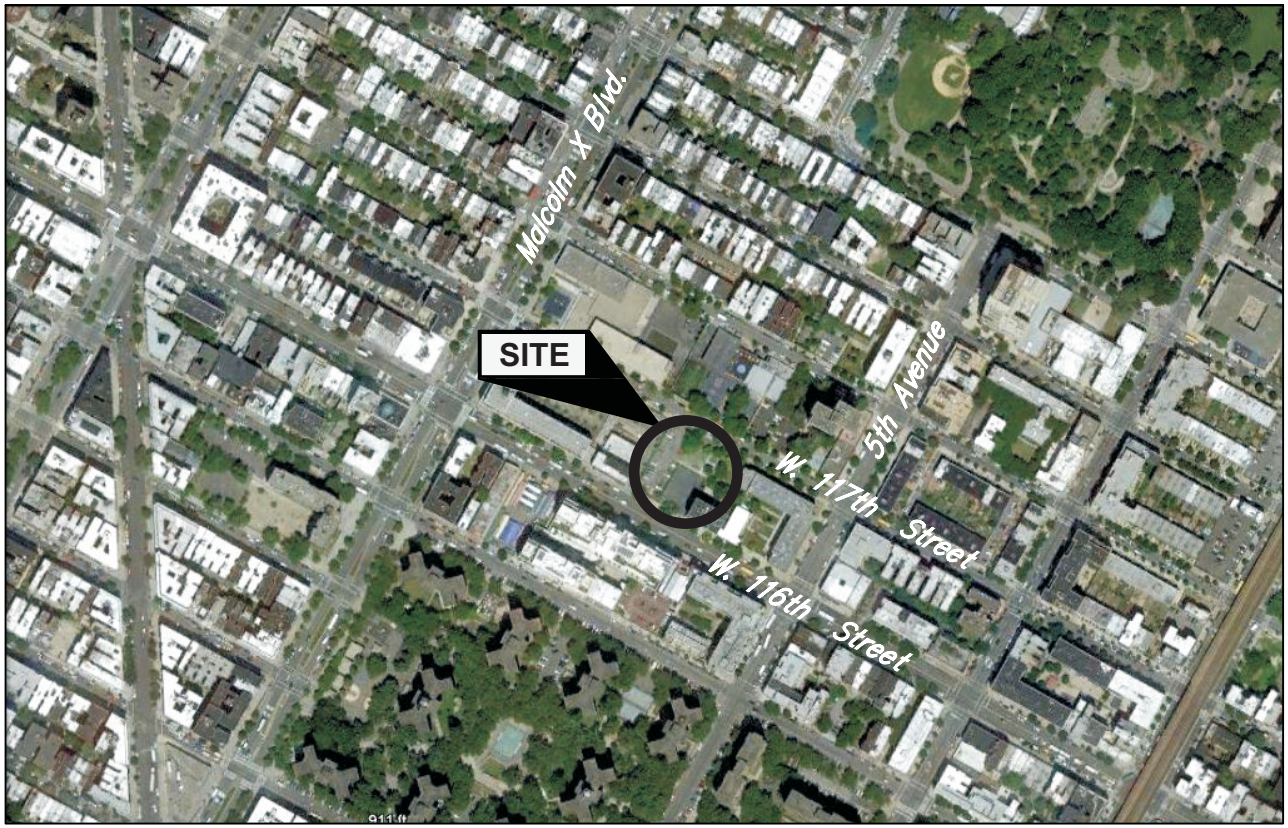
Except as expressly provided in this limitations section, H-R makes no other representation or warranty of any kind whatsoever, oral or written, expressed or implied; and all implied warranties of merchantability and fitness for a particular purpose, are hereby disclaimed.

TABLE 1
pVs SHEAR WAVE VELOCITY SURVEY RESULTS
WEST 116th STREET
HARLEM, MANHATTAN, NEW YORK

Depth Interval (ft)	Line 1 Vs (fps)	Line 2 Vs (fps)
0 - 15	840	768
15 - 26	613	632
26 - 54	768	790
54 - 67	1112	1202
67 - 100	1620	1884
Average Vs (fps)	**959**	**993**
Seismic Site Class (NYC BC)	**D**	**D**

TABLE 2
MASW SHEAR WAVE VELOCITY SURVEY RESULTS
WEST 116th STREET
HARLEM, MANHATTAN, NEW YORK

Line 1		Line 2	
ÄZ (ft)	**Vs (fps)**	**ÄZ (ft)**	**Vs (fps)**
0 - 1.2	620	0 - 1.2	620
1.2 - 2.8	583	1.2 - 2.6	597
2.8 - 4.7	603	2.6 - 4.4	587
4.7 - 7.1	711	4.4 - 6.7	686
7.1 - 10.2	744	6.7 - 9.5	791
10.2 - 14.0	724	9.5 - 13.0	793
14.0 - 18.7	800	13.0 - 17.4	710
18.7 - 24.6	840	17.4 - 23.0	713
24.6 - 32.0	765	23.0 - 30.0	783
32.0 - 67.0	1190	30.0 - 67.0	1191
67.0 - 100	1620	67.0 - 100	1884
Average Vs (fps)	**1076**	**Average Vs (fps)**	**1109**
Seismic Site Class (NYC BC)	**D**	**Seismic Site Class (NYC BC)**	**D**



N

H-R

APPROXIMATE SCALE (feet)

0 500 1000

NY

LOCATION

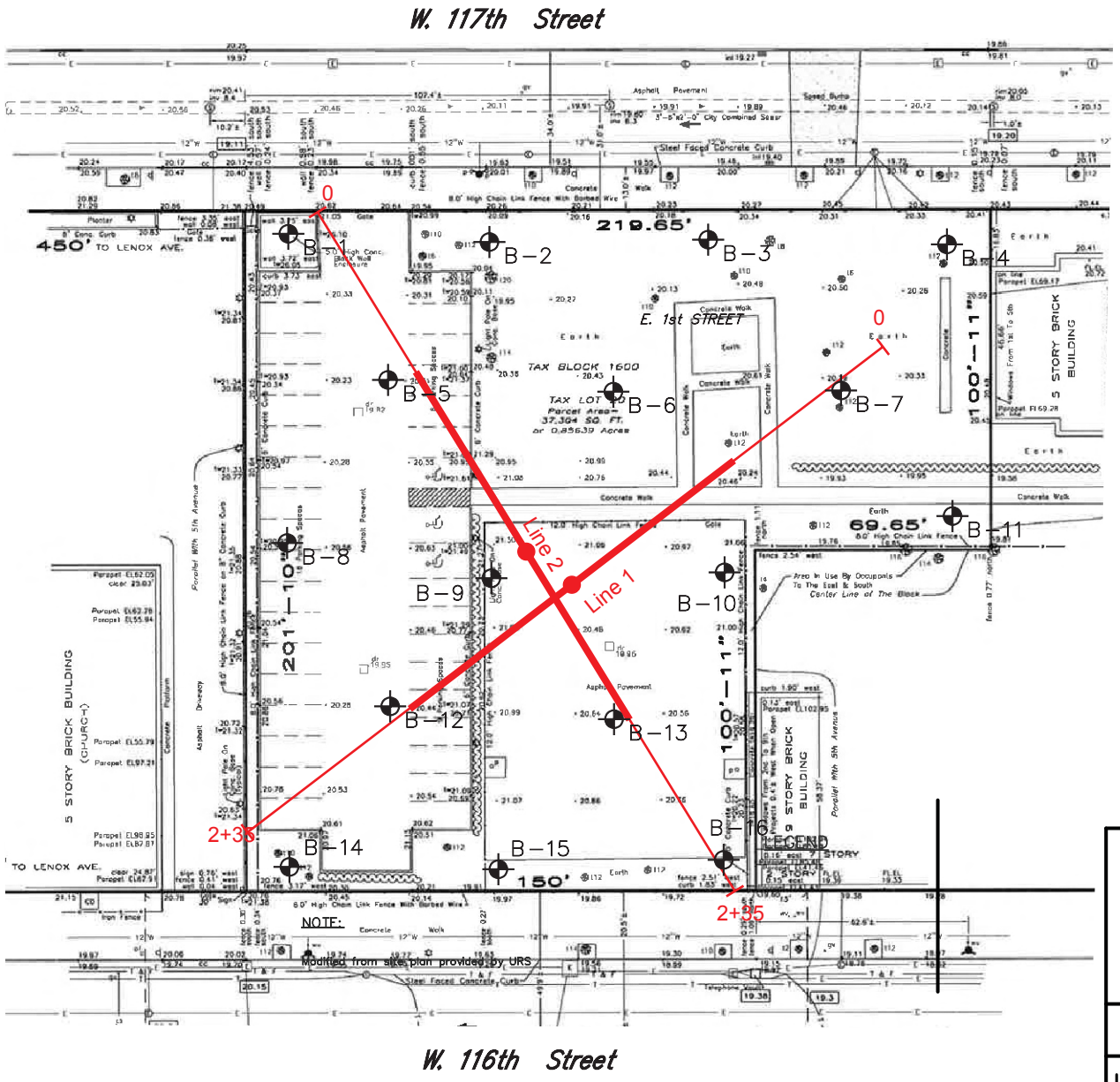
NOTE:

Modified from Google Earth aerial photograph.

Figure 1
General Site Location
West 116th Street
Harlem, Manhattan, NY

File 10JCC28 | July, 2011

HAGER–RICHTER GEOSCIENCE, INC.
Fords, New Jersey



B-1 BOREHOLE INSTALLED BY URS

SEISMIC LINE WITH MIDPOINT AND EFFECTIVE DATA COVERAGE IN BOLD

SCALE (feet)

0 50 100

Figure 2
Site Plan
West 116th Street
Harlem, Manhattan, NY

File 10JCC28 | July, 2011

HAGER-RICHTER GEOSCIENCE, INC.
Fords, New Jersey

APPENDIX

Boring logs provided by URS

SEE APPENDIX A

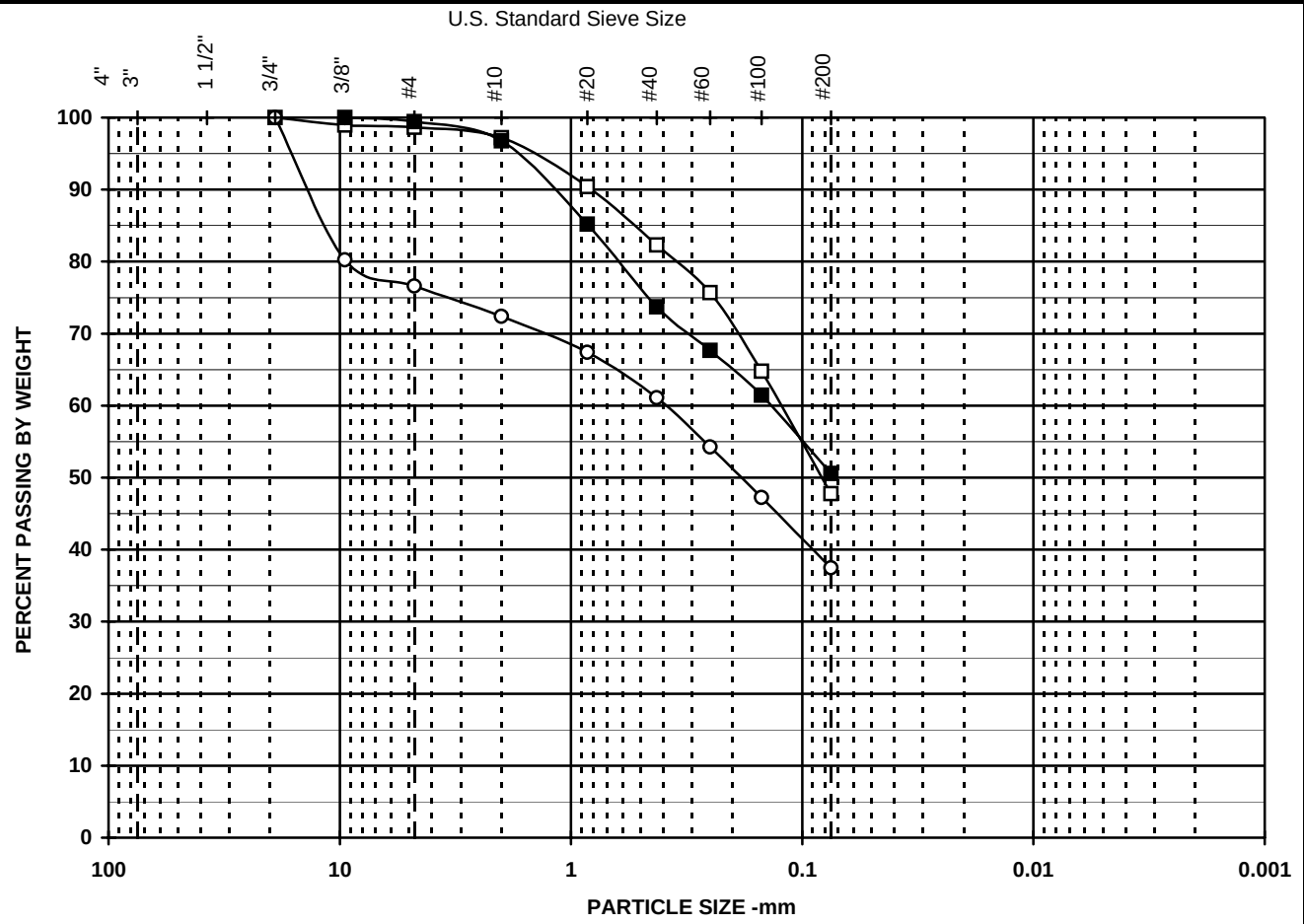
APPENDIX C
LABORATORY TEST RESULTS

URS #11100377
West 116th Street
LABORATORY TESTING DATA SUMMARY

BORING NO.	SAMPLE NO.	DEPTH (ft)	IDENTIFICATION TESTS							REMARKS
			WATER CONTENT (%)	LIQUID LIMIT (-)	PLASTIC LIMIT (-)	PLAS. INDEX (-)	USCS SYMB. (1)	SIEVE MINUS NO. 200 (%)	ORGANIC CONTENT (burnoff) (%)	
B-1	S-5	17-19	21.3				SC	47.7		
B-1	S-10	40-42	26.8	27	21	6	CL-ML	99.1		
B-1	S-13	55-57	32.4	33	18	15	CL	99.3		
B-2	S-7	30-32	142.6	193	92	101	OH		15.8	
B-5	S-5	20-22	21.0				ML	50.6		
B-7	S-4	15-17	16.4				SM	37.5		
B-9	S-4	15-17	26.8				OL	58.6		
B-10	S-5	20-22	18.6				SM	33.4		
B-11	S-7	27-29	205.9	300	143	157	OH		33.9	
B-12	S-4	15-17	20.2				SM	39.8		
B-12	S-7	30-32	20.7				SP	3.5		
B-12	S-9	40-42	28.9				CL-ML	90.5		
B-12	S-12	55-57	33.3	27	21	6	CL-ML			
B-16	S-4	15-17	12.3				GM	19.7		
B-16	S-8	30-32	23.4				SP-SM	7.2		

Note: (1) USCS symbol based on visual observation and Sieve and Atterberg limits reported.

COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	



Symbol	□	■	○
Boring	B-1	B-5	B-7
Sample	S-5	S-5	S-4
Depth	17-19	20-22	15-17
% +3"	0.0	0.0	0.0
% Gravel	1.4	0.6	23.4
% SAND	50.9	48.8	39.1
%C SAND	1.4	2.7	4.2
%M SAND	14.9	23.0	11.3
%F SAND	34.5	23.1	23.6
% FINES	47.7	50.6	37.5
% -2μ			
D_{100} (mm)	19.00	9.50	19.00
D_{60} (mm)	0.13	0.14	0.40
D_{30} (mm)			
D_{10} (mm)			
Cc			
Cu			

Particle Size	PERCENT FINER		
(Sieve #)	□	■	○
4"			
3"			
1 1/2"			
3/4"	100.0		100.0
3/8"	98.9	100.0	80.2
4	98.6	99.4	76.6
10	97.2	96.7	72.4
20	90.4	85.2	67.4
40	82.3	73.7	61.1
60	75.7	67.7	54.3
100	64.8	61.4	47.2
200	47.7	50.6	37.5

SYMBOL	w (%)	LL	PL	PI	USCS	DESCRIPTION AND REMARKS	Date Tested
□	21.3				SC	Dark brown, Clayey sand	7/13/2011
■	21.0				ML	Dark brown, Sandy silt	7/13/2011
○	16.4				SM	Dark brown, Silty sand with gravel wood pieces noted	7/13/2011

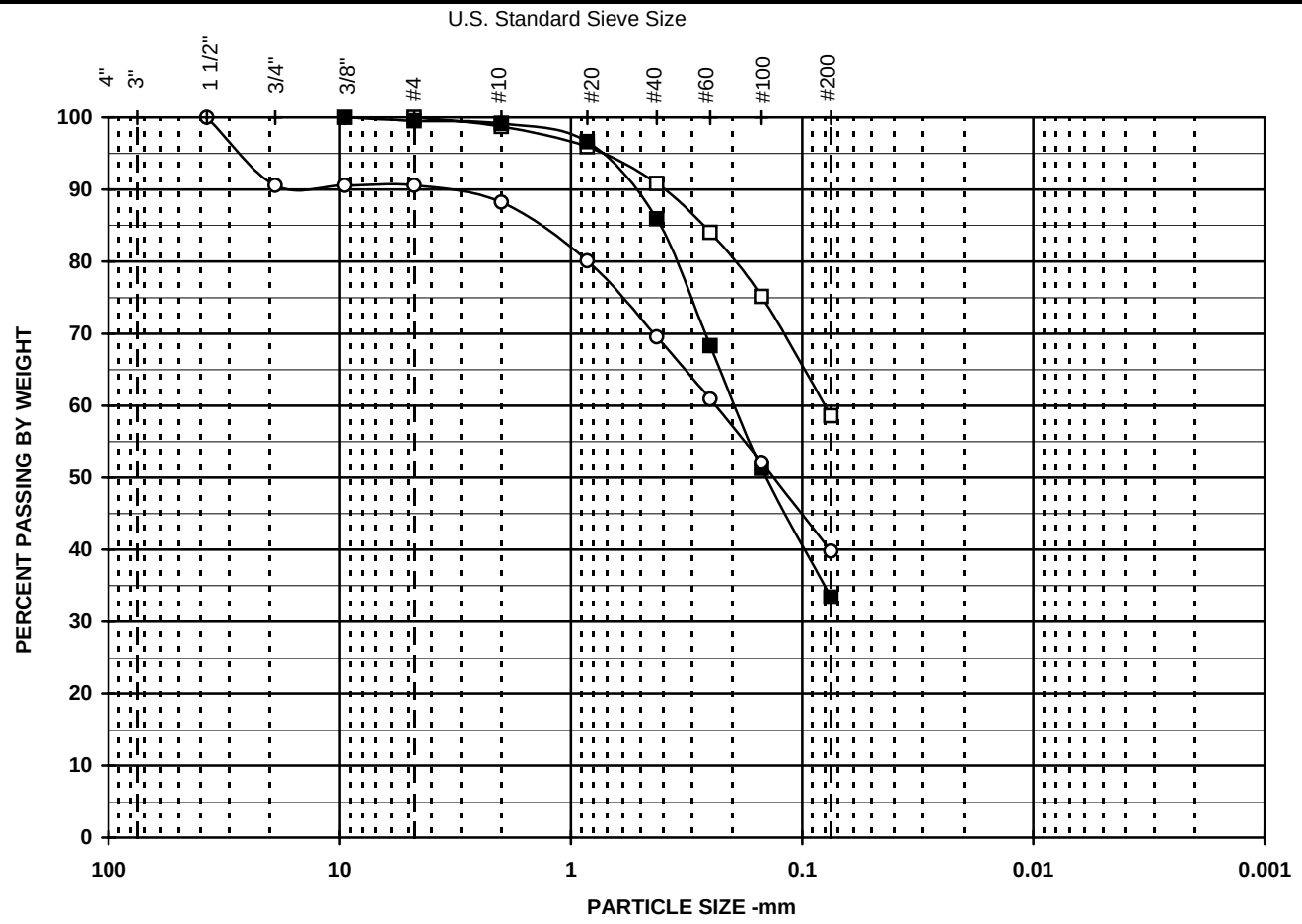
TerraSense, LLC	URS
T11100377	11100377

PARTICLE SIZE DISTRIBUTION
West 116th Street

Analysis File: 3SV-MasterRev3

siev1a.xls 7/19/2011

COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	



Symbol	□	■	○
Boring	B-9	B-10	B-12
Sample	S-4	S-5	S-4
Depth	15-17	20-22	15-17
% +3"	0.0	0.0	0.0
% Gravel	0.0	0.5	9.4
% SAND	41.4	66.1	50.8
%C SAND	1.2	0.3	2.3
%M SAND	7.9	13.2	18.7
%F SAND	32.2	52.6	29.7
% FINES	58.6	33.4	39.8
% -2μ			
D_{100} (mm)	4.75	9.50	37.50
D_{60} (mm)	0.08	0.20	0.24
D_{30} (mm)			
D_{10} (mm)			
Cc			
Cu			

Particle Size	PERCENT FINER		
(Sieve #)	□	■	○
4"			
3"			
1 1/2"			100.0
3/4"			90.6
3/8"		100.0	90.6
4	100.0	99.5	90.6
10	98.8	99.2	88.2
20	95.9	96.6	80.1
40	90.8	85.9	69.5
60	84.0	68.3	60.9
100	75.2	51.3	52.1
200	58.6	33.4	39.8

SYMBOL	w (%)	LL	PL	PI	USCS	DESCRIPTION AND REMARKS	Date Tested
□	26.8				OL	Gray, Sandy Organic silt	7/13/2011
■	18.6				SM	Brown, Silty sand	7/13/2011
○	20.2				SM	Gray, Silty sand	7/13/2011

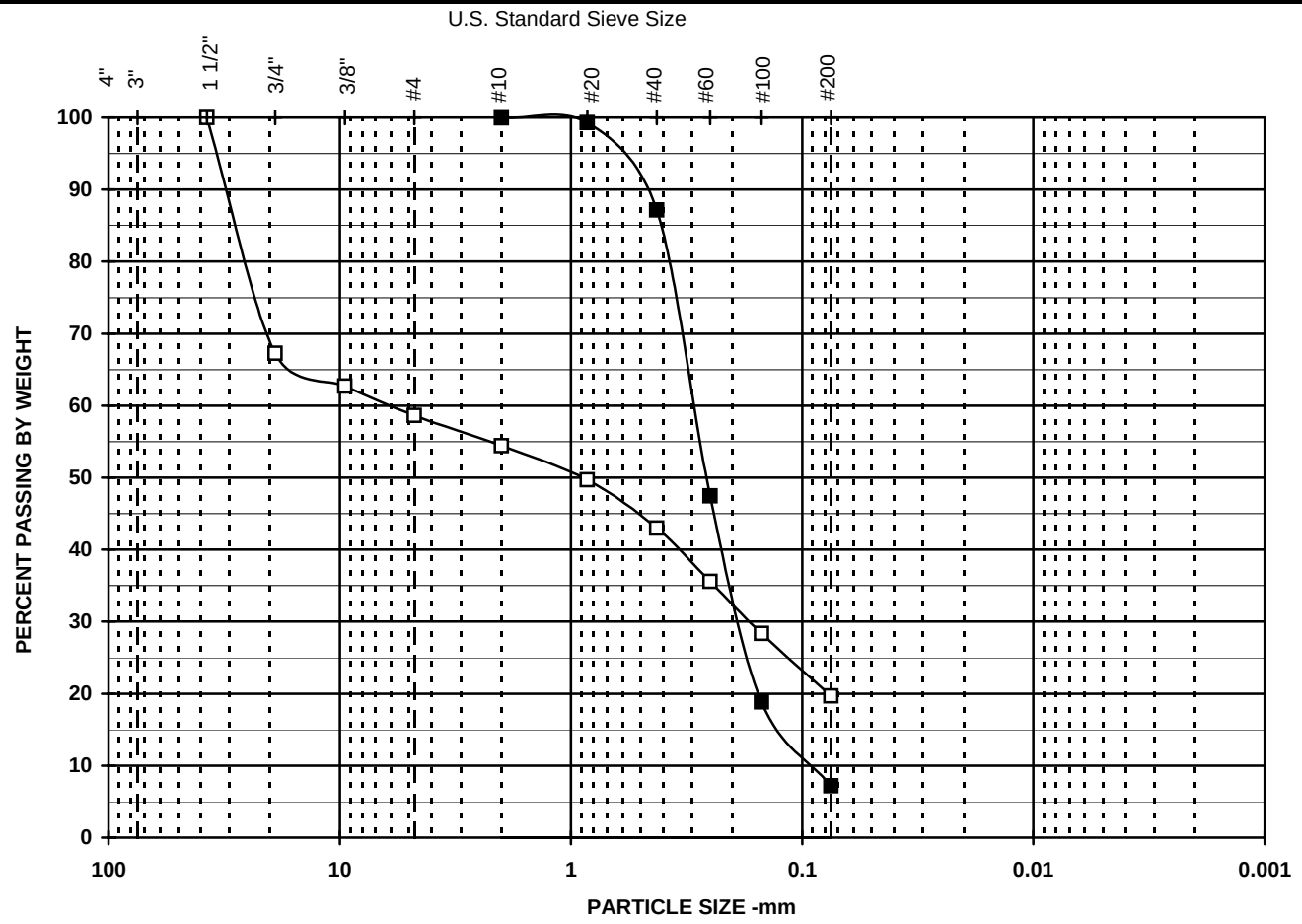
TerraSense, LLC	URS
T11100377	11100377

PARTICLE SIZE DISTRIBUTION
West 116th Street

Analysis File: 3SV-MasterRev3

sieve1b.xls 7/19/2011

COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	



Symbol	□	■	○
Boring	B-16	B-16	
Sample	S-4	S-8	
Depth	15-17	30-32	
% +3"	0.0	0.0	
% Gravel	41.4	0.0	
% SAND	38.9	92.8	
%C SAND	4.2	0.0	
%M SAND	11.4	12.8	
%F SAND	23.3	80.0	
% FINES	19.7	7.2	
% -2μ			
D_{100} (mm)	37.50	4.75	
D_{60} (mm)	6.36	0.31	
D_{30} (mm)	0.17	0.19	
D_{10} (mm)		0.09	
Cc		1.3	
Cu		3.3	

Particle Size	PERCENT FINER		
(Sieve #)	□	■	○
4"			
3"			
1 1/2"	100.0		
3/4"	67.3		
3/8"	62.7		
4	58.6		
10	54.4	100.0	
20	49.7	99.3	
40	43.0	87.2	
60	35.6	47.5	
100	28.3	18.8	
200	19.7	7.2	

SYMBOL	w (%)	LL	PL	PI	USCS	DESCRIPTION AND REMARKS	Date Tested
□	12.3				GM	Dark brown, Silty gravel with sand	7/13/2011
■	23.4				SP-SM	Brown, Poorly-graded sand with silt	7/13/2011
○							

TerraSense, LLC	URS
T11100377	11100377

PARTICLE SIZE DISTRIBUTION
West 116th Street

Analysis File: 3SV-MasterRev3

sieve1c.xls 7/19/2011

APPENDIX 7

Previous Regulatory Correspondence

NYC Environmental Protection

Caswell F. Holloway
Commissioner

Angela Licata
Deputy Commissioner
Environmental Planning and Analysis
alicata@dep.nyc.gov

59-17 Junction Boulevard
Flushing, NY 11373
T: (718) 595-4398
F: (718) 595-4479

March 1st, 2010

Mr. Robert Dobruskin
New York City Department of City Planning
22 Reade Street, Room 4E
New York, New York 10007-1216

Re: West 116th / 117th Street Development
1428 Fifth Avenue
Block 1600, Lots 20, 21, 26, 27 and 30
Block 1600, Lots 20 and 21 (Owned by the applicant)
CEQR # 77DCP038M/11DEPTECH0035M
Manhattan, New York

Dear Mr. Dobruskin:

The New York City Department of Environmental Protection, Bureau of Environmental Planning and Analysis (DEP) has reviewed the January 2011 Environmental Assessment Statement prepared by Ethan C. Eldon Associates and the November 2009 Phase I Environmental Site Assessment Report (Phase 1) prepared by Ecosystems Strategies, Inc., on behalf of West 116 Residential LLC (applicant) for the above reference project. The applicant is seeking a zoning map amendments from New York City Department of City Planning (DCP) to change an existing R7-2 with C1-4 zoning district to a C4-5X (R7X equivalent) zoning district for Block 1600, Lots: 20(project site), 21, 26, 27 and 30, bounded by West 116th Street, 5th Avenue, West 117th Street and Lenox Avenue in the Harlem section of Manhattan, Community District 10. The proposed action would facilitate the construction of a nine-story and a 12-story mixed-use building (North and South Buildings) with a total of 230,569 square feet (SF), containing approximately 200,170 SF of residential space (195 units), approximately 22,621 SF. of commercial retail space, and approximately 8,166 SF of community facility on Block 1600, Lot 20 (project site). In addition, the proposed action would also include100 accessory parking spaces located in the cellar which would be used by the proposed two buildings (North and South Buildings) and the adjacent existing six-story apartment building (IMPACHousing) on Lot 21 which is owned by the applicant. Currently, the site consists of a six-story apartment building with 120 dwelling units, a parking area, a private basketball court and vacant land. It should be noted that Lots 26, 27 and 30 are not under the control or ownership of the applicant.

The November 2010 Phase I report revealed that historical on-site and surrounding area land uses consisted of a variety of residential, commercial and manufacturing uses (manufacturing uses unknown) including a church, school, parking garage, retail facilities, and manufacturing facility (uses UNKNOWN). The New York State Department of Environmental Conservation (NYSDEC) Petroleum Bulk Storage facilities (PBS) database revealed that the church property at 1421 Fifth Avenue, which adjoins the subject property to the east, is

a PBS facility (PBS Number: 2-608293) containing an active 3,000-gallon fuel oil underground storage tank (UST); the children's center, which adjoins the subject property to the northwest is a PBS facility (PBS Number 2-341487) containing a 10,000-gallon fuel oil UST; in addition, the "Canaan Houses" property which adjoins the subject property to the north is a PBS facility (PBS Number: 2-600905) containing an active 5,000-gallon fuel oil UST. The NYSDEC database identified 65 spills, including eight Leaking Underground Storage Tanks within ½ mile radius of subject property. It should be noted that spill # 0305658 occurred approximately 165 feet southwest of the property as the result of the discovery of petroleum contaminated soil and oil and water mixture in an excavation. An active NYSDEC spill # 0601808 was reported for petroleum contaminated soil that was discovered during construction activities at an adjoining property and spill# 0209842 was reported for an adjoining property (Dunlevy Milbank Children). This spill was closed in June 2004. It should be noted that a previous site assessment identified small quantities of petroleum products, hydraulic fluid and chemicals in the basement of the subject property.

Based upon our review of the submitted documentation, we have the following comments/ recommendations to DCP:

***Proposed Development Site under the control or ownership of the applicant (*Block1600 Lot 20)**

DCP should inform the applicant that based on prior on-site and surrounding area land uses, a Phase II Environmental Site Assessment (Phase II) is necessary to adequately identify/characterize the surface and subsurface soils of the subject parcels prior to on-site soil disturbance. A Phase II Investigative Protocol/Workplan summarizing the proposed drilling and soil/groundwater sampling activities should be submitted to DEP for review and approval. The Workplan should include blueprints and/or site plans displaying the current surface grade and sub-grade elevations and a site map depicting the proposed soil boring locations. Soil and groundwater samples should be collected and analyzed by a New York State Department of Health Environmental Laboratory Approval Program certified laboratory for the presence of Volatile Organic Compounds by United States Environmental Protection Agency (EPA) Method 8260, Semi-Volatile Organic Compounds by EPA Method 8270, Pesticides/Polychlorinated Biphenyl by EPA Method 8081/8082 and Target Analyte List (TAL) metals. An investigative Health and Safety Plan (HASP) should also be submitted to DEP for review and approval.

Soft Sites under and not under the control or ownership of the applicant
Block 1600, Lots 21, 26, 27 and 30

It is our understanding that these sites would remain the same as the existing conditions; it should be noted that the remaining floor area for Lot 21 (site own by the applicant) is borrow for the proposed projects, Lots 26 and 27 is a new nine-story building with a floor Area Ratio of 5.1 and Lot 30 with a three-story church would be unlikely to change. However, should the current proposal changes and future development are proposed for these sites, DEP recommends that an "E" designation for hazardous materials should be place on the zoning map pursuant to 11-15 of the New York City Zoning Resolution for any projected and or potential development sites. The "E" designation will ensure that testing and mitigation will be provided as necessary before any future development. Soil and groundwater samples should be collected and analyzed by an

NYSDOH ELAP-CERTIFIED laboratory for the presence of VOCs by EPA Method 8260, SVOCs by EPA Method 8270, Pesticides/PCBs by EPA Method 8081/8082 and TAL Metals. An investigative HASP will also be required to be submitted for review and approval.

DCP should also instruct the applicant that the Phase II Work plan and HASP should be submitted to DEP for review and approval prior to start of any fieldwork. Future correspondence related to this project should include the following tracking number **11DEPTECH035M**. If you have any questions, you may contact Ms. Mahalia Myrie at 718-595-3212.

Sincerely,

Maurice S. Winter
Deputy Director, Site Assessment

cc: T. Estesen
M. Myrie
C. Evans- DCP
O. Abinader- DCP
File