511 WEST 21ST STREET

NEW YORK, NY

Remedial Action Work Plan

NYSDEC BCP Number C231080

Prepared For:
510 West 22nd Street Partners, LLC
c/o Albanese Development Corporation
1050 Franklin Avenue
Garden City, New York 11530

Submitted to:
New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau B, 12th Floor
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CERTIFICATIONS

I, Arnold F. Fleming, certify that I am currently a NYS registered professional engineer or Qualified Environmental Professional as defined in 6 NYCRR Part 375 and that this Remedial Action Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10) and that all activities were performed in full accordance with the DER-approved work plan and any DER-approved modifications.

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

STATE OF NEW YORK
ARNOLD F. FLEMING
LICENSED PROFESSIONAL ENGINEER

Arnold F. Fleming, P.E.	3/31/15	
NYS Professional Engineer # 050411	Date	Signature

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TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

LIST OF ACRONYMS

AGV	NYSDOH Air Guidance Value
AOC	area of concern
BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
ECL	Environmental Conservation Law
BTEX	benzene, toluene, ethylbenzene, and xylenes
CAMP	Community Air Monitoring Program
Class GA Standards	NYSDEC TOGS 1.1.1 Class GA Ambient Water Quality Standards and Guidance Values
CEQR	City Environmental Quality Review
CFR	Code of Federal Regulations
CP-51	NYSDEC Final Commissioner Policy, October 21, 2010 – Soil Cleanup Guidance
CPP	Citizen Participation Plan
COC	Certificate of Completion
CUSCOs	6 NYCRR 375-6.8(b)– Commercial Use Soil Cleanup Objectives
DER-10	NYSDEC Division of Environmental Remediation (DER), DER-10 / Technical Guidance for Site Investigation and Remediation
DUSR	Data Usability Summary Report
EC	engineering control
ESA	Environmental Site Assessment
FB	field blanks
FER	Final Engineering Report
ft-bgs	feet below ground surface
FLS	Fleming-Lee Shue, Inc.
HASP	Health and Safety Plan
HSA	Hollow Stem Auger
HSO	Health and Safety Officer
IC	institutional control
ISCO	*in-situ* chemical oxidation
IRM	Interim Remedial Measure
LBG	Leggette, Brashears and Graham, Inc.
MW	Monitoring Well
MTBE	Methyl tertiary-butyl ether
NJDEP	New Jersey Department of Environmental Protection
NYCDEP	New York City Department of Environmental Protection
NYCDOB	New York City Department of Buildings
NYCDOT	New York City Department of Transportation
NYCRR	New York Codes, Rules and Regulations

NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSDOH-ELAP	New York State Department of Health Environmental Laboratory Approval Program
OSHA	Occupational Safety and Health Association
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PCE	tetrachloroethene
PID	photoionization detector
PPE	personal protective equipment
PGSCO	6 NYCRR 375-6.8(b) Protection of Groundwater Soil Cleanup Objective
QA/QC	quality assurance / quality control
QAPP	Quality Assurance Project Plan
RAWP	Remedial Action Work Plan
RE	Remedial Engineer
RI	Remedial investigation
RSCOs	Recommended Soil Cleanup Objectives
SB	soil boring
SCG	applicable standards, criteria and guidance values
SG	soil gas
SMP	Site Management Plan
SoMP	Soil/Material Management Plan
SVOC	semi-volatile organic compound
TAL	Target Analyte List
TAGM 4046	NYSDEC Technical and Administrative Guidance Memorandum #4046
TB	trip blanks
TCE	trichloroethylene
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure
TCLP Limits	USEPA Maximum Concentrations of Contaminants for the Toxicity Characteristic
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UST	underground storage tank
UUSCOs	6 NYCRR 375-6.8(a) Track 1 - Unrestricted Use Soil Cleanup Objectives
VOC	volatile organic compound

EXECUTIVE SUMMARY

Site Description

The Volunteer, 510 West 22nd Street Partners, LLC, entered into a Brownfield Cleanup Agreement (BCA) with the New York State Department of Environmental Conservation (NYSDEC) in April 11, 2013 to investigate and remediate a 0.45 acre, 19,750 square feet (sq. ft.), property located at 511 West 21st Street in Manhattan (Site). The Site is located in a commercially zoned area on the west side of Manhattan between 10th and 11th Avenues. The building is currently vacant. The property has frontage on the north side of West 21st Street and the south side of West 22nd Street. The surrounding properties consist of multiple-story commercial buildings and the Highline Elevated Park.

The proposed development plan is to renovate the existing building, including installation of new foundation elements and construction of five additional floors. When renovations and construction of the additional floors are completed, the Site will contain a commercial use 10-story building with retail usage at the ground level and additional commercial lease space in the upper nine floors. The mechanical rooms and building lobby will be located on the ground level.

The Site is approximately 11-ft. above mean sea level. In general, the surface topography in the vicinity of the Site gently decreases in elevation to the west, toward the Hudson River. According to the Pillori Associates Geotechnical Investigation (May 2008), the Site is underlain by a shallow layer of urban fill followed by historic fill and native soils. The native soils beneath the fill layer consist of organic silty clay of estuarine origin as well as sand and silt of glacial origin. The depth-to-bedrock varies from approximately 33 ft-bgs at the northern end of the Site to 65 ft-bgs at the southern end of the Site. Published geologic data indicates that the Site is underlain with mica schist that is known as the Manhattan Schist. The Manhattan Schist is a mass of metamorphic rock covering the deeper limestone stratum, which is the firm bedrock providing the foundation for New York City's skyscrapers.

The depth-to-groundwater at the Site is approximately 6 to 7 ft-bgs. The monitoring wells were surveyed to accurately determine depth-to-water elevations and determine the groundwater flow direction. The local groundwater flow direction is to the southwest. Groundwater Contour

Diagrams for December 2013 and June 2014 are provided as Figures 11 and 12.

Site History

The Site was used for manufacturing in the 1800s, with the first known manufacturing occurring in 1836 by a gas meter company. Previous reports indicate that the current parking garage structure was constructed in 1918/19 as a 2-story parking garage building, and the building was then gutted to its load bearing walls and reconstructed as a 5-story building in 1989. Time Warner occupied the building from 1991 to 2008 and used the building for vehicle parking, storage, vehicle maintenance, and offices. The Site was assigned NYSDEC Spill #0010394 upon discovery of a release of gasoline from underground storage tanks (UST) in 2000. Legette, Brashears & Graham (LBG) on behalf of Time Warner conducted investigation and remediation related to the release until 2012. Time Warner vacated the building in 2008 and it has remained vacant since that time. The Volunteer purchased the Site in 2012 and entered into the NYSDEC BCP in 2013.

Previous Environmental Investigations

Previous investigations of the environmental quality of the Site identified gasoline-related contamination in soil and groundwater on Site. The list of previous investigations performed at the Site is presented below:

- Phase I Environmental Site Assessment, prepared by AKRF, Inc., May 2007;
- UST Closure/Remedial Action Report (RAR), prepared by LBG, April 2008;
- Geotechnical Engineering Investigation, prepared by Pillori Associates, May 2008;
- Phase II Subsurface Investigation, prepared by AKRF, Inc., August 2008;
- Phase I Environmental Site Assessment, prepared by Fleming Lee-Shue, Inc., November 2011.
- Quarterly Groundwater Monitoring Reports, prepared by LBG from 2008 through October 2012;

The subsurface conditions at the Site were impacted by petroleum releases from an on Site gasoline USTs which have since been removed. The Site was assigned NYSDEC Spill #0010394 when contamination was discovered in 2000. According to the NYSDEC SPILLS database, the leaks associated with the USTs were repaired and a small amount of soil was excavated. Subsequent subsurface investigations (including required offsite sampling under NYSDEC Spills Program) identified benzene and methyl tert-butyl ether (MTBE) in soil, and benzene, toluene, ethylbenzene and xylenes (BTEX) and MTBE in groundwater, with the highest concentrations in samples collected to the west of the gasoline dispensers and southwest of the former UST location under the 21st Street sidewalk. As required by the NYSDEC Spills Program, Time Warner conducted further investigations of soil and groundwater both on and off-Site.

As a result of the findings of their investigations, LBG on behalf of Time Warner removed two gasoline USTs and one waste oil UST along with associated appurtenances from the Site between 2007 and 2008. According to end point samples and field observations the waste oil UST was removed with no evidence of a release to the environment and no further action was recommended by LBG in the UST Closure Report.

The two gasoline USTs located in the southern portion of the Site were confirmed to have discharged to the environment and were removed along with impacted soils from as large an area as practicable without compromising the building's foundation. Evidence of free product was noted on groundwater near the footings and skimmed. Based on endpoint sampling results, additional MTBE-contaminated soil was removed and test pits dug around the southern portion of the building. Oxidants were added to the excavation and test pits prior to backfilling. Remediation sumps were installed in the test pit area. Gasoline-impacted soils were left around the foundation elements within the UST area due to structural concerns associated with removal of these soils.

Following the removal of the two gasoline USTs and associate impacted soils in early 2008, Time Warner installed additional groundwater monitoring wells within and around the former gasoline UST area. Groundwater samples collected and analyzed from monitoring wells around the former gasoline UST area continued to contain concentrations of gasoline related compounds exceeding the AWQS. As directed by NYSDEC, LBG on behalf of Time Warner installed additional groundwater monitoring wells and continued to monitor groundwater through 2012.

In late 2011 and early 2012, LBG on behalf of Time Warner injected a slurry mix of RegenOx and Oxygen Release Compound Advanced® into the saturated zone beneath the southern-central portion of the building in hopes of breaking down the gasoline impacted soils around the foundation elements. The analytical results of groundwater samples collected during the 2nd quarter of 2012 indicated that the injections were successful reducing VOC concentrations in groundwater; however, further sampling was recommended by NYSDEC to confirm these findings. LBG on behalf of Time Warner ceased groundwater monitoring after the 2nd quarter sampling event.

Upon purchasing the Site in 2012, the Volunteer entered into the NYSDEC BCP through the execution of the April 2013 BCA. Groundwater sampling by FLS in 2013 on behalf of the Volunteer indicated that groundwater quality had not improved since 2012. The findings of the remedial investigation conducted by the Volunteer are discussed in the following section.

Summary of the Remedial Investigation under BCP

The Site was further investigated under the BCP in accordance with the scope of work presented in the NYSDEC-approved Remedial Investigation Work Plan (RIWP) dated October 2013. The investigation was conducted in December 2013 with additional groundwater sampling in January and June 2014. The Remedial Investigation Report (RIR) was submitted to NYSDEC in October 2014 and approved by NYSDEC in October 2014.

The remedial investigation (RI) sampling completed at the Site involved the collection of soil, groundwater and soil vapor samples. In general, the sample locations were targeted toward specific areas of concern identified from site observations and a review of available historic information. A lesser number of samples were obtained for general characterization purposes. As part of the RI, data collected from previous Site investigations was confirmed and further investigated as needed to fill in data gaps. The remedial investigation identified the following contaminated media at the Site.

- Urban Fill – Soils contain various polycyclic aromatic hydrocarbons (PAH), metals and pesticide at concentrations exceeding the UUSCO in shallow soils with a few exceedances of the UUSCO in deeper soils.
- Former Gasoline UST Area - Grossly contaminated soils remain around the foundation features along the 21st Street side of the Site. Contaminants associated with this area include benzene, ethylbenzene, toluene and xylenes (BTEX) and methyl tert-butyl

ether (MTBE). Soils contain BTEX and MTBE at concentrations exceeding the unrestricted use soil cleanup objectives (UUSCO).

- Boring location SB-1/monitoring well FLS-1 – Soils contain 2-methylnaphthalene at concentrations exceeding the protection of groundwater soil cleanup objectives (PGSCO) and copper at a concentration exceeding the commercial use soil cleanup objectives (CUSCO). A petroleum-like sheen was also observed on groundwater in monitoring well FLS-1.
- Boring location SB-5 – Soil contains benzene at a concentration exceeding the UUSCO and PGSCO in the groundwater smear zone.
- Boring location SB-9 – Soils contain benzo(a)pyrene and dibenzo(a,h)anthracene at concentrations exceeding the CUSCO in shallow soils.
- Groundwater contains BTEX and MTBE at concentrations exceeding the ambient water quality standard (AWQS) within the former UST area.
- Soil vapor samples SV-1 through SV-4 contained concentrations of gasoline related contaminants in the area of the former gasoline UST. Soil vapor location SV-4 indicated concentrations of Freon-12, ethyl acetate, methylene chloride, methyl ethyl ketone and toluene at concentrations several orders of magnitude above the laboratory method detection limits. Methylene chloride in SV-4 exceeded the NYSDOH Soil Vapor Intrusion (SVI) Guidance Decision Matrix value.
- Indoor air did not contain any contaminants in exceedance of the New York State Department of Health (NYSDOH) Air Guidance Values (AGV).

Qualitative Human Health Exposure Assessment

No exposure pathway to the soil and groundwater contamination currently exists. Soil vapor intrusion could lead to exposure of sub-slab soil vapor contamination at the Site. The results from this Remedial Investigation indicate that the contaminants in soil vapor and indoor air do not require further action as there were no concentrations of compounds exceeding the DOH SVI Guidance Decision Matrix. Based upon this information, there will be no exposure pathway to the contaminants until the commencement of remediation activities at the Site.

A Health and Safety Plan (HASP) will address the excavation of the petroleum-contaminated soil and the air monitoring for potentially harmful vapors in the vicinity of the excavation and construction personnel. This CHASP addresses the following:

- Dust and odor control during excavation and construction activities;
- Construction and maintenance of a safety fence and gates along with adequate guard service to prevent unauthorized entrance to the Site;
- Community Air Monitoring Program for dust and vapors;
- Truck wash station and tracking pad for removal of loose soil prior to return to city streets;
- Site maintenance to keep perimeter areas around the outside of the site clean.

During the excavation of the soil and the early construction phases, there will be limited potential exposure to contaminants due to the adherence to the CHASP. After the excavation and proper removal of the petroleum-contaminated soil, there should be no potential for exposure to the public and onsite personnel to petroleum related contaminants. Once constructed, the engineered composite cover consisting of a permanent concrete cap (i.e., the foundation), asphalt and/or one foot of acceptable soil (i.e., soil that complies with the use-based SCO in 6 NYCRR Table 375-6.8(b)) will create a permanent physical barrier between the remaining urban fill and building occupants.

Summary of the Remedy

A Track 2 cleanup utilizing the CUSCOs will apply to the portion of the building receiving a new building slab and foundation features. A Track 4 cleanup will be conducted in the area of the Site in which the existing building slab will remain in place. If a Track 2 is not achieved for the new slab portion of the Site, the entire Site will revert to a Track 4 Cleanup. Figure 17 depicts the proposed Track 2 and Track 4 areas. The Track 2 area will have a passive sub-slab depressurization system (SSDS) installed under the portion of the building receiving new slab. The Track 4 area will have additional sub-slab soil vapor samples collected prior to construction with the analytical results provided to NYSDEC and NYSDOH for review. If any of these additional samples detect elevated concentrations in sub-slab soil vapor, a retrofitted SSDS will be designed and installed during construction. The Track 2 area will have approximately 3,160 cubic yards of soil removed from the Site including approximately 10 inches to 24 inches of soils removed for the installation of a SSDS. Also included are four hotspot excavations consisting of: the former underground storage tank and pump island area, SB-1, SB-5 and SB-9. These areas will be excavated to approximately 10 feet below grade surface to remove grossly contaminated soil. This remedy has been selected by the Volunteer as it will remove source material impacting the groundwater and soil vapor quality on Site. This approach will achieve protection of public health and the environment for the intended use of the property and allows for the occupation of the building by future tenants. The selected remedy will achieve all of the remedial action objectives established for the project and addresses applicable standards, criteria and guidance values (SCG). The selected remedial action alternative is effective in both the short-term and long-term and reduces, if not eliminates mobility, toxicity and volume of contaminants within the Site boundaries.

Land use at the Site will continue to be limited to commercial and industrial uses, as otherwise permitted by city zoning regulations. The preferred remedial action alternative is cost effective and implementable within an acceptable time frame. The selected remedy uses standards methods that are well established in the industry. Engineering and institutional controls will be included as part of the proposed Track 2 and Track 4 remedies.

The Track 2 cleanup will apply to the portion of the building receiving a new building slab and foundation features. A Track 4 will be applied to the portion of the building where the building slab will remain in place. If a Track 2 is not achieved for the new slab portion of the Site, the entire Site will revert to a Track 4 Cleanup. The selected remedial approach is depicted on Figures 14 and 17. The soil volume to be removed under this track cleanup is estimated at 3,160 cubic yards. Limited dewatering will be required to accommodate excavation of soils below the water table. The following summarized the key components of the selected Site remedy:

1. Site mobilization involving site security setup, equipment mobilization, utility mark outs and marking excavation areas;
2. Performance of a Community Air Monitoring Program (CAMP) for particulates and VOCs during invasive work;
3. Screening for indications of contamination (by visual means, odor, and monitoring with PID) of all excavated soil during any intrusive Site work;
4. Removal of approximately 778 cubic yards of soil contamination (i.e., grossly contaminated soil), to the extent practicable, through hotspot excavation in the former gasoline UST area. Impacted foundation elements will also be removed. Estimated depth of excavation is 10 feet;
5. Removal of the top 2 feet of urban fill in the new slab portion of the Site;

6. Soil excavation to accommodate the installation of new foundation features (i.e. pile caps, mat slab, elevator pits) and utilities throughout the Site;
7. Hotspot excavation of 93 cubic yards of fill material containing contaminants above the PGSCO/CUSCO (soils around SB-1, SB-5 and SB-9) within the new slab portion of the Site to below Track 2 levels. Estimated depth of excavation is 10 feet;
   a. SB-1/FLS-1 - Hotspot removal of soils that contain copper at a concentration exceeding the CUSCO. Removal of any grossly contaminated soils related to the observed sheen.
   b. SB-5 – Hotspot removal of soils that contain benzene at a concentration exceeding the UUSCO and PGSCO in the groundwater smear zone.
   c. SB-9 – Hotspot removal of soils that contain benzo(a)pyrene and dibenzo(a,h)anthracene at concentrations exceeding the CUSCO.
8. Construction and maintenance of an engineered composite cover consisting of a concrete cap, asphalt and/or one foot of acceptable soil to prevent human exposure to soils to remain on Site. These soils contain contaminants exceeding the UUSCO;
9. Construction and maintenance of a passive SSDS under the new building slab section of the building to prevent human exposure to potential residual soil vapor contamination;
10. Additional evaluation of sub-slab soil vapor quality under the existing building slab to remain to determine the need for potential mitigation. If NYSDEC and NYSDOH determine mitigation is required for this area based on additional samples to be collected before construction, FLS will provide design details for installation of a retrofitted SSDS, as prior to construction;
11. Recording of an Environmental Easement, including Institutional Controls, to prevent future exposure to any residual contamination remaining at the Site, require periodic certification of the remedy, restrict the use of groundwater as a source of potable or process water, allow commercial/industrial use, and require compliance with the SMP. (A copy of a draft Environmental Easement is provided in Appendix E.);

12. Restriction on the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYCDOH, and restriction on the installation of wells with the exception of environmental monitoring wells.

13. Publication of a Site Management Plan (SMP) for long term management of residual contamination as required by the Environmental Easement, including plans for: (1) Institutional and Engineering Controls, (2) monitoring, (3) operation and maintenance and (4) reporting. The SMP will describe quarterly groundwater monitoring to be conducted at the Site. Analytical results of this quarterly groundwater monitoring will be evaluated to determine if residual groundwater contamination remains and requires further groundwater remediation. If necessary, in-situ treatment of on-site groundwater will be implemented within two years of source removal;

14. All liquids to be removed from the Site, including dewatering fluids, will be handled, transported and disposed in accordance with applicable local, State, and Federal regulations. Liquids discharged into the New York City sewer system will be addressed through approval by NYCDEP;

15. Collection and analysis of end-point samples to evaluate the performance of the remedy with respect to attainment of SCOs proposed in the Track 2 remedy;

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

17. Import of materials to be used for backfill in compliance with: (1) the requirements for the identified site use as set forth in 6 NYCRR Part 375-6.7(d), including, but not limited to, the backfill may not exceed the lower of protection of groundwater or commercial use soil cleanup objectives set forth in Table 375-6.8(b); (2) All Federal, State and local rules and regulations for handling and transport of material;

18. All responsibilities associated with the Remedial Action, including permitting requirements and pretreatment requirements, will be addressed in accordance with all applicable Federal, State and local rules and regulations.

Remedial activities will be performed at the Site in accordance with this NYSDEC-approved RAWP and the Department-issued Decision Document. All deviations from the RAWP and/or Decision Document will be promptly reported to NYSDEC for approval and fully explained in the Final Engineering Report (FER).

1.0 INTRODUCTION

The Volunteer, 510 West 22nd Street Partners, LLC, entered into a Brownfield Cleanup Agreement (BCA) with the New York State Department of Environmental Conservation (NYSDEC) in April 2013, to investigate and remediate a 0.45 acre, 19,750 square feet (sq. ft.), property located at 511 West 21st Street in the County of New York, New York (Site). The developer, 510 West 22nd Street Partners, LLC is a Volunteer in the Brownfield Cleanup Program. The property use will remain commercial in accordance with the local zoning designation.

The proposed development plan is to renovate the existing building, including installation of new foundation elements and construction of five additional floors. When renovations and construction of the additional floors are completed, the Site will contain a commercial use 10-story building with retail usage at the ground level and additional commercial lease space in the upper nine floors. The mechanical rooms and building lobby will be located on the ground level. Refer to the Brownfield Cleanup Program (BCP) application for additional details.

This Remedial Action Work Plan (RAWP) summarizes the nature and extent of contamination as determined from data gathered during the Remedial Investigation (RI), performed in December 2013 with follow-up sampling in January and June 2014, and serves as a remedial design document. It provides an evaluation of a Track 1 cleanup and other applicable Remedial Action alternatives, their associated costs, and the recommended and preferred remedy. The remedy described in this document is consistent with the procedures defined in DER-10 and complies with all applicable standards, criteria and guidance. The remedy described in this document also complies with all applicable Federal, State and local laws, regulations and requirements. The NYSDEC and New York State Department of Health (NYSDOH) have determined that this Site does not pose a significant threat to human health and the environment. The RI for this Site did not identify any fish and wildlife resources.

1.1 SITE LOCATION AND DESCRIPTION

The Site is located in the Borough of Manhattan, New York City, New York and is identified as Block 693 Lot 23 on the New York City Tax Map. A United States Geological Survey (USGS) topographical quadrangle map (Figure 1) shows the Site location. The Site is situated on an approximately 0.45-acre area bounded by West 22nd Street to the north, West 21st Street to the south, The High Line (NYC Park) to the east, and buildings to the west.

The subject property is a 19,750-sq. ft. parcel of land that is developed with an L-shaped 5-story parking garage building with no basement level. Constructed in 1918/19 as a 2-story parking garage building, the building was gutted to its load bearing walls and reconstructed as a 5-story building in 1989. Time Warner occupied the building from 1991 to 2008 and used the building for vehicle parking, storage, vehicle maintenance, and offices. Time Warner vacated the building in 2008 and the building has remained vacant since that time.

1.2 CONTEMPLATED REDEVELOPMENT PLAN

The Site is intended to be renovated as a mixed-use commercial project with ground floor retail along the 21st and 22nd Street sides. The first floor of the building will be utilized predominantly for retail tenancy and will also include the main lobby entrance for commercial tenants residing on the upper floors as well as the building's mechanical rooms. Five additional floors are to be constructed upon the existing 5-story building. The Volunteer will be removing a large portion of the existing building slab and replacing a substantial portion of the building foundation elements as part of the new development plan. The building slab and most of the foundation elements in southwestern portion of the Site will remain as per NYCDOB requirements. A development plan depicting the proposed renovation is included as Figure 3.

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

1.3 DESCRIPTION OF SURROUNDING PROPERTY

The Site is located on the north side of West 21st Street and the south side of West 22nd Street between 10th Avenue and 11th Avenue in Manhattan, New York. The property has frontage on the north side of West 21st Street and the south side of West 22nd Street. The surrounding properties consist of multiple-story commercial buildings. The neighboring properties are described below.

- **North**: West 22nd Street followed by a 4-story apartment building with a ground floor retail unit and a 6-story apartment building with ground floor art galleries. Further north are multiple-story residential and office buildings, some with ground floor retail units and art galleries.

- **South**: West 21st Street followed by an 8-story public storage building. Further south are multiple-story office and warehouse buildings.

- **East**: The elevated High Line Park and a paved parking lot. Beyond the Highline is a 1-story church with an adjoining 4-story school/rectory (Guardian Angel School), a 5-story apartment building, and a 4-story apartment building. These buildings are located along the west side of 10th Avenue.

- **West**: A 2-story art gallery building followed by multiple-story office, warehouse, and art gallery buildings. Further west is 11th Avenue, the Chelsea Piers recreational complex and Hudson River Park followed by the Hudson River.

The Guardian Angel School (Grades K through 8) is a sensitive receptor identified within the immediate vicinity of the Site.

1.4 SITE HISTORY

FLS reviewed available documentation on historical environmental investigations at the Site, including:

- Phase I and II Environmental Site Assessments
  - Phase I Environmental Site Assessment, prepared by AKRF, Inc., May 2007;
  - Phase II Subsurface Investigation, prepared by AKRF, Inc., August 2008;
  - Phase I Environmental Site Assessment, prepared by FLS, November 2011.
- Site Investigation and UST Closure Reports under NYSDEC Spills Program
  - UST Closure/Remedial Action Report, prepared by LBG, April 2008;
  - Geotechnical Engineering Investigation, prepared by Pillori Associates, May 2008;
  - Selected Quarterly Groundwater Monitoring Reports, prepared by LBG from 2008 through December 2012;

- Remedial investigation under NYSDEC BCP
  - Remedial Investigation Report prepared by FLS, October 2014.

1.4.1 Past Uses and Ownership

The Site consists of an L-shaped, 19,750-square foot, parcel of land that is currently developed with a 5-story parking garage building constructed at street grade. Constructed in 1918-19 as a 2-story parking garage building, the building was gutted to its load bearing walls and reconstructed as a 5-story building in 1989. Time Warner, a television cable provider, signed a lease for the Site in 1988 and occupied the building from 1991 to 2008. Time Warner used the building for vehicle parking, storage, vehicle fueling and maintenance, and offices. Time Warner vacated the building in 2008 and it has remained vacant since that time. The Volunteer, 510 West 22nd Street Partners, LLC, purchased the Site in January 2012.

1.4.2 Previous Environmental Investigations

AKRF Phase I Environmental Site Assessment, May 2007

The following recognized environmental conditions were identified in the 2007 Phase I Environmental Site Assessment (ESA). The only remaining AOCs:

- Active NYSDEC Spill #00-10394 was opened at the Site when contamination related to on-Site underground storage tanks was discovered in 2000. Subsequent investigations found petroleum compounds (BTEX and MTBE) in the soil and groundwater at the Site at concentrations exceeding the regulatory standards. Time Warner is the responsible party for the NYSDEC Spill.
- Twenty-four petroleum release incidents have been reported in the vicinity of the Site, several of which caused regional contamination of soils and groundwater and resulted in significant amounts of free petroleum product in offsite monitoring wells not affiliated with this Site.
- The former Consolidated Edison West 18th Street Gas Works site caused extensive contamination of soil and groundwater from manufactured gas plant wastes and petroleum.

Due to the down gradient and cross gradient location of the former gas works, it is unlikely to have affected the environmental conditions on the Site.

- The Site storage areas contained two 275-gallon aboveground storage tanks that were observed to be in good condition at the time of the inspection. Small leaks and spills from auto repair activities were captured by an oil water separator beneath the floor slab in the northern section of the building.

AKRF Phase II Subsurface Investigation, August 2008

AKRF conducted a Phase II investigation in July 2008, consisting of the advancement of 10 soil borings and the collection of 18 soil and 6 groundwater samples. Gasoline related VOCs were detected in soil samples at concentrations exceeding regulatory standards, in 5 of the 18 soil samples mostly at the soil-water interface. Based on the distribution and concentrations, AKRF concluded that the VOCs detected beneath the southern portion of the building appeared to be attributable to the known on-site spill of MTBE-containing gasoline.

Shallow soils composed of urban fill contained SVOCs consisting of polycyclic aromatic hydrocarbons (PAHs) and metals at concentrations exceeding cleanup standards. The PAHs and metals are indicative of urban fill encountered in New York City. Therefore, AKRF concluded that the nature and levels of the SVOCs and metals detected on-Site are likely attributable to the presence of urban fill beneath the Site.

Gasoline related VOCs were detected in all of the groundwater samples at concentrations exceeding the NYSDEC Class GA Ambient Water Quality Standards (drinking water standards). One SVOC, bis(2-ethylhexyl)phthalate was detected in one of the groundwater samples at a concentration exceeding the regulatory standard. Metals were detected in filtered groundwater samples at concentrations that exceeded their respective standards.

Overall, AKRF concluded that gasoline contamination from on-Site Spill# 00-10394 remains in the southern portion of the Site, and may be migrating off-Site in groundwater. Additional petroleum contamination, either from historical on-Site gasoline storage tanks or from off-Site spills, was discovered in the northern portion of the Site. The Site is underlain by urban fill, which contains SVOCs and metals.

LBG UST Closure/Remedial Action Report, April 2008

The environmental contractor under contract with Time Warner, LBG, observed the removal of two 4,000 gasoline USTS, associated gasoline dispensers/piping, a 550-gallon waste oil UST, an oil-water separator connected to the waste oil UST, and two aboveground storage tanks from the Site between September 2007 and February 2008 by Tradewinds Environmental, Inc. and LBG. The two 4,000-gallon gasoline USTs with associated dispenser were located on the 21st Street side of the Site and the 550-gallon waste oil UST with a connected aboveground oil-water separator and the two ASTs were located on the 22nd Street side of the Site.

All contaminated soils associated with the two 4,000 gasoline USTs that could be excavated without compromising the building's structural elements were removed and disposed of off-site. According to the closure report, no soil contamination was observed in the shallow soils that would indicate possible piping leaks. Evidence of free product was noted around the foundation footings and was removed to best of their ability using sumps to skim the product. Gross contaminated soils was left in place within the vicinity of the structural piles and foundation curtain walls along 21st Street located due to concerns of undermining the structural integrity of the building. The gasoline UST excavation was backfilled with pea gravel to aid in future application of chemical oxidants.

Chemical oxidants were applied to the gasoline impacted soil after excavation and two test pits were excavated to examine soil conditions near the south foundation wall and gravel was placed at the bottom of these test pits to allow for additional oxidizing chemicals to be added in the future. Remediation sumps were installed in the test pit area.

LBG also advanced three soil borings on the Site and installed two groundwater monitoring wells (one onsite and one offsite) in February 2008 to supplement the three wells previously installed onsite and in the sidewalk along 21st Street in connection with Spill # 00-10394.

Quarterly groundwater monitoring at the Site by LBG began during March 2008. At the request of the NYSDEC, three additional monitoring were installed in the southern portion of the Site during 2010. The groundwater monitoring reports continue to document the presence of MTBE and BTEX in the groundwater at the Site at elevated concentrations. The BTEX and MTBE concentrations are generally greatest in the downgradient wells closest to the former location of the gasoline USTs. The average concentration of BTEX and MTBE in all existing wells decreased over time following the oxidant application.

LBG's most recent groundwater monitoring report from the 3rd quarter of 2012 describes the results of groundwater sampling to evaluate the effects of the 2 rounds of chemical oxidation injections performed at the Site in late 2011 and early 2012. The two rounds of injections were performed due to rebounding concentrations of BTEX and MTBE since mid-2010. During the late 2011 and early 2012 events a slurry mix of RegenOx® and Oxygen Release Compound Advanced® was injected into the saturated zone at and beneath the water table in the southern-central portion of the Site during each round. LBG's evaluation of the results from the 2nd quarter of 2012 groundwater monitoring states that the injections were successful in mobilizing residual VOCs into the dissolved phase thereby making them available to react with the slurry mix and slowly reducing the concentrations within the remaining gross contaminated soils. However, the evaluation also states that continued groundwater monitoring is necessary to ensure the effectiveness of the injections, and discusses the likelihood of additional future injections and soil excavation, indicating that remediation of soil and groundwater at the Site was not yet completed. LBG ceased groundwater injections and monitoring likely at the behest of Time Warner shortly after 510 West 22nd Street Partners, LLC acquired the Property. Responsibility for the closure of the open NYSDEC Spill Case remains with Time Warner.

FLS Phase I ESA, November 2011

A Phase I ESA was prepared for the Site by FLS in November 2011 on behalf of 510 West 22nd Street Partners, LLC. The FLS Phase I ESA identified the following recognized environmental conditions (RECs):

- The open NYSDEC Spill #0010394 on the Site;
- The historical Sanborn Fire Insurance maps show 11 properties with underground gasoline tanks in the vicinity of the Site. The adjacent property to the west of the subject property at 521-529 West 21st Street is listed on the NYSDEC Spills Database as an active spill site for the release of gasoline and fuel oil to the soil and groundwater. This is considered a REC that could potentially impact the Site.

Upon purchasing the Site the *Volunteer* entered into the NYSDEC BCP through the execution of the April 2013 BCA. The findings of the RI conducted by FLS between December 2013 and June 2014 are summarized in the following sections.

1.5 GEOLOGICAL CONDITIONS

1.5.1 Geology

The Site is approximately 11-ft. above mean sea level. In general, the surface topography in the vicinity of the Site gently decreases in elevation to the west, toward the Hudson River. According to the Pillori Associates Geotechnical Investigation (May 2008), the Site is underlain by a shallow layer of urban fill followed by historic fill and native soils. The native soils beneath the fill layer consist of organic silty clay of estuarine origin as well as sand and silt of glacial origin. The depth-to-bedrock varies from approximately 33 ft-bgs at the northern end of the Site to 65 ft-bgs at the southern end of the Site. Published geologic data indicates that the Site is underlain with mica schist that is known as the Manhattan Schist. The Manhattan Schist is a mass of metamorphic rock covering the deeper limestone stratum, which is the firm bedrock providing the foundation for New York City's skyscrapers.

1.5.2 Hydrogeology

The depth-to-groundwater at the Site is approximately 6 to 7 ft-bgs. The monitoring wells were surveyed to accurately determine depth-to-water elevations and determine the groundwater flow direction. The local groundwater flow direction is to the southwest. Groundwater Contour Diagrams for December 2013 and June 2014 are provided as Figures 11 and 12.

2.0 DESCRIPTION OF REMEDIAL INVESTIGATION FINDINGS

The Site was investigated in accordance with the scope of work presented in the NYSDEC-approved Remedial Investigation Work Plan (RIWP) dated October 2013. The investigation was conducted in December 2013 with additional groundwater sampling in January and June 2014. The Remedial Investigation Report (RIR) was submitted to NYSDEC in October 2014 and approved by NYSDEC in October 2014.

2.1 SUMMARY REMEDIAL INVESTIGATIONS PERFORMED

The recent remedial investigation (RI) sampling completed at the Site by Fleming Lee-Shue, Inc. (FLS) involved the collection of soil, groundwater and soil vapor samples. In general, the sample locations were targeted toward specific areas of concern identified from site observations and a review of available historic information. A lesser number of samples were obtained for general characterization purposes. The sampling methodology was performed in a manner that was consistent with the RIWP. As part of the RI, data collected from previous Site investigations was confirmed and further investigated as needed to fill in data gaps.

2.1.1 Borings and Wells

A total of 14 soil borings were drilled and sampled as part of the RI activities conducted in December 2013. The soil boring locations are depicted on Figure 2. Six groundwater monitoring wells existed at the Site prior to the initiation of the RI activities. FLS installed an additional four groundwater monitoring wells, designated FLS-1 through FLS-4. Three monitoring wells are located in the public sidewalk on the north side of 21st Street. All monitoring well locations are depicted on Figure 2. A total of four sub-slab soil vapor probes were installed during the RI activities. The sub-slab vapor probe locations are depicted on Figure 2.

2.1.2 Samples Collected

Two soil samples were collected from each soil boring: one from below the concrete slab (0-2 ft-bgs) except where noted and another either from the depth exhibiting the highest reading on the photoionization detector (PID) or from the soil/groundwater interface. A total of 28 soil samples were collected for analysis.

Groundwater samples were collected during three sampling events: December 2013, January 2014 and June 2014. Ten groundwater samples were collected during the December 2013 event from both the newly installed monitoring wells (FLS-1 through FLS-4) and those installed prior to the FLS RI activities (MW-5 through MW-10). Confirmatory groundwater samples were collected and analyzed in January 2014 from the four new wells, FLS-1 through FLS-4. As requested by the NYSDEC a full round of groundwater samples were collected from all monitoring wells onsite as well as offsite during the June 2014 sampling event.

A total of four sub-slab soil vapor samples were collected for analysis. Additionally, one ambient indoor air sample was collected from within the building at the Site.

2.1.3 Chemical Analytical Work Performed

The soil and groundwater samples collected during the December 2013 RI sampling event were analyzed for the following parameters:

- Target compound list (TCL) volatile organic compounds (VOC) plus 10 tentatively identified compounds (TICs) by EPA Method 8260;
- TCL semi-volatile organic compounds (SVOC) plus up to 20 TICs by EPA Method 8270;
- Target analyte list (TAL) metals including cyanide by EPA Method 6010C/7471B; and
- Polychlorinated biphenyls (PCBs) and pesticides by EPA Methods 8082 and 8081.

The four groundwater samples collected during the January 2014 RI sampling event were analyzed for the following parameters:

- TCL VOCs plus 10 TICs by EPA Method 8260,
- TAL metals by EPA Method 6010C/7471B.

The thirteen groundwater samples collected during the June 2014 RI sampling event were analyzed for the following parameters:

- TCL VOCs plus 10 TICs by EPA Method 8260, The sub-slab soil vapor and ambient indoor air samples collected in December 2013 during the RI were analyzed for:

- VOCs via EPA Method TO-15.

2.1.4 Remedial Investigation Findings

A sheen was observed on purged groundwater in FLS-1 while measuring groundwater levels. As a result a spill was called in to the NYSDEC Spills Hotline (Spill No. 1309055) on December 17, 2013. The spill was subsequently closed on the same day as there was already a spill on the Site (Spill No. 0010394). No sheen was observed in any of the other monitoring wells.

Of the 14 soil borings sampled, only soil in four borings yielded PID readings of 15 ppm or more. Those soil borings are SB-1, SB-2, SB-5 and SB-9, and the maximum PID reading was 423 ppm in SB-9, which is the closest soil boring to the former UST area.

Soil Analytical Results

The soil analytical results were compared to 6 NYCRR Table 375-6.8(a) Unrestricted Use Soil Cleanup Objectives (UUSCO), 6 NYCRR Table 375-6.8(b) Commercial Use Soil Cleanup Objectives (CUSCO) and Protection of Groundwater Soil Cleanup Objectives (PGSCO) listed in Table 1.

Approximately 75% of all soil analytical results that exceeded the UUSCO values are common contaminants typically associated with urban fill and were identified in the shallow soils. Deeper soil samples collected within the groundwater smear zone contained a few contaminants related to urban fill exceeding the UUSCO. The few VOCs identified in soils at concentrations above the UUSCO were collected from deep soils in the ground water smear zone and are associated with the gasoline UST release and not typically found in urban fill. Table 4 summarizes the RI soil data by chemical compound, sample depth and values exceeding the UUSCO and CUSCO. Tables 5 through 8 provide a summary of the soil analytical results. Figure 4 through 7 depict the soil sample locations and exceedance of the SCOs by contaminant class. The following provides a summary of the analyses:

- Five of the 28 soil samples contained VOCs at concentrations that exceeded the UUSCOs. Most of the VOC samples also exceeded their respective PGSCOs which is the same value as the UUSCO with exception of total xylenes which has a higher PGSCO value. These were methylene chloride, benzene, toluene, ethylbenzene and total xylenes (BTEX). Methylene chloride is a common lab contaminant. None of the analytical results exceeded the CUSCO for VOCs.

- Six of the 28 soil samples analytical results contained SVOCs at concentrations that exceeded the UUSCOs. The samples with elevated SVOCs were all collect from the shallow soils. A few of the compounds that exceeded their respective UUSCO also exceeded their respective PGSCO. Four of the 28 sample analytical results contained SVOCs at concentrations that exceeded the CUSCO.

- Each of the shallow soil samples contained at least one metal analyte at concentrations that exceeded the UUSCOs. Two of the deep soil samples analyzed contained metal analytes at concentrations that exceeded the UUSCOs. The metal analytes that were detected at concentrations exceeding the UUSCOs included lead, mercury, copper, zinc, cadmium and silver. Three of the shallow soil samples exceeded both the UUSCO and PGSCO for mercury. Copper was identified in one shallow sample at a concentration exceeding the CUSCO.

- No PCBs were detected at concentrations that exceeded the laboratory method detection limits in any of the soil samples.

- Six of the 28 soil samples taken from the top 5 ft-bgs of soil contained the pesticide 4,4-DDT at concentrations that exceeded the UUSCOs. None of the 4,4-DDT detections exceeded the PGSCOs or CUSCOs.

Groundwater Analytical Results

The groundwater analytical results were compared to the NYSDEC Division of Water Technical and Operational Guidance Series (TOGS) Ambient Water Quality Standard (AWQS) listed in Table 2. Table 9 provides a summary of the RI findings. Tables 10 through 13 summarize the groundwater analytical results. Figures 8 through 10 depict the groundwater sample results with compounds exceeding the AWQS.

- Seven of the 10 groundwater samples collected in December 2013 contained VOCs at concentrations that exceeded the AWQS. Five of 13 groundwater samples collected in June 2014 contained VOCS at concentrations that were above the AWQS. Of the four newly installed monitoring wells, groundwater samples from three (FLS-1, FLS-2 and FLS-4) contained one or more of the gasoline related compounds, BTEX and isopropylbenzene, at concentrations exceeding AWQS. Chloroform, a common laboratory contaminant, was also detected in FLS-4 at a concentration above the AWQS. The highest concentrations of BTEX as well as methyl tertiary-butyl ether (MTBE) were in samples from MW-10, MW-7 and GFMW-1 which are within or immediately downgradient of the former gasoline UST excavation.

- Only one SVOC (2,4-Dimethylphenol) was detected at a concentration that exceeded the regulatory standards in three of the 10 groundwater samples. No other SVOCs were detected above regulatory standards in any of the groundwater samples.

- The metals sodium, manganese, aluminum, selenium and arsenic were identified in the unfiltered samples at concentrations that exceeded the regulatory standards.

- No PCBs or Pesticides were detected at concentrations that exceeded the laboratory detection limits in any of the groundwater samples, except for heptachlor epoxide which was detected, but at a concentration that was below the standard.

Indoor Air and Sub-Slab Soil Vapor Analytical Results

Indoor air and sub-slab soil vapor analytical results were compared to the NYSDOH 2006 Soil Vapor Intrusion Guidance. Table 14 summarizes the analytical results of indoor air and sub-slab soil vapor samples. Figure 2 depicts the locations of the indoor air sample and four sub-slab soil vapor samples. The analytical results did not identify any VOCs at concentrations exceeding the NYSDOH air guidance values for either of the analytes identified in the indoor air sample. The NYSDOH 2006 Soil Vapor Intrusion Guidance Decision Matrix suggests that no further action is needed for indoor air and sub-slab soil vapor based on the analytical results.

2.2 SIGNIFICANT THREAT

The NYSDEC and NYSDOH have determined that this Site does not pose a significant threat to human health and the environment. Notice of that determination has been provided for public review. A copy of the notice is included in Appendix B.

2.3 SUMMARY OF ENVIRONMENTAL CONDITIONS

2.3.1 Conceptual Model of Site Contamination

Gasoline Related Volatile Organic Compounds

Gasoline related VOCs were detected in soils at concentrations that exceeded their UUSCO. Specifically, the source of the VOCs is linked to a release from the former gasoline. The highest remaining VOC concentrations in soils are found in soils below the former gasoline pump islands located in the southern portion of the Site along West 21st Street. Based on the post excavation sampling conducted by LBG on behalf of Time Warner during the UST removal, impacted soils remain around these foundation elements within the former pump island area and were left in place due to the possibility of compromising the structural integrity of the building. According to LBG some of the concrete UST vault was also left in place due to structural concerns. These areas of impacted soils are likely the source contributing to concentrations of VOCs at concentrations exceeding their respective AWQS in groundwater samples from monitoring wells MW-7, MW-8 and MW-10. These monitoring wells are located within and downgradient of the UST excavation area. The VOCs identified in groundwater in the vicinity of the gasoline UST include BTEX and MTBE.

The most recent groundwater data contained benzene, toluene and MTBE, at concentrations that exceed the AWQS in samples from the monitoring wells MW-6 and GFMW-1, immediately downgradient of the UST area, but no analytes exceeding the AWQS in the sample from GFMW-2 located in the sidewalk immediately downgradient of the suspected source area. There were no analytes present at concentrations exceeding the AWQS in the side gradient monitoring well, MW-5, or in the monitoring wells, FLS-3 and FLS-4, located immediately upgradient of the UST area. The groundwater samples from monitoring wells, FLS-1 and FLS-2, further upgradient contained low concentrations of BTEX slightly exceeding the AWQS. No MTBE has been detected in these upgradient monitoring wells. The low levels of VOCs in the groundwater from the upgradient monitoring wells, FLS-1 and FLS-2, are likely attributable to residual contaminants in fill.

The distribution of VOCs concentrations in groundwater across the Site indicates that the groundwater plume is isolated to the areas immediately within and downgradient of the former UST excavation area which also contains gasoline impacted soils around the foundation features (i.e. piles, footings, etc.). The removal of the remaining gasoline impacted soils should have a direct effect in reducing concentrations of BTEX and MTBE concentrations in groundwater in this area as well as downgradient. In addition, the removal of the gross contaminated soils will remove the source of the BTEX and MTBE vapors in soil gas below the building slab.

Currently soil and groundwater impacted with VOCs do not pose a risk to the building personnel or the public as the Site is capped with the building's concrete slab. The main route of potential exposure would be to personnel involved with removal of Site soils and groundwater through dermal absorption, ingestion and inhalation.

Regional Fill

The Site is located on the former Manhattan Island shoreline with a large portion of the Site within the former banks of the Hudson River. Soils beneath the Site are composed of sands with some silt and gravel content. Building debris (i.e. concrete, brick) and ash were noted in the shallow soils. Soil samples of the shallow soils material identified contaminants typical to urban fill. These contaminants include the PAH group of SVOCs, metals and pesticides. The following contaminants were identified in fill material on the Site:

- The VOCs detected in soil within the groundwater smear zone are likely due to the grossly contaminated soils remaining around the former gasoline UST area.
- SVOCs comprised of PAHs including benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, were detected in shallow soil at concentrations above their UUSCO.
- Metals, including cadmium, copper, lead, mercury, silver and zinc were detected in shallow soil at concentrations exceeding their UUSCOs.

- The pesticide; 4,4-DDT; was detected in the shallow soil at the Site at concentrations exceeding the UUSCOs.
- No PCBs were detected in soil.

The majority of the soil samples that exceed the UUSCO are located in shallow soils. A few of the soil samples collected from shallow soils contained PAHs and copper slightly above the CUSCO. Mercury and lead were detected in deeper soils at concentrations exceeding their UUSCO. A few PAHS were identified above the PGSCOs as well. None of the urban fill related contaminants present at concentrations exceeding the UUSCO in soils were identified at concentrations exceeding the AWQS in groundwater. The fill material is currently capped by the Site building slab which provides a barrier to direct contact, ingestion and inhalation. The main route of exposure would be to personnel involved with removal of Site soils and groundwater through dermal absorption, ingestion and inhalation.

2.3.2 Description of Areas of Concern

The following AOC have been identified and investigated at this Site:

1. **Historic Fill** - Historically the Site was part of the Hudson River shoreline and has since been filled to current grade. The shallow material contains low concentrations of PAHs and metals typically found in urban fill.
2. **Gasoline USTs** – A NYSDEC Spill was recorded for discharge of gasoline from the two 4,000 gallon USTs that were located on the 21st Street side of Site. The two USTs were subsequently removed in October 2007 along with surrounding impacted soils. Additional soils were removed in January 2008 from below the pump islands. Pockets of grossly contaminated soils remained on Site around foundation elements along the 21st Street side of the building due to concern of undermining the building. VOCs associated with the gasoline subsurface discharge include BTEX, MTBE and isopropylbenzene. These chemical compounds were identified in soil and groundwater at concentrations above the NYSDEC soil and groundwater standards.
3. **Waste oil UST and associated aboveground oil-water separator** – The waste oil UST/oil-water separator were located on the 22nd Street side of Site and were removed in November 2007. No indication of a subsurface release was identified and the post-excavation sampling results were in compliance with NYSDEC standards.
4. **Monitoring well FLS-1** – During the December 2013 groundwater sampling event a petroleum-like sheen was observed on the surface of the water column in monitoring well

FLS-1, which measured about a 0.09-inch with the product level indicator. As a result, a spill was called in to the NYSDEC Spills Hotline (Spill No. 1309055) on December 17, 2013. The spill was subsequently closed on the same day as there was already a spill on the Site (Spill No. 0010394). On June 25, 2014 the monitoring wells onsite were gauged and an unmeasurable sheen was noted on the water column in FLS-1.

2.3.3 Identification of Standards, Criteria and Guidance

The analytical results from the soil samples were compared to the following NYSDEC Soil Cleanup Objectives (SCO) and are presented in Table 1.

- Unrestricted Use Soil Cleanup Objectives (UUSCOs) in 6 NYCRR Subpart 375-6(a);
- Commercial Use Site Cleanup Objectives (CUSCO) 6 NYCRR Subpart 375- 6(b);
- Protection of Groundwater Soil Cleanup Objectives (PGSCO) SCO in 6 NYCRR Subpart 375- 6(b).)

The groundwater data was compared to the Ambient Water Quality Standards (AWQS) for class GA groundwaters as listed in NYSDEC Technical Operation and Guidance Series (TOGS) 1.1.1 "Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations." The AWQS are presented in Table 2.

The soil vapor data for methylene chloride, PCE and TCE were compared to the guidance values as listed in Table 3, the NYSDOH "Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York, October 2006, revised 2013."

2.3.4 Soil/Fill Contamination

Table 4 provides a breakdown of the soil data by contaminant, depth, and compounds exceeding the UUSCO, PGSCO and CUSCO. Tables 5 through 8 summarize the analytical results from the RI soil sampling and compounds exceeding the UUSCOs, CUSCOs and PGSCOs. Figures 4 through 7 depict the location of the documented soil exceeding the UUSCOs, CUSCOs and PGSCOs. Approximately 75% of all UUSCO exceedances in soil were found in the shallow soil samples (0 to 2 ft. or 3 to 5 ft.).

Only five of the 28 soil samples analyzed had VOCs exceeding UUSCOs and PGSCOs, of which none exceeded the CUSCOs. The soil samples at SB-1 (7-9 ft.) and SB-2 (8-10 ft.) had methylene chloride concentrations of 0.457 and 0.381 mg/kg respectively. The soil sample at SB-5 (6-8 ft.) had a BTEX concentration of 1.90 mg/kg with benzene and ethylbenzene concentrations exceeding UUSCOs. Soil sampled at SB-9 (6-8 ft.) had a BTEX concentration of 28.7 mg/kg and exceeded UUSCOs in benzene, ethylbenzene and xylenes. The soil sample taken at SB-14 (8-10 ft.) had a BTEX concentration of 3.07 mg/kg and exceeded UUSCOs for benzene, toluene and xylenes. The soil sample from SB-14 (8-10 ft.) also exceeded UUSCOs for MTBE and methylene chloride with concentrations of 8.7 and 0.352 mg/kg respectively. Table 5 provides a summary of the VOC soil analytical results and Figure 4 shows the locations where contaminant concentrations exceeded the SCOs.

SVOCs were detected in seven of the 28 soil samples at concentrations exceeding the UUSCOs, six of which also contained SVOCs at concentrations exceeding the CUSCOs and PGSCOs. All of the SVOC detections were in shallow soil samples, with the exception of one deep soil sample, SB-1 (7-9 ft.). A sample collected from SB-1 contained 2-methylnaphthalene at a concentration exceeding the PGSCOs. The greatest concentration of SVOCs were detected in the soil sample taken from SB-9 (3-5 ft.), where 7 SVOCs were detected (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene). Five SVOCs (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, chrysene, and indeno(1,2,3-cd)pyrene) exceeded UUSCOs in both soil samples from SB-3 (0-2 ft.) and SB-12 (0-2 ft.). Soil sampled from SB-11 (0-2 ft.) only had four SVOCs exceeding UUSCOs (benzo(a)pyrene, benzo(b)fluoranthene, chrysene, and indeno(1,2,3-cd)pyrene, while soil from SB-6 (3-5 ft.) only had three SVOCs above UUSCOs (benzo(a)anthracene, benzo(b)fluoranthene, chrysene. Only one SVOC, indeno(1,2,3-cd)pyrene, was found to exceed UUSCOs in soil sampled from SB-14 (0-2 ft.). benzo(a)pyrene was found to exceed CUSCOs in soil samples from SB-3 (0-2 ft.), SB-9 (3-5 ft.), SB-11 (0-2 ft.), and SB-12 (0-2 ft.). The only other SVOC (dibenzo(a,h)anthracene) found to exceed CUSCOs in a soil sample was from SB-9 (3-5 ft.). benzo(a)anthracene was found to exceed PGSCOs in soil samples from SB-3 (0-2 ft.), SB-6 (3-5 ft.), SB-9 (3-5 ft.), and SB-12 (0-2 ft.). Chrysene was found to exceed PGSCOs in soil samples from SB-3 (0-2 ft.), SB-6 (3-5 ft.), SB-9 (3-5 ft.), SB-11 (0-2 ft.), and SB-12 (0-2 ft.). Table 6 provides a summary of the SVOC soil analytical results and Figure 5 shows the locations where contaminant concentrations exceeded the SCOs.

All of the shallow soil samples analyzed had at least one metal exceeding UUSCOs while only two of the deep soil samples collected had metals exceeding UUSCOs. One metal, copper, was detected in shallow soil sample, SB-1, at a concentration exceeding CUSCO. The lead concentrations exceeded UUSCOs in all shallow soil samples taken and ranged from 75.5 mg/kg to 358 mg/kg in shallow soil. The lead concentrations were 123 and 122 mg/kg in soil samples from SB-9 (6-8 ft.) and SB-11 (8-10 ft.) respectively (the only two deep soil samples where lead exceeded UUSCOs). The lead concentrations were lower in the deep soil sample than the shallow soil sample in all instances, including those samples where lead was detected at concentrations above UUSCOs in both the shallow and deep sample. Mercury exceeded UUSCOs in shallow soil in the central and southeast portions of the Site (SB-3 (0-2 ft.), SB-5 (3-5 ft.), SB-7 (3-5 ft.), SB-10 (0-2 ft.), and SB-20 (0-2 ft.). Mercury exceeded the PGSCOs in the soil samples collected from SB-9 (3-5 ft.), SB-11 (0-2 ft.), and SB-12 (0-2 ft.). Mercury was also found above UUSCOs in one deep soil sample at SB-9 (6-8 ft.). Mercury concentrations above UUSCOs ranged from 0.22 to 0.93 mg/kg except for the soil sample from SB-12 (0-2 ft.), where it was detected at a concentration of 2.7 mg/kg. Copper was detected above UUSCOs in all shallow soil samples except soil samples from SB-8 (0-2 ft.), SB-8 (3-5 ft.), SB-13 (0-2 ft.), and SB-14 (0-2 ft.). Zinc was also detected in all shallow soil samples collected except for SB-6 (3-5 ft.), SB-8 (0-2 ft.), SB-9 (3-5 ft.), SB-13 (0-2 ft.), and SB-14 (0-2 ft.). Cadmium and silver were only detected above UUSCOs in the shallow soil samples at SB-10 (0-2 ft.) and SB-5 (3-5 ft.). Table 7 provides a summary of the metals soil analytical results and Figure 6 shows the locations where contaminant concentrations exceeded the SCOs.

No PCBs were detected above laboratory detection limits in any of the soil samples collected. Six of the 28 soil samples taken exceeded UUSCOs for one pesticide, 4,4-DDT, but none exceeded the CUSCOs or PGSCOs. The only pesticide found above UUSCOs in shallow soil samples was 4,4-DDT. The samples that had 4,4-DDT above UUSCOs were collected from SB-3 (0-2 ft.), SB-6 (3-5 ft.), SB-9 (3-5 ft.), SB-10 (0-2 ft.), SB-11 (0-2 ft.), SB-12 (0-2 ft.). Table 8 provides a summary of the Pesticide and PCB soil analytical results and Figure 7 shows the locations where contaminant concentrations exceeded the SCOs.

2.3.5 On-Site and Off-Site Groundwater Contamination

The groundwater analytical results were compared to the TOGS AWQS. Tables 10 through 13 summarize the analytical results for groundwater samples collected. Figures 8 through 10 illustrate exceedances of regulatory standards in groundwater.

During the December 2013 groundwater investigation 9 of the 10 wells sampled contained petroleum-related VOCs at concentrations exceeding regulatory standards; however, only 7 of the 13 wells had exceedances during the most recent June 2014 sampling event. Petroleum-related compounds were detected in exceedance of the AWQS in samples collected from monitoring wells FLS-1 and FLS-4 during the December 2013 and January 2014 sampling events, but were not detected at concentrations exceeding the AWQS during the most recent June 2014 event. BTEX and isopropylbenzene were detected in monitoring well FLS-2 during all three sampling events at concentrations exceeding AWQS.

The greatest concentrations of VOCs were detected in groundwater samples collected from monitoring wells MW-7 and MW-10 during the first and third groundwater sampling event and GFMW-1 during third groundwater sampling event. These monitoring wells are located in the southern portion of the Site in the vicinity and down gradient of the former USTs. As documented in the LBG April 2008 UST Closure/Remedial Action Report, petroleum-impacted soils had been left in place in the vicinity of MW-7 and MW-10 due to concerns with undermining the structural integrity of the building.

Six of the nine groundwater samples collected from monitoring wells located in the southern portion of the Site contained petroleum-related compounds at concentrations exceeding the AWQS. During December 2013 sampling event, the BTEX concentrations in groundwater samples collected from the monitoring wells ranged from 25.1 µg/l (MW-6) to 7,690 µg/l (MW-10). BTEX concentrations in samples collected from these wells during June 2014 ranged from 21.1 µg/l (MW-6) to 10,133 µg/l (MW-10). Other compounds exceeding standards in samples collected from these monitoring wells include MTBE (GFMW-1, MW-6, MW-7, MW-8, MW-10) and isopropylbenzene (MW-8).

Only one SVOC (2,4-dimethylphenol) was detected above regulatory standards in three of the 10 groundwater samples that were collected during the first groundwater sampling event of this RI

(SVOCs were not analyzed during the second and third groundwater sampling event). The concentration of 2,4-dimethylphenol in ranged from 2.8 to 6.4 µg/l in the samples that exceeded standards (MW-7, MW-8, and MW-10). No other SVOCs were detected above regulatory standards in any of the groundwater samples collected.

Sodium was found above standards in all of the samples collected during the first and second groundwater sampling events (metals were not analyzed during third groundwater sampling event). Iron exceeded standards in all of the groundwater samples taken except for MW-7. Manganese exceeded standards in all of the groundwater samples taken except for MW-7 and MW-8. Selenium was found above standards in FLS-1 and MW-9, while aluminum and arsenic were found above standards only in MW-7.

No PCBs or pesticides were detected above laboratory detection limits in any of the groundwater samples collected, except for heptachlor epoxide which was detected below standards.

The second round of groundwater samples, which only included the four monitoring wells installed by FLS, confirmed that FLS-1, FLS-2, and FLS-4 had BTEX concentrations exceeding standards, with the highest concentrations located at FLS-4, the closest monitoring well to the former UST area. When compared to the first round of groundwater sampling, the results from the second round all showed lower BTEX concentrations.

The third round of groundwater samples, which included all LBG, FLS, and offsite monitoring wells, confirmed that greatest concentrations of VOCs were from the samples collected from monitoring wells MW-7, MW-10, and GFMW-1. These monitoring wells are located in the southern portion of the Site in the vicinity and down gradient of the former USTs.

2.3.6 On-Site and Off-Site Soil Vapor Contamination

A map depicting the indoor air and sub-slab soil vapor sampling locations is included as Figure 2. Table 14 summarizes the soil vapor analytical results.

Soil vapor samples SV-1 through SV-4 contained concentrations of gasoline related contaminants in the area of the former gasoline UST. Soil vapor location SV-4 indicated concentrations of Freon-12, ethyl acetate, methylene chloride, methyl ethyl ketone and toluene at elevated concentrations. Additional sub-slab soil vapor samples will be collected from this area prior to construction with the analytical results provided to NYSDEC and NYSDOH for review to delineate potential impacts and need for mitigation.

No offsite soil vapor sampling was conducted as part of the RI. Several VOCs including PCE, TCE, Freon-12, ethyl acetate, MEK and methylene chloride were detected in soil vapor samples that were not detected in groundwater or soil at the Site. BTEX and MTBE were detected in soil vapor samples and are likely due to the grossly contaminated soils within the former gasoline UST area.

2.4 ENVIRONMENTAL AND PUBLIC HEALTH ASSESSMENTS

2.4.1 Qualitative Human Health Exposure Assessment

This Qualitative Exposure Assessment was performed in accordance with Appendix 3B of DER-10. The following details the analysis of the parameters assessed and a summary of the recommendations.

Contaminant Source

Urban fill containing metals and PAHs is located in shallow soils beneath the slab. The VOC contamination in soil is located at the ground water/soil interface. The groundwater contamination is located in the southern portion of the property within the former UST area and primarily consists of gasoline related VOCs. Sub-slab soil vapor contaminants are also present in soil vapor below the slab at the Site.

Contaminant Release and Transport Mechanisms

There is currently no potential for exposure to site contamination, as the entire Site is covered by a concrete slab and vacant building. The contamination is currently located beneath an impervious surface (concrete slab).

If the impervious surface were removed from the Site during redevelopment, there could be a potential for exposure to contaminated soil, soil vapor, and/or groundwater.

Point of Exposure

The main point of exposure to the contaminants of concern would be direct contact with contaminated material. Since the entire Site is covered by a concrete slab and vacant building, there is currently no potential for direct contact with contaminated material.

Since VOC contamination in the fill layer is limited, there is only a slight potential for these VOCs to vaporize. However, the entire Site is covered by a concrete slab and the indoor air samples did not exceed any of the NYSDOH guidance values. The results from the remedial investigation indicate that the contaminants in soil vapor and indoor air do not require further action.

Route of Exposure

The main route of possible exposure for the contamination would be through direct dermal contact by construction workers during the excavation and removal of the contaminated soils. Additionally, a route of exposure would be created if excavation extends into the saturated zone. A secondary route of exposure could be inhalation of vapors and dust particles by construction workers onsite. A Community Air Monitoring Plan (CAMP) will be implemented during any intrusive work onsite to ensure proper protection of worker health and safety.

Receptor Population

The main receptor population would be the equipment operators, construction truck drivers and environmental workers (construction population) during the excavation and removal processes. The construction population will be the only individuals who will come in direct contact with the contamination, as the access to the Site would be limited to only authorized individuals during the construction of the Site. Work area monitoring would be conducted as per the health and safety Plan (HASP).

The secondary receptor population would be the individuals working in the vicinity of the project. Their exposure would be highly unlikely as proper engineering controls and safety measures including community and work area air monitoring will be implemented during the excavation and removal of debris and contaminated soil from the Site.

Conclusions

No exposure pathway to the soil and groundwater contamination currently exists. Soil vapor released during excavation of soils could lead to exposure of sub-slab soil vapor at the Site though the results from this Remedial Investigation indicate that the contaminants in soil vapor and indoor air do not require further action at their recorded concentrations. Based upon this information, there will be no exposure pathway to the contaminants until the commencement of remediation activities at the Site.

A Construction Health and Safety Plan (CHASP) will address the excavation of the petroleum-contaminated soil and the air monitoring for potentially harmful vapors in the vicinity of the excavation and construction personnel. This CHASP addresses the following:

- Dust and odor control during excavation and construction activities;
- Construction and maintenance of a safety fence and gates along with adequate guard service to prevent unauthorized entrance to the Site;
- Community Air Monitoring Program for dust and vapors;
- Truck wash station and tracking pad for removal of loose soil prior to return to city streets;
- Site maintenance to keep perimeter areas around the outside of the site clean.

During the excavation of the soil and the early construction phases, there will be limited potential exposure to contaminants due to the adherence to the CHASP. After the excavation and proper removal of the contaminated soil there should be no potential for exposure to the public and onsite personnel to petroleum related contaminants. Once constructed, the engineered composite cover consisting of a concrete cap, asphalt and/or one foot of acceptable soil will create a permanent physical barrier between the remaining urban fill and building occupants. A vapor mitigation system consisting of the concrete (foundation) portion of the engineered composite cover and a passive SSDS will be constructed beneath the new slab portion of the building. The existing slab to remain area in the southwest corner of the Site will have additional sub-slab soil vapor samples collected prior to construction with the analytical results provided to NYSDEC and NYSDOH for review. If any of these additional samples detect elevated concentrations in soil vapor, a retrofitted SSDS will be designed and installed during construction. These remedial actions ensure no exposure pathways will exist after construction.

2.4.2 Fish & Wildlife Remedial Impact Analysis

The purpose of a Fish and Wildlife Resources Impact Analysis (FWRIA) is to determine potential impacts to fish and wildlife from Site contamination. The need for a FWRIA is based on the following four criteria:

1. The remediation is directed toward a specific discharge or spill event that does not adversely impact fish and wildlife resources.

2. The areas of concern at the site consist solely of an underground storage tank(s) or an underground tank system, with no significant impact on surrounding groundwater or surface water.

3. The site is a point source of contamination to the groundwater (i.e. dry cleaner or gas station) which will be prevented from discharging to surface water, and there is no widespread soil contamination or habitat of an endangered, threatened or special concern species present.

4. There are no ecological resources present on or in the vicinity of the site, (e.g. an urban site which is not proximate to a surface water body, wetland or other ecologically significant area).

There are no fish or wildlife resources in the vicinity of the Site, nor are there any ecological resources present; therefore, there has not been and there will not be any impact to any such resources. The AOCs at the Site are associated with former USTs and urban fill. Accordingly, a FWRIA was not required.

2.5 REMEDIAL ACTION OBJECTIVES

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

2.5.1 Groundwater

RAOs for Public Health Protection

- Prevent ingestion of groundwater containing contaminant levels exceeding drinking water standards.

- Prevent contact with, or inhalation of, volatiles from contaminated groundwater.

RAOs for Environmental Protection

- Restore ground water aquifer, to the extent practicable, to pre-disposal/pre-release conditions, to the extent practicable.

- Remove the source of ground water or surface water contamination.

2.5.2 Soil

RAOs for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation of or exposure from contaminants volatilizing from contaminants in soil.

RAOs for Environmental Protection

- Prevent migration of contaminants that would result in groundwater or surface water contamination.

2.5.3 Soil Vapor

RAOs for Public Health Protection

- Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into buildings at the site.

3.0 DESCRIPTION OF REMEDIAL ACTION PLAN

The goal of the remedy selection process under the RAWP 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 their applicable standards, criteria and guidance values (SCGs). Three remedial alternatives have been considered and the evaluation process is detailed in the following sections.

3.1 EVALUATION OF REMEDIAL ALTERNATIVES

The following three remedial action alternatives both address the onsite contaminated media according to the BCP remedial approaches outlined in DER-10 and CP-51. The three remedial alternatives presented herein propose to achieve the following Tracks and are evaluated in the following sections:

- Remedial Alternative #1 – Achievement of Track 1 Cleanup for the Site;
- Remedial Alternative #2 – Achievement of Track 2 Cleanup for the new slab portion of the Site; Track 4 Cleanup for the southwestern portion of the Site;
- Remedial Alternative #3 – Achievement of Track 4 Site-Specific SCOs for the entire Site.

Remedial Alternatives #1 through 3 are presented here as part of the evaluation of possible remedies for this Site given the proposed renovation plan. The Volunteer will be replacing most of the building foundation elements to support the construction of five additional floors onto the existing building The renovation plan involves the removal of most of the building floor slab and old foundation elements which will require structural reinforcement and shoring of excavations. This will allow access to and removal of the grossly contaminated soils and dependent on the remedial approach the PAH and metals hot spots identified during remedial investigations.

The composite cover, which has been designed in accordance with NYCDOB requirements, will include a concrete cap. A small portion of the southwestern building slab and foundation elements will remain in place due to NYCDOB requirements, but will be reinforced as part of the building renovation. Limited cover and soils will be removed from this area during the renovation.

During the renovation, most of the building shell is to remain intact and remedial activities will be conducted within the building structure.

3.1.1 Remedial Alternative #1

Remedial Alternative #1 is presented for consideration in accordance with BCP guidelines. The goal of this remedial alternative is the achievement of Track 1 Cleanup as per NYSDEC DER-10 and CP-51. This remedial approach would require that any and all soils onsite that do not meet the UUSCO (6 NYCRR 375-6(a)) would be excavated and removed from the Site. This includes the excavation of any soils meeting the definition of grossly contaminated soils within the Site boundaries.

Based on current RI soil data, soils impacted with compounds above the UUSCO extend down to just above groundwater table at 5 ft-bgs with several UUSCO hotspots extending down to 8-10 ft-bgs and possibly deeper. Based on the known data and Site conditions the projected soil volume is estimated around 6,000 cubic yards or higher. Soil excavation for Track 1 Cleanup would entail the following:

- Soil excavation of source material/grossly contaminated soils from the former UST area along West 21st Street. Petroleum impacted concrete foundation elements will also be removed;
- Excavation of Site wide soils to UUSCO and PGSCO to approximately 5 ft-bgs;
- Additional hot spot soil excavation of SB-1, SB-2, SB-5, SB-9, SB-11and SB-14 to remove soils exceeding the UUSCO and PGSCO (6 NYCRR 375-6(b)) down to 10 ft-bgs or more;
- Soil removed to accommodate the installation of the new building foundation elements (i.e. mat-slab, pile caps, spread footings, etc.);

Soils volume to this depth to be removed under this cleanup approach is projected to be around 6,000 cubic yards and possibly more. This would include removing the top five feet of soils across the entire Site, the UUSCO hotspots and any grossly contaminated soils that remain within the former gasoline UST area. This volume would likely increase given expected volume of wet soils requiring the use of drying agents (i.e. lime, fly ash, etc.). A variance would need to be obtained from the NYCDOB to remove the portion of the building slab required to remain in place.

Dewatering would be required to accommodate excavation of soils below the water table which has been recorded to be 6-7 ft-bgs. Excavation of soils within the building to these depths would also entail extensive sheeting and shoring as well as structural strengthening of the building foundation elements. Underpinning would be needed to shore up the adjacent building foundations to the west and north of the building. Additional soil characterization would be required prior to initiating this remedial alternative to confirm the depth where soil quality is equal to or below the UUSCO thereby likely increasing the total soil volume and the time frame to initiate the remediation and redevelopment.

Feasibility Review – Remedial Approach #1

The following discusses the feasibility of the major components of Remedial Alternative 1:

- **Excavation** - To attain a Track 1 Cleanup any and all soils above the UUSCO (6 NYCRR 374-6(a)) and grossly contaminated soils as per 6 NYCRR 375-1.2(u) within the perimeter of the Site would be required be excavated. Given the limited work area within the building shell, excavation would need to be conducted in a manner that would not undermine the building's structural integrity or that of the adjacent buildings, sidewalks and streets. To remove impacted soils below the area where the slab is to remain would require obtaining a variance from NYCDOB to remove the slab and underlying soils. The cost to undertake the removal of this volume of soil would be the highest of the three remedial alternatives given the soil volume, excavation schedule length and logistics of removing the soils within a limited area. End point soil samples will be collected following excavation activities to confirm that applicable SCGs have been met.
- **Sheeting and Shoring** - Extensive sheeting and shoring would be required to facilitate the removal of the projected volume of soils within the confines of the building. Structural reinforcements would be required to ensure that the building structural elements, exterior building facade as well as the adjacent buildings foundations and structural elements, sidewalk, and streets are not undermined during the excavation. Removal of soils from below the southwestern slab required to remain in place as per NYCDOB would require underpinning of the floor and adjacent building. This would also require a variance from the NYCDOB. The additional excavation stabilization elements will add additional costs to design and extend the projected remediation timeframe. Unless a variance can be obtained from the NYCDOB to remove the southwestern slab these soils would have to remain in place. The costs associated with the building structural reinforcements and excavation stabilization would be the highest under this cleanup track compared to the other remedial alternatives.

- **Dewatering** - In order to remove the volume of soils at the depth projected for this cleanup track, dewatering would need to be implemented during removal of the soils below the water table. Dewatering would be required to lower the water table from its current depth of approximately 6-7 ft-bgs to 10 ft-bgs or more to reduce the water content of soils prior to excavation. In addition the removal of a large volume of groundwater may impact adjacent building foundations especially those to the west and south of the Site which are constructed on several feet of fill. Additional water treatment, dewatering system design and implementation required to meet the Track 1 cleanup would be the highest of the remedial alternatives being considered.
- **Soil management with transport off-site and disposal** – The excavated soil volume for this cleanup approach is projected to be approximately 6,000 cubic yards excavation depth. Any wet soil would be managed on-site prior to being loaded into covered trucks and transported off-site for disposal. If deemed necessary drying agents (i.e. lime, fly ash, etc.) would be added to the wet soils prior to load out. The number of trucks required to remove the large volume of soils would likely create congestion of the neighboring streets. The expected cost of the soil management, transportation, and off-site disposal work would be the highest of the remedial alternatives given the large volume of soils, management of wet soil, and limited work space within building.
- **Backfill of the excavation with certified clean fill** – The backfilling would be performed from excavation floor up to bottom of planned building foundation elements, would require to be performed as a controlled backfill in layers with sufficient compaction to achieve soil stability. A material with a high compaction rating would be required to fill up through the seasonal high water table followed by certified clean backfill material that meets the requirements for the identified site use as set forth in 6 NYCRR Part 375-6.7(d) and the geotechnical requirements for this project. The entire backfill volume would be equivalent to soil volume removed. Backfilling including compaction would increase project schedule time and increase the original projected costs for this project. Any fill material brought to the site will meet the requirements for the identified site use as set forth in 6 NYCRR Part 375-6.7(d).
- **Environmental compliance support, permitting, measurement, and project control activities -** These activities include regulatory interaction, compliance support, permitting support, laboratory analysis and measurement, engineering, and implementation and maintenance of project controls. Costs associates with carrying out this cleanup track and the additional time would be the highest of the remedial

alternatives being considered given additional permitting, structural support mechanisms, hydraulic controls, dewatering and soil management to support a large volume excavation within a confined work environment that exists at this Site.

Accomplishment of a Track 1 Cleanup at this Site would not require any institutional controls or the installation of long term engineering controls beyond those required by NYCDOB. Short term engineering controls implemented during remediation would consist of dust and odor controls and support for the excavation and building stability. The removal of onsite grossly contaminated soils and extensive dewatering would likely address groundwater contaminated with VOCs, or at least would reduce it such that any residual should naturally attenuate. If necessary, in-situ treatment of on-site groundwater will be implemented within two years of source removal.

If a Track 1 cleanup is obtained, a Site Management Plan (SMP) would not be required. The remedial components associated with Remedial Alternative #1 would result in the longest time frame to completion and highest overall project costs, as shown in Table 18. Undertaking this remedial approach would entail high risk given the danger of removing this volume of soil from within an existing 5-story building.

3.1.2 Remedial Alternative #2

Remedial Alternative #2 is presented for consideration in accordance with BCP guidelines. The goal of this remedial alternative is the achievement of Track 2 Cleanup in the area of the building in which the existing slab is to be removed and a Track 4 Cleanup in the smaller area where the existing slab to remain as per NYCDOB requirements. According to the remedial investigation findings, this approach would require the excavation of soils from the following areas:

- Soil excavation of source material/grossly contaminated soils from the former UST area along West 21st Street. Petroleum impacted concrete foundation elements will also be removed;
- Soil excavation of 0-2 ft. below existing slab grade within the new slab portion of the Site;
- Hot spot soil excavation of SB-1, SB-5, and SB-9 to remove soils exceeding the CUSCO and PGSCO (6 NYCRR 375-6(b)) within the new slab portion of the Site;
- Soil removed to accommodate the installation of the new building foundation elements (i.e. mat-slab, pile caps, spread footings, etc.);

The soil volume to be removed under this track cleanup is estimated at 3,160 cubic yards and may increase depending on the volume of wet soils requiring the use of drying agents (i.e. lime, fly ash, etc.). Limited dewatering would be required to accommodate excavation of soils below the water table.

Feasibility Review – Remedial Approach #2

The following discusses the feasibility of the major components of Remedial Alternative 2:

- **Excavation** - The costs to undertake the removal of this volume of soil would be less than those associated with attaining a Track 1 cleanup but higher than those associated with a Track 4 cleanup. Excavation under this cleanup track would take less time and would require less preparation than a Track 1 Cleanup. End point soil samples will be collected following excavation activities to confirm that applicable SCGs have been met.
- **Sheeting and shoring** - Sheeting and shoring would be required to facilitate the removal of soils within the petroleum hotspot area, but only minimal structural shoring would be required along the building perimeter given the shallow excavation depth for the remainder of the Site. The smaller hotspot excavation, which may extend beyond the water table, would likely be completed using trench boxes or other excavation stabilization techniques. These additional excavation stabilization elements will add additional costs to the remediation but are much less than those required with the Track 1 Alternative.
- **Dewatering** - Limited dewatering would need to be implemented during removal of the soils below the water table in the hotspot locations. Dewatering fluid management is projected to be minimal (less than 10,000 gallon per day) and prior to setting up a system NYCDEP approval will be attained, if required, for pretreatment prior to discharge to the city sewers through the existing building connection. If dewatering fluid volume exceeds the 10,000 gallon daily NYCDEP limit the proper permits will need to be obtained. Permitting costs, dewatering system design and implementation required to meet the Track 2 cleanup would be lower than those associated with the Track 1 cleanup alternative.
- **Soil management with transport off-site and disposal** – The excavated soil volume under this cleanup approach is projected to be around 3,160 cubic yards. Any wet soil would be managed on-Site prior to being loaded into covered trucks and transported off-site for disposal. If deemed necessary drying agents (i.e. lime, fly ash, etc.) will

be added to the wet soils prior to load out. Removal of the projected soil volume for this Cleanup Track should be manageable and not create any issues for local traffic or the neighbors. The expected cost of the soil management, transportation, and off-site disposal work would be much lower than the Track 1 cleanup given the lesser soil volume but would be higher than those costs associated with a Track 4 alternative.

- **Backfill of the excavation with certified clean fill** – The backfilling would be performed from excavation floor up to bottom of planned building foundation elements, would be performed as a controlled backfill in layers with sufficient compaction to achieve soil stability. An aggregate material with a high compaction rate will be used to fill up through the seasonal high water table followed by certified clean backfill material that meets the requirements for the identified site use as set forth in 6 NYCRR Part 375-6.7(d), including, but not limited to, the backfill may not exceed the lower of protection of groundwater or commercial use soil cleanup objectives set forth in Table 375-6.8(b) and the geotechnical requirements for this project. The cost of the backfilling including compaction and backfill volume would be higher than those required in the Track 4 alternative but lower than the backfilling costs associated with a Track 1 alternative. Any fill material brought to the site will meet the requirements for the identified site use as set forth in 6 NYCRR Part 375-6.7(d).
- **Environmental compliance support, permitting, measurement, and project control activities** - These activities include regulatory interaction, compliance support, permitting support, laboratory analysis and measurement, engineering, and implementation and maintenance of project controls. Costs associates with carrying out this cleanup track and the additional time would be the more than those associated with the Track 1 cleanup but higher than those associated with a Track 4 alternative.

Through the removal of onsite soils above the CUSCO and grossly contaminated soils and through the dewatering efforts groundwater impacts may either be fully remediated to the regulatory levels or contaminant levels in groundwater will be reduced to levels that should naturally attenuate. A post-remedial groundwater monitoring plan to be outlined in the SMP will describe quarterly groundwater monitoring to be conducted at the Site. Analytical results of this quarterly groundwater monitoring will be evaluated to determine if residual groundwater contamination remains and requires further groundwater remediation. If necessary, in-situ treatment of on-site groundwater will be implemented within two years of source removal.

The current redevelopment plan includes a composite cover system consisting of a concrete cap (foundation), asphalt and/or one foot of acceptable soil. This would provide a permanent cover for the Site and ensure that recontamination will not occur from future Site operations and eliminate contact with the fill material. The Track 2 area would have a SSDS installed under the portion of the building receiving new slab. The Track 4 area would have additional sub-slab soil vapor samples collected prior to construction with the analytical results provided to NYSDEC and NYSDOH for review. If any of these additional samples detect elevated concentrations in sub-slab soil vapor, a retrofitted SSDS will be designed and installed during construction. A SMP would be required to ensure the continued maintenance of the engineering controls and outline the groundwater monitoring plan. The remedial components associated with Remedial Alternative #2 would result in a longer time frame to completion and higher overall project costs when compared to a Track 4 cleanup.

3.1.3 Remedial Alternative #3

Remedial Alternative #3 is presented for consideration in accordance with BCP guidelines. The goal of this remedial alternative is the achievement of Track 4 soil cleanup levels as per DER-10 and CP-51. This remedial approach would entail leaving fill material containing PAHs and other contaminants above the UUSCO, CUSCO and PGSCO in place under site specific SCOs. Under this remedial approach the following soils would be removed:

- Soil excavation of source material/grossly contaminated soils from the former UST area along West 21st Street. Petroleum impacted concrete foundation elements will also be removed;
- Hot spot soil excavation of SB-1 to remove source of petroleum-like sheen identified in monitoring well FLS-1;
- Soil removed to accommodate the installation of the new building foundation elements (i.e. mat-slab, pile caps, spread footings, etc.);

A total PAH soil cleanup level of 500 ppm would be implemented under this cleanup track for all subsurface soils to remain in place as per CP-51(H). Permanent engineering and institutional controls will be implemented as required and discussed in a SMP.

The soil volume to be removed under this track cleanup is estimated at 1,495 cubic yards. The soil volume includes in the projected volume of fill material removed during the installation of the new foundation elements and the composite cover system. The volume may increase or decrease dependent on the volume of grossly contaminated soils encountered during hotspot excavation. Drying agents (i.e. lime, fly ash, etc.) will be utilized, as needed, for to dry out wet grossly contaminated media and reduce noxious odors that may be present in these soils prior to load out. Dewatering and excavation stabilization would also be required to accommodate excavation of soils below the water table in the hotspot excavation areas.

Feasibility Review – Remedial Approach #3

The following discusses the feasibility of the major components of Remedial Alternative 3:

- **Excavation** - To attain a Track 4 cleanup, grossly contaminated soils as per 6 NYCRR 375-1.2(u) within the identified hotspot areas would be removed as it presents a continued source of contamination to groundwater and soil gas. Given the limited work area within the building shell excavation would need to be conducted in a manner that would not undermine the buildings structural integrity or that of the adjacent buildings, sidewalks and streets. The hotspot excavations would need to be stabilized to allow removal of deeper grossly contaminated soils. The number of trucks required to remove this project volume of soils would be manageable The cost to undertake the removal of this volume of soil would be lower than those associated with attaining a Track 1 or a Track 2 Cleanup discussed. End point soil samples will be collected following excavation activities to confirm that applicable SCGs have been met.

- **Sheeting and shoring** – Limited sheeting and shoring would be required to facilitate the removal soils from the two hotspot locations containing grossly contaminated soils. Structural reinforcements would be limited to those that will be utilized for the installation of the planned foundation elements. Excavation beyond the water table would require stabilizing the excavation sidewalls to avoid undermining the surrounding area and building structural elements. The hotspot excavation stabilization elements will add some additional costs to design and implement but overall will be considerably less than those required under the Track 1 and 2 alternatives.
- **Dewatering** – Limited dewatering would need to be implemented during removal of the soils below the water table in the hotspot locations. Dewatering fluid management is projected to be minimal (less than 10,000 gallon per day) and prior to setting up a system NYCDEP approval will be attained, if required, for pretreatment prior to discharge to the city sewers through the existing building connection. Dewatering will also assist in the removal of groundwater impacted by the gross contaminated soils. Permitting costs, dewatering system design and implementation required to

meet the Track 4 cleanup would be lower than those associated with the Track 1 and 2 cleanup alternatives.

- **Soil management with transport off-site and disposal** – The entire excavated soil volume is projected to be about 1,495 cubic yards. Any wet soil would be managed on-site prior to being loaded into covered trucks and transported off-site for disposal. If necessary drying agents (i.e. lime, fly ash, etc.) will be added to the wet soils and gross contaminated soils prior to load out. The expected cost of the soil management, transportation, and off-site disposal work would be the lower than those associated with the Remedial Alternatives 1 and 2.
- **Backfill of the excavation with certified clean fill** – The backfilling would be performed in the hotspot areas and as part of preparing the soils for the installation of the composite cover system. An aggregate material with a high compaction rate will be used to fill up through the seasonal high water table in the hot spot locations followed by backfill material that meets the requirements for the identified site use as set forth in 6 NYCRR Part 375-6.7(d), including, but not limited to, the backfill may not exceed the lower of protection of groundwater or commercial use soil cleanup objectives set forth in Table 375-6.8(b) and the geotechnical requirements for this project. The cost of the backfilling including compaction and backfill volume would be lower than those associated with Remedial Alternatives #1 and #2. Any fill material brought to the site will meet the requirements for the identified site use as set forth in 6 NYCRR Part 375-6.7(d).
- **Environmental compliance support, permitting, measurement, and project control activities** - These activities include regulatory interaction, compliance support, permitting support, laboratory analysis and measurement, engineering, and implementation and maintenance of project controls. Costs associates with carrying out this cleanup track and the time it would take to complete the remedy would be lower than that associated with Remedial Alternatives 1 and 2.

Through the removal of grossly contaminated soils groundwater impacts may either be fully remediated to the regulatory levels or contaminant levels in groundwater will be reduced to levels that should naturally attenuate. A post-remedial groundwater monitoring plan to be outlined in the SMP will describe quarterly groundwater monitoring to be conducted at the Site. Analytical results of this quarterly groundwater monitoring will be evaluated to determine if residual groundwater contamination remains and requires further groundwater remediation. If necessary, in-situ treatment of on-site groundwater will be implemented within two years of source removal.

The current redevelopment plan includes a composite cover system consisting of the concrete slab. This would provide a permanent cover for the Site and ensure that recontamination will not occur from future Site operations and eliminate contact with the fill material. This alternative would have a passive SSDS installed under the portion of the building receiving new slab. The existing slab area to remain would have additional sub-slab soil vapor samples collected prior to construction with the analytical results provided to NYSDEC and NYSDOH for review. If any of these additional samples detect elevated concentrations in sub-slab soil vapor, a retrofitted SSDS will be designed and installed during construction. A SMP would be required to ensure the continued maintenance of the engineering controls and outline the groundwater monitoring plan.

The remedial components associated with Remedial Alternative #3 would result in the shortest project time frame and lowest costs, , as shown in Table 18. The majority of the remedial costs would be associated with the management of grossly contaminated soils and installation of the composite cover system.

3.2 REMEDIAL ALTERNATIVES EVALUATION CRITERIA ANALYSIS

The Remedial Alternatives have been evaluated with respect to the following BCP remedial selection evaluation criteria in the table below in accordance with Section 4.2(b) & (c) of DER-10.

Evaluation Criteria	**Alternative #1** Unrestricted Use	**Alternative #2** Commercial Use	**Alternative #3** Commercial Use with Site Specific SCOs
Protection of human health and the environment	Would eliminate any potential human exposure and further environmental impact to groundwater and soil gas through full removal of soils impacted above UUSCO. Achieves the RAOs.	Would reduce any potential human exposure and eliminate further impact to groundwater through removal of grossly contaminated media and top 2 ft. of urban fill impacted above the Track2 SCOs through excavation and placement of engineering controls consisting of a composite cover system including SSDS. Achieves the RAO.	Would reduce any potential human exposure and eliminate further impact to groundwater through removal of grossly contaminated media through excavation and placement of engineering controls consisting of a composite cover system including SSDS. Achieves the RAO.
Compliance with standards, criteria, and guidelines (SCGs)	Remedy would conform to SCGs. Attainment of a Track 1 cleanup using UUSCOs. Removes any requirements for engineering and institutional controls.	Remedy would conform to SCGs. A Track 2 cleanup using CUSCOs for the new slab portion of the Site and Track 4 for the portion where the slab will remain. Removes source of groundwater and soil gas contamination. Placement of engineering and institutional controls with preparation of a SMP.	Remedy would conform to SCGs. Track 4 cleanup using Site Specific SCOs for fill contaminants above the CUSCO. Utilize a total PAH approach. Remove source of groundwater contamination. Placement of engineering and institutional controls with preparation of a SMP.

Evaluation Criteria	**Alternative #1** Unrestricted Use	**Alternative #2** Commercial Use	**Alternative #3** Commercial Use with Site Specific SCOs
Long-term effectiveness and permanence	Would be effective in long term through removal of contaminated soils onsite thereby eliminating onsite impacts to groundwater and soil gas.	Would be effective in long term through removal of grossly contaminated soils and top layer of contaminated fill onsite thereby eliminating onsite impacts to groundwater and soil gas. Engineering controls would provide permanent containment of remaining impacted fill.	Would be effective in long term through removal of grossly contaminated soils onsite thereby eliminating onsite impacts to groundwater and soil gas. Engineering controls would provide permanent containment of remaining impacted fill.
Reduction of toxicity, mobility, or volume of contaminated material	Would fully remove all contaminated soils onsite including those impacting groundwater and soil gas.	Would fully remove gross contaminated soils impacting groundwater and soil gas. Removal of hotspot pockets onsite. Volume of contaminated urban fill would be reduced and remaining contaminants in fill are immobile and non-volatile, not known to impact groundwater.	Would remove gross contaminated soils impacting groundwater and soil gas from within the UST area.
Short-term effectiveness and impacts	During remedial activities potential for Site personnel to come into contact with contaminated media through dermal absorption, ingestion, and inhalation. Engineering controls including CAMP monitoring and dust and odor controls will be implemented during remedial activities.	During remedial activities potential for Site personnel to come into contact with contaminated media through dermal absorption, ingestion, and inhalation. Engineering controls including CAMP monitoring and dust and odor controls will be implemented during remedial activities.	During remedial activities potential for Site personnel to come into contact with contaminated media through dermal absorption, ingestion, and inhalation. Engineering controls including CAMP monitoring and dust and odor controls will be implemented during remedial activities.

Evaluation Criteria	**Alternative #1** Unrestricted Use	**Alternative #2** Commercial Use	**Alternative #3** Commercial Use with Site Specific SCOs
Implementability	Will be technically difficult to implement given the large volume and depth of soil to be removed, volume of dewatering fluids and structural constraints and concerns of working inside the building. Limited Site access from adjacent streets.	Will be manageable to implement given the defined hot spot excavation areas. Will have a larger area within building for staging for dewatering, soil load out/truck wash, and excavation support.	Will be manageable to implement given the overall excavation will be in isolated areas. Will have a larger area within building for staging for dewatering, soil load out/truck wash, and excavation support.
Cost effectiveness	Technically and administratively will have exorbitant costs associated with designing and carrying out this remedy due to logistics of implemented remedy within a building.	Will be cost effective as portion of costs associated with this remedy are manageable and consistent with the redevelopment plan.	Will be cost effective as portion of costs associated with this remedy are manageable and consistent with the redevelopment plan.
Land use	Remedy is consistent with commercial use.	Remedy is consistent with commercial use.	Remedy is consistent with commercial use.
Community Acceptance	The immediate area is predominantly commercial and planned Site use is consistent with current and future planned commercial use.	The immediate area is predominantly commercial and planned Site use is consistent with current and future planned commercial use.	The immediate area is predominantly commercial and planned Site use is consistent with current and future planned commercial use.

The follow SCGs have been evaluated for applicability to the Remedial Alternatives.

- 6 NYCRR Part 375-6 Soil Cleanup Objectives – This SCG item applies to the provided remedial alternatives given the soils at this inactive Site are impacted by contaminants in excess of the SCOs with some areas containing soils that meet the definition of *Grossly Contaminated Soils*.

- New York State Groundwater Quality Standards 6 NYCRR Part 703 – This SCG item applies to all the remedial alternatives because the Site groundwater is impacted in excess of NYS groundwater quality standards.

- NYSDEC Ambient Water Quality Standards and Guidance Values TOGS 1.1.1 – This SCG item applies to all the remedial alternatives because the down gradient groundwater is impacted in excess of ambient standards by onsite contaminants.
- NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation May 2010 – Managing document for implementation of the BCA.
- NYSDEC CP-51 Soil Cleanup Guidance October 2010 – Supplemental managing document to DER-10 for implementation of the BCA.
- New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan – This SCG item applies to remedial alternatives 1, 2 and 3 as a means of monitoring the effectiveness of nuisance controls as required under the NYSDEC BCP.
- NYS Waste Transporter Permits 6 NYCRR Part 364 – This SCG item applies to the remedial alternatives 1, 2 and 3 because contaminated soil off-site transportation would be a part of the proposed remedy.
- NYS Solid Waste Management Requirements 6 NYCRR Part 360 and Part 364 – This SCG item applies remedial alternatives 1, 2 and 3 because off-site disposal of contaminated soil would be a part of this alternative.

3.3 SELECTION OF PREFERRED REMEDY

This section describes the selected remedy, Remedial Alternative #2, and summarizes it according to the remedial selection criteria discussed in the previous remedial alternative analysis section. The following land use factor evaluation examines whether the preferred alternative, Remedial Alternative #2 is acceptable based on the criteria in the sections below as required by Article 27, Title 14 of the Environmental Conservation Law 27-1415.

3.3.1 Zoning

The Site is located within an M1-5 zoning district and within the Special West Chelsea District. M1-5 zoned areas are considered for light manufacturing/commercial use including art galleries. The planned land use following the remediation of the Site and renovation of the building will be in compliance with existing zoning designation and the E-142 Special Chelsea District requirements.

3.3.2 Applicable Comprehensive Community Master Plans or Land Use Plans

The property is located in the Special West Chelsea District and is immediately adjacent to the High Line elevated park. Certain building codes apply to construction, renovation, additions or major foundation work to buildings within 25 ft. of the NYC High Line elevated park. The Site development plan adheres with local zoning ordinances for this Site and surrounding area.

3.3.3 Surrounding Property Uses;

The properties immediately adjacent to the Site are predominantly commercial with some residential units. The Highline Park located adjacent to the Site is a public elevated park maintained by the NYC Parks Department. The Site remedy and proposed Site use adhere to the surrounding property use.

3.3.4 Citizen Participation;

The BCP application and RIWP were made available for public review and comment. The RIR and RAWP Fact Sheets will be distributed to the contact list in the approved CPP included in Appendix D.

3.3.5 Environmental Justice

There are no known Environmental Justice concerns associated with this site.

3.3.6 Land Use Designations

As noted above the Site is located in the Special West Chelsea District and is located in a predominantly industrial/commercial zoned area and will adhere with local zoning ordinances for this Site and surrounding area.

3.3.7 Population Growth Patterns

Development in the area surrounding the Site has grown at a rapid pace in the years since the establishment of the "Special West Chelsea District" in 2005 and the renovation of the Highline into a City Park. The proposed action is consistent with current zoning and has the potential to introduce new commercial users to the area. Therefore, the population added as a result of the proposed development is not expected to have a significant impact on the population in the surrounding community.

3.3.8 Accessibility to Existing Infrastructure

The Site is accessible to the existing infrastructure. Water and sewer service will be available during construction as the building is currently and will remain connected during building renovation to several utilities. A sanitary and storm sewer lines are located along 21st and 22nd Streets. Significant adverse impacts related to water usage and supply are not expected as a result of the proposed development, nor are significant adverse wastewater or storm water impacts anticipated as the remediation will be conducted within the confines of the Site Building. Existing gas, water, electric and telecommunication connections are located in proximity to the Site.

3.3.9 Proximity to Cultural Resources

The elevated Highline City Park is located adjacent to the Site. The proposed remediation activities are not expected to impact this cultural resource.

3.3.10 Proximity to Natural Resources

No regulated wetlands are mapped onsite or immediately adjacent to the Site. No significant coastal zones, lakes or NYSDEC designated Significant Habitats are located within the vicinity of the Site. The Hudson River, an estuarine deep water, is located approximately ¼ mile west of the Site. The Hudson River includes Littoral Zone wetlands. The proposed remediation is not anticipated to result in any significant adverse impacts to natural resources.

3.3.11 Off-Site Groundwater Impacts

Sample from monitoring wells, MW-6 and GFMW-3, located along the 21st Street sidewalk downgradient of the former UST area contained low concentrations of benzene, toluene and MTBE. The remedial activities are proposed to remove any onsite grossly contaminated soils that are contributing to the presence of these chemical compounds in groundwater. Removal of these soils will allow down gradient groundwater to natural attenuate over time. The post remedial monitoring plan which will be written into the Site Management Plan (SMP) will focus on monitoring the groundwater within and immediately downgradient of the former UST area onsite. If necessary, in-situ treatment of on-site groundwater will be implemented within two years of source removal. As per the BCA, the Volunteer is not responsible for remediating offsite media.

The groundwater samples from upgradient monitoring wells FLS-1 and FLS-2 have historically contained concentrations of BTEX and isopropylbenzene intermittently exceeding the AWQS. During the most recent June 2014 sampling event, monitoring well FLS-2 only contained benzene and isopropylbenzene at concentrations exceeding the AWQS. The soils in sampled in this portion of the Site have historically not indicated the presence of a BTEX or isopropylbenzene in soils. The selected remedy will address onsite exceedances of petroleum related contaminants in soil within the former gasoline UST area and SB-1 thereby removing on-Site petroleum-related soil contaminants that may be impacting groundwater downgradient and off-site.

3.3.12 Proximity to Floodplains

According to the New York City flood maps, the Site is located within the 100-year floodplain boundary (Zone AE). The finished floor elevations will be above base flood elevation and in accordance with NYCDOB requirements. All infrastructure improvements will be completed in compliance with FEMA guidelines and NYCDOB building codes.

According to the New York City Office of Emergency Management (OEM) hurricane evacuation maps, the Site is located within the Flood Zone #1. This zone is the first to be evacuated during a coastal storm surge.

3.3.13 Geography and Geology of the Site

The Site is located within a highly urban area. Historically the Site was located along the former Manhattan Island western shoreline which since the 1600s has been filled and leveled by fill transported from possibly higher elevated areas around the island. As noted in the Section 2.2.3 the Site and surrounding area have been developed and paved over since at least 1900. Currently the Site and surrounding area are level and completely contained with asphalt paved roadways, concrete sidewalks and building foundations. The planned remediation of the Site will be contained within the Site boundaries and in conformance with the urban surroundings.

3.3.14 Current Institutional Controls

The Site currently has no institutional controls. Following implementation of the selected remedy, the Site will require an environmental easement for fill remaining under the proposed engineering control.

3.4 SUMMARY OF SELECTED REMEDIAL ACTIONS

The Volunteer has selected Remedial Alternative #2, as it will remove source material contributing to the impact groundwater and soil gas quality on Site. This approach will achieve protection of public health and the environment for the intended use of the property and allows for the occupation of the building by future tenants. The selected remedy will achieve all of the remedial action objectives established for the project and addresses applicable SCGs. The selected remedial action alternative is effective in both the short-term and long-term and reduces, if not eliminates mobility, toxicity and volume of contaminants within the Site boundaries.

Land use at the Site will continue to be limited to commercial and industrial uses, as otherwise permitted by city zoning regulations. The preferred remedial action alternative is cost effective and implementable within an acceptable time frame. The selected remedy uses standards methods that are well established in the industry. Engineering and institutional controls will be included as part of the remedy.

The Track 2 cleanup will apply to the portion of the building receiving a new building slab and foundation features. A Track 4 will be applied to the portion of the building where the building slab will remain in place. If a Track 2 is not achieved for the new slab portion of the Site the entire Site will revert to a Track 4 Cleanup. The selected remedial approach is depicted on Figures 14 and 17.

The soil volume to be removed under this track cleanup is estimated at 3,160 cubic yards. Dewatering and building/excavation support will be required to accommodate excavation of soils below the water table specifically in the former UST area. The following summarized the key components of the selected Site remedy:

1. Site mobilization involving site security setup, equipment mobilization, utility mark outs and marking excavation areas;
2. Performance of a Community Air Monitoring Program (CAMP) for particulates and VOCs during invasive work;
3. Screening for indications of contamination (by visual means, odor, and monitoring with PID) of all excavated soil during any intrusive Site work;
4. Removal of soil contamination (i.e., grossly contaminated soil), to the extent practicable, through hotspot excavation in the former gasoline UST area. Impacted foundation elements will also be removed;
5. Removal of the top 2 feet of urban fill in the new slab portion of the Site;
6. Soil excavation to accommodate the installation of new foundation features (i.e. pile caps, spread footings, mat slab, etc.) and utilities throughout the Site;
7. Hotspot excavation of fill material containing contaminants above the PGSCO/CUSCO (soils around SB-1, SB-5 and SB-9) within the new slab portion of the Site to below Track 2 levels;
    a. SB-1/FLS-1 - Hotspot removal of soils that contain copper at a concentration exceeding the CUSCO. Removal of any grossly contaminated soils related to the observed sheen
    b. SB-5 – Hotspot removal of soils that contain benzene at a concentration exceeding the UUSCO and PGSCO in the groundwater smear zone;
    c. SB-9 – Hotspot removal of soils that contain benzo(a)pyrene and dibenzo(a,h)anthracene at concentrations exceeding the CUSCO.
8. Collection and analysis of end-point samples to evaluate the performance of the remedy with respect to attainment of SCOs proposed in the conditional Track 2 remedy;

9. All liquids to be removed from the Site, including dewatering fluids, will be handled, transported and disposed in accordance with applicable local, State, and Federal regulations. Liquids discharged into the New York City sewer system will be addressed through approval by NYCDEP.

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

11. Import of materials to be used for backfill in compliance with: (1) the requirements for the identified site use as set forth in 6 NYCRR Part 375-6.7(d), including, but not limited to, the backfill may not exceed the lower of protection of groundwater or commercial use soil cleanup objectives set forth in Table 375-6.8(b) in 6 NYCRR Part 375-6.7(d); (2) All Federal, State and local rules and regulations for handling and transport of material;

12. Construction and maintenance of an engineered composite cover consisting of concrete, asphalt and/or one foot of acceptable soil to prevent human exposure to soils containing contaminants exceeding the UUSCO to remain on Site;

13. Construction and maintenance of a SSDS under the new building slab section of the building to prevent human exposure to potential residual soil vapor contamination;

14. Additional evaluation of sub-slab soil vapor quality under the existing building slab to remain to determine the need for potential mitigation. If NYSDEC and NYSDOH determine mitigation is required for this area based on additional samples to be collected before construction, FLS will provide design details for installation of a retrofitted SSDS, as prior to construction;

15. Recording of an Environmental Easement, including Institutional Controls, to prevent future exposure to any residual contamination remaining at the Site. (a copy of a draft Environmental Easement is provided in Appendix E.);

16. Restriction on the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYCDOH.

17. Publication of a Site Management Plan (SMP) for long term management of residual contamination as required by the Environmental Easement, including plans for: (1)

Institutional and Engineering Controls, (2) monitoring, (3) operation and maintenance and (4) reporting. The SMP will describe quarterly groundwater monitoring to be conducted at the Site. Analytical results of this quarterly groundwater monitoring will be evaluated to determine if residual groundwater contamination remains and requires further groundwater remediation. If necessary, in-situ treatment of on-site groundwater will be implemented within two years of source removal;

18. All responsibilities associated with the Remedial Action, including permitting requirements and pretreatment requirements, will be addressed in accordance with all applicable Federal, State and local rules and regulations.

Remedial activities will be performed at the Site in accordance with this NYSDEC-approved RAWP and the Department-issued Decision Document. All deviations from the RAWP and/or Decision Document will be promptly reported to NYSDEC for approval and fully explained in the Final Engineering Report (FER).

3.5 STANDARD REMEDIAL ELEMENTS

Due to a New York City Department of Buildings (NYCDOB) requirement that 25% of the original building must remain in place, the site remedy will be comprised of two cleanup tracks, whereby a Track 2 cleanup meeting the commercial use or protection of groundwater soil cleanup objectives (CSCOs/PGWSCOs), as applicable, would be implemented on the eastern portion of the site, while a Track 4 cleanup for commercial use would be implemented on the western portion of the site. The elements of the selected remedy, as shown in Figures 14 and 17, are as follows:

1. **Remedial Design** - A remedial design program will be implemented to provide the details necessary for the construction, operation, optimization, maintenance, and monitoring of the remedial program. Green remediation principles and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per DER-31. The major green remediation components are as follows:
    - Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
    - Reducing direct and indirect greenhouse gases and other emissions;

- Increasing energy efficiency and minimizing use of non-renewable energy;
- Conserving and efficiently managing resources and materials;
- Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;
- Maximizing habitat value and creating habitat when possible;
- Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals; and
- Integrating the remedy with the end use where possible and encouraging green and sustainable re-development.

2. **Excavation** – Excavate all soil which exceeds commercial use SCOs (or protection of groundwater SCOs, or protection of groundwater SCOs for petroleum-related constituents that are found in groundwater, such as benzene, toluene, ethylbenzene and xylene [BTEX] and methyl tertiary butyl ether [MTBE]) from the upper 15 feet of soil on the eastern portion of the site seeking a Track 2 remedy, as defined by 6 NYCRR Part 375-6.8(2), and transport off-site for disposal. The extent of soil targeted for removal is expected to be the top ten (10) feet of the former UST area, up to ten (10) feet from several "hot spot" areas and the top two (2) feet from the rest of the eastern portion of the building footprint. Approximately 3,160 cubic yards of soil material will be removed from the eastern portion of the site (93 cubic yards from the "hot spots", 778 cubic yards from the Former UST area and 2,289 cubic yards from across the rest of the eastern portion of the site). Clean fill meeting the requirements for the identified site use as set forth in 6 NYCRR Part 375-6.7(d) will be brought in to replace excavated soil and establish the designed grades at the site. If the Track 2 remedy cannot be achieved in this area, Track 4 will be the contingent remedy.

3. **Site Cover - Western portion:** A site cover currently exists and will be maintained to allow commercial use of the site. Any site redevelopment will maintain a site cover, which may consist of the structures such as buildings, pavement, sidewalks comprising the site development or a soil cover in areas where the upper one foot of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs). Where the soil cover is required it

will be a minimum of one foot of soil, meeting the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d) for commercial use. The soil cover will be placed over a demarcation layer, with the upper six inches of the soil of sufficient quality to maintain a vegetation layer. Any fill material brought to the site will meet the requirements for the identified site use as set forth in 6 NYCRR Part 375-6.7(d).

4. **Site Cover – Eastern portion:** A site cover, consistent with that described for the western portion above, would only be required for this area if the Track 4 contingent remedy is performed. It would not be required if Track 2 is achieved.

5. **Groundwater Treatment Contingency – Western Portion:** Removal of the vast majority of the source of groundwater contamination from the eastern portion of the site is expected to greatly improve groundwater conditions across the entire site. However, if downgradient groundwater concentrations are not reduced by that action, in-situ treatment of on-site groundwater will be implemented within two years of source removal. If off-site groundwater requires additional remedial action, that work would be pursued under the existing Stipulation Agreement (ref. Spill No. 0010394).

6. **Institutional Control -** Imposition of an institutional control in the form of an environmental easement for the controlled property that: requires the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3); allows the use and development of the controlled property for commercial and industrial uses as defined by Part 375-1.8(g), although land use is subject to local zoning laws; restricts the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDOH or NYCDOH; requires compliance with the Department approved Site Management Plan.

7. **Site Management Plan -** A Site Management Plan is required, which includes the following:

a. An Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary to ensure the following institutional and/or engineering controls remain in place and effective:

- Institutional Controls: The Environmental Easement discussed in Section 6 above.
- Engineering Controls: The Site Cover discussed in Paragraphs 3 and 4 above.

This plan includes, but may not be limited to:

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

ii. descriptions of the provisions of the environmental easement including any land use and groundwater use restrictions;

iii. a provision for evaluation of the potential for soil vapor intrusion should the on-site building become occupied and for any buildings developed on the Site, including provisions for implementing actions recommended to address exposures related to soil vapor intrusion;

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

v. maintaining site access controls and Department notification; and

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

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

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

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

iii. monitoring for vapor intrusion for any buildings re-occupied or developed on the site, as may be required by the Institutional and Engineering Control Plan discussed above.

4.0 REMEDIAL ACTION PROGRAM

4.1 GOVERNING DOCUMENTS

4.1.1 Site Specific Health & Safety Plan

All remedial work performed under this plan will be in full compliance with governmental requirements, including Site and worker safety requirements mandated by Federal OSHA.

The Volunteer and associated parties preparing the remedial documents submitted to the State and those performing the construction work, are completely responsible for the preparation of an appropriate Health and Safety Plan (HASP) and for the appropriate performance of work according to that plan and applicable laws.

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

The Site Safety Coordinator will be assigned. A resume will be provided to NYSDEC prior to the start of remedial construction.

Confined space entry will comply with all OSHA requirements to address the potential risk posed by combustible and toxic gasses.

4.1.2 Quality Assurance Project Plan

A Quality Assurance Project Plan (QAPP) has been created for the Site to address quality control and quality assurance procedures for all site sampling, including post excavation end-point sampling, and is included in Appendix F.

4.1.3 Soil/Materials Management Plan

The details of the Soil/Materials Management Plan (SoMP) are discussed in Section 5.4 of this RAWP. Section 5.4 includes detailed plans for managing all soils/materials that are disturbed at the Site, including excavation, handling, storage, transport and disposal. It also includes the controls that will be applied to these efforts to assure effective, nuisance-free performance in compliance with all applicable Federal, State and local laws and regulations. A SoMP, which describes procedures for excavation, handling, storage, transport and disposal, is included in Appendix G.

4.1.4 Storm-Water Pollution Prevention Plan

The excavation work will be conducted within the confines of the building which encompasses the entire Site and the Site is less than 1 acre in size. The New York State Pollutant Discharge Elimination System (SPDES) general permit requirements for construction sites less than 1 acre in size does not require a Storm-Water Pollution Prevention Plan (SWPPP).

4.1.5 Community Air Monitoring Plan

The purpose of the CAMP is to protect downwind receptors (e.g., residences, businesses, schools, nearby workers, and the public) from potential airborne contaminants released as a direct result of the Remedial Action being performed at the Site. A summary of the CAMP plan is included in Section 5.0 of the HASP and presented in Appendix C.

4.1.6 Contractors Site Operations Plan

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

4.1.7 Citizen Participation Plan

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

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

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

Muhlenberg Library
209 West 23rd Street
New York, NY 10011-2379
(212) 924-1585
M & W:10-6; Tu & Th:10-7;
F & Sat 10-5; Sun: Closed:

www.nypl.org/locations/muhlenberg

4.2 GENERAL REMEDIAL CONSTRUCTION INFORMATION

4.2.1 Project Organization

An organization chart is included in Figure 13. Resumes of key personnel involved in the Remedial Action are included in Appendix J.

4.2.2 Remedial Engineer

The Remedial Engineer for this project will be Arnold F. Fleming, P.E. The Remedial Engineer is a registered professional engineer (P.E.) licensed by the State of New York. The Remedial Engineer will have primary direct responsibility for implementation of the remedial program for the 511 West 21st Street, Manhattan Site (NYSDEC BCA Index No. C231080-02-13; Site No. C231080). The Remedial Engineer will certify in the Final Engineering Report that the remedial activities were observed by qualified environmental professionals under his supervision and that the remediation requirements set forth in the Remedial Action Work Plan and any other relevant provisions of ECL 27-1419 have been achieved in full conformance with that Plan. Other Remedial Engineer certification requirements are listed later in this RAWP.

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

The Remedial Engineer will review all pre-remedial plans submitted by contractors for compliance with this Remedial Action Work Plan and will certify compliance in the Final Engineering Report. The Remedial Engineer will provide the certifications listed in Section 10.1 in the Final Engineering Report.

4.2.3 Remedial Action Construction Schedule

A general Remedial Action construction schedule commencing from NYSDEC approval of the RAWP through receipt of the Certificate of Completion is included in Table 15.

4.2.4 Work Hours

The hours for operation of remedial construction will conform to the New York City Department of Buildings construction code requirements or according to specific variances issued by that agency. DEC will be notified by the Volunteer of any variances issued by the Department of Buildings. NYSDEC reserves the right to deny alternate remedial construction hours. General work hours for the Site will be between 7:00am to 3:00pm from Monday to Friday.

4.2.5 Site Security

The entrance to the Site building will be locked during non-working hours. During working hours access to the Site will be limited to Site contractors and other permitted personnel. If needed a security officer will be stationed at the Site entrance during working hours. These controls will be maintained for the duration of the remedial activities proposed herein.

4.2.6 Traffic Control

All vehicular traffic involved in the Site remediation activities will enter the Site via an established truck entrance located on the 21st Street and 22nd Street sides of the building. All vehicular traffic involved in the Site remediation activities will be parked in permitted area either within the Site building or along the adjacent street as per city permits.

All trucks will exit the Site via 21st Street or 22nd Street. Given the limited excavation area and confined work area within the building truck traffic arriving and departing the Site will be kept to a minimal throughout the day. The anticipated truck route is provided as Figure 16.

The Volunteer will seek, as needed, local input from Manhattan Community Board 4, and if necessary, revisions to the truck route will be made based on local input. Due to the expected truck traffic, traffic control will be needed and such control measures will be provided in accordance with local municipal traffic control requirements.

The need for traffic control on the local roadways entering the Site is not anticipated at this time. Should conditions change and indicate the need for such control, said control measures will be provided in a manner that conforms to local municipal traffic control requirements.

4.2.7 Contingency Plan

If underground tanks or other previously unidentified contaminant sources such as buried drums, stained soils, subsurface pits, etc. are found during on-site remedial excavation, sampling will be performed, as warranted on product, sediment and surrounding soils, etc. Chemical analytical work will be for full scan parameters (TAL metals; TCL volatiles and semi-volatile organic compounds, TCL pesticides and PCBs). Sample parameter reduction must be approved by NYSDEC. These analyses will not be limited to STARS parameters where tanks are identified without prior approval by NYSDEC. Analyses will not be otherwise limited without NYSDEC approval.

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

4.2.8 Worker Training and Monitoring

As detailed in the accompanying HASP, all workers associated with the remedial activities will have been certified by a licensed physician as being physically able to perform their assigned field work, and to use the Personal Protective Equipment (PPE) which will be required for this project, in accordance with the provisions of OSHA Regulation 29 CFR 1910.120(f); and passed a Qualitative Respirator Fit Test.

All remediation personnel working within the remediation area shall be thoroughly trained as specified in OSHA Regulations 29 CFR 1910.120(e), and 1910.1028. This training will include: (1) Attendance at an initial 40-hour basic health and safety training course off the Site; (2) At least three days of actual field experience under the direct supervision of a trained, experienced supervisor; (3) On-site, site-specific training; and (4) an 8-hour annual update in the basic health and safety training course.

In addition to the above, on-site Managers and supervisors who are directly responsible for, or who supervise employees engaged in hazardous waste operations must also receive: (1) 8-hours of site supervisor training; and (2) additional training at the time of job assignment on such topics as, but not limited to, the company's safety and health program and the associated employee training program; personal protective equipment program; spill containment program; air quality monitoring; emergency response; monitoring equipment usage and calibration; and, health hazard monitoring procedures and techniques.

At the time of job assignment, special training will be provided to on-site personnel who may be exposed to unique or special hazards not covered by the initial 40-hour basic health and safety course. If unique or special hazards are unexpectedly encountered, specialized training will be provided before work proceeds.

4.2.9 Agency Approvals

Volunteer has addressed all SEQRA requirements for this Site. All permits or government approvals required for remedial construction have been, or will be, obtained prior to the start of remedial construction.

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

A complete list of all local, regional and national governmental permits, certificates or other approvals or authorizations required to perform the remedial and development work is attached in Table 17. This list includes a citation of the law, statute or code to be complied with, the originating agency, and a contact name and phone number in that agency. This list will be updated in the Final Engineering Report.

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

4.2.10 NYSDEC BCP Signage

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

4.2.11 Pre-Construction Meeting with NYSDEC

A meeting among the NYSDEC Project Manager, Remedial Engineer, and the contractors will be conducted at the Site prior to the start of the remedial activities proposed herein.

4.2.12 Emergency Contact Information

An emergency contact sheet with names and phone numbers is included in Table 16. That document will define the specific project contacts for use by NYSDEC and NYSDOH in the case of a day or night emergency.

4.3 SITE PREPARATION

4.3.1 Mobilization

The mobilization of equipment related to the proposed soil excavation activities will not occur until the RAWP has been approved by the NYSDEC/NYSDOH and all required construction controls have been installed.

4.3.2 Erosion and Sedimentation Controls

No erosion and sediment controls will be required as this project is less than one acre and not required to have a SWPPP. In addition the remedial activities will take place within the Site building. Any floor drains that may be present on the first floor will either be plugged up or equipped with a sediment filter prior to start of remedial activities.

4.3.3 Stabilized Construction Entrance(s)

The remedial construction entrance/exit will be located within the Site building entrance at 22nd Street. The construction entrance/exit shall have a stabilized aggregate pad underlain with filter cloth to prevent vehicles from tacking sediment off-site. The stabilized construction entrance will be constructed across the full width of the entrance/exit. Trucks will be inspected prior to exiting and, if required, will be manually brushed and/or washed down on the tracking pad. A figure showing the tracking pad location and detail is provided in Figure 16.

4.3.4 Utility Marker and Easements Layout

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

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

4.3.5 Sheeting and Shoring

Appropriate management of structural stability of on-Site or off-Site structures during on-Site activities include excavation is the sole responsibility of the Volunteer and its contractors. The Volunteer and its contractors are solely responsible for safe execution of all invasive and other work performed under this Plan. The Volunteer and its contractors must obtain any local, State or Federal permits or approvals that may be required to perform work under this Plan. Further, the Volunteer and its contractors are solely responsible for the implementation of all required, appropriate, or necessary health and safety measures during performance of work under the approved Plan. The current plans depicting location, design documents, construction details and specifications are provided in Appendix L. When the final NYC DOB approved support of excavations plans are available, they will be provided to NYSDEC for reference.

4.3.6 Equipment and Material Staging

All materials will be stored within the building or permitted areas outside the building away from storm sewers and nearby environmentally sensitive areas.

4.3.7 Decontamination Area

Washing of trucks and equipment utilized in the remediation of soils and/or groundwater will be conducted manually by Site personnel. The bucket of the excavation equipment will be cleaned before moving to a new area of concern by removing any solid residue, washing with an alconox/water solution and rinsing with clean water in a designated area within the remediation area.

Disposable supplies (i.e. boot over covers, gloves, sampling scoops, etc.) will be collected in bags proximate to their area of usage and containerized in 55-gallon drums for disposal in accordance with applicable regulations.

4.3.8 Site Fencing

The perimeter of the Site is surrounded by the Site building. A locking gate or roll down door at each Site entrance will be maintained for the duration of the remedial activities proposed herein.

4.3.9 Demobilization

Any equipment that was utilized on Site exclusively for the remediation activities will be decontaminated and removed. All materials generated during the course of the remedial activities will be disposed off-site in accordance with acceptable rules and regulations.

4.4 REPORTING

As discussed in Section 4.4.1 and 4.4.2, reports will be submitted on a monthly basis. All monthly Reports will be included in the Final Engineering Report.

4.4.1 Monthly Reports

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

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

4.4.2 Other Reporting

Photographs will be taken of all remedial activities and submitted to NYSDEC in digital (JPEG) format. Photos will illustrate all remedial program elements and will be of acceptable quality. Representative photos of the Site prior to any Remedial Actions will be provided. Representative photos will be provided of each contaminant source, source area and Site structures before, during and after remediation. Photos will be included in the daily reports as needed, and a comprehensive collection of photos will be included in the Final Engineering Report. Daily reports will be provided to the project managers for NYSDEC and NYSDOH by email during all periods of major invasive activity at the Site.

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

4.4.3 Complaint Management Plan

In the event complaints are filed by the public regarding nuisance or other site conditions, the complaints will be addressed by either the Site Remediation or Site Development contractor, depending upon which facet of the project the complaint relates to.

The NYSDEC and NYSDOH Project Managers will be notified immediately via e-mail of any such complaints. All complaints will be addressed in a timely manner (i.e. within 24-hours of receipt of the complaint) without a stoppage of site work. However, if the complaints address issues that are deemed by the regulatory oversight agencies (i.e. NYSDEC, NYSDOH and/or local regulatory officials) to be potentially harmful to human health and/or the environment, Site work will be immediately suspended until a resolution acceptable to the regulatory agency can be implemented.

4.4.4 Deviations from the Remedial Action Work Plan

In the event that any deviations from the RAWP are required, the NYSDEC and NYSDOH Project Managers will be notified in writing of the anticipated deviation. In no event will a deviation occur without first obtaining prior written approval from the NYSDEC and NYSDOH.

Additionally, in no event shall a deviation affect the overall site remedy. All deviations will be identified in the Final Engineering Report (FER).

5.0 REMEDIAL ACTION: MATERIAL REMOVAL FROM SITE

The proposed remediation for the Site will include removal of the top 2 feet of fill material from across the portion of the Site receiving a new slab. Additional fill material will be removed as part of the installation of new foundation elements. Grossly contaminated soils from the former gasoline UST/pump island area along 21st Street will be removed to the extent feasible. Additional hotspots areas will be excavated to attempt to achieve a Track 2 Cleanup. Where determined to be necessary, deeper excavation may be performed to remove additional contamination. The building structure and excavations will be shored up as required to ensure that the Site building or adjacent structures are not undermined. Contaminated fill and grossly contaminated soils will be characterized and disposed of at the appropriate off-site disposal facility. Dewatering when required will be conducted in accordance with local permits and approvals. Post–remediation soil sampling will be conducted to evaluate the effectiveness of the remediation.

5.1 SOIL CLEANUP OBJECTIVES

The Soil Cleanup Objectives for this Site, where feasible, are the CUSCOs for commercial use listed in Table 375-6.8(b) of 6 NYCRR Subpart 375-6. Specifically, the Track 2 area will remove all soil with contaminants above CUSCOs down to 15 feet below the surface. The Soil Cleanup Objectives for this Site are listed in Table 1. Tables 5 through 8 summarize all soil samples that exceed the SCOs proposed for this Remedial Action. A spider diagram that depicts soil samples that exceed the UUSCOs, CUSCOs, and GPSCOs proposed for this Remedial Action is shown in Figures 4 through 7. Regional historic fill related compounds above the UUSCO will remain onsite under the proposed composite cover. Soil and materials management on-Site and off-Site will be conducted in accordance with the Soil Management Plan as described below. If required, UST closures will, at a minimum, conform to criteria defined in DER-10.

5.2 REMEDIAL PERFORMANCE EVALUATION

5.2.1 End-Point Sampling Frequency

The proposed end-point sampling frequency per Section 5.4 of DER-10 requires post-excavation soil samples be collected at a frequency of one per 30 linear ft. of excavation sidewall and one per 900 sq. ft. of excavation base. End point samples will be collected from the foundation base elevation of the fill layer prior to placement of the composite cover systems and from the base of the hotspot excavations. End point samples will be collected from the sidewalls of the hotspot excavations six inches above the excavation base at the above frequency to confirm the removal of gross contaminated soils. The following provides a breakdown of the endpoint sample parameters for each excavation area:

1. UST Area End point samples will be analyzed for VOCs
2. Urban Fill End point samples will be analyzed for SVOCs, TAL Metals, and pesticides
3. SB-1/FLS-1 Endpoint samples will be collected for VOCs
4. SB-5 Endpoint samples will be collected for VOCs
5. SB-9 Endpoint samples will be collected for SVOCs.

5.2.2 Methodology

All results will be reported in a tabular format. The excavation boundaries will be surveyed by a New York licensed surveyor and will be mapped. All end-point/post-excavation sample locations will be mapped as well. Any exceedances of the UUSCO, CUSCO and GPSCO will be noted.

5.2.3 Reporting of Results

All results will be reported in a tabular format. The excavation boundaries will be mapped. All end-point/post-excavation sample locations will be mapped as well. Any exceedances of the UUSCO for unrestricted use and CUSCO for commercial use will be noted. The required NYSDEC Electronic Data Deliverable (EDD) format will be provided to NYSDEC Environmental Information Management System (EIMS) department.

5.2.4 Quality Assurance/Quality Control

The Quality Assurance/Quality Control Plan (QA/QC) Plan was prepared in accordance with the NYSDEC May 2010 DER-10 Technical Guidance for Site Investigation and Remediation and applies to the investigation and remediation of soils, ground water and soil vapor in the area of former underground storage tanks. The QA/QC Plan provides directions in implementing the activities that would generate data of known and defensible quality. It complies with the September 1992 NYSDEC Division of Water Sampling Guidelines and Protocols and the October 2006 Guidance for Evaluating Soil Vapor Intrusion in the State of New York. NYSDEC is currently updating these guidance documents with the DER series documents which will be supplemented as they become available. The QA/QC Plan has been provided in Appendix F.

5.2.5 Data Usability Summary Report

A Data Usability Summary Report (DUSR) will be prepared for soil, groundwater, and soil vapor samples collected for NYSDEC or NYSDOH regulatory compliance during the Remedial Action (RA) phase.

5.2.6 Reporting of End-Point Data in Final Engineering Report

The Final Engineering Report (FER) will include a detailed description of all remedial activities completed at the Site. The FER will include a table summarizing the end-point sampling data for each area of concern and map depicting all end-point sampling locations.

Chemical labs used for all end-point sample results and contingency sampling will be NYSDOH ELAP certified.

End point sampling, including bottom and side-wall sampling, will be performed in accordance with DER-10 sample frequency requirements. Side-wall samples will be collected a minimum of every 30 linear ft. Bottom samples will be collected at a rate of one for every 900 sq. ft. The FER will provide a tabular and map summary of all end-point sample results and exceedances of SCOs. A proposed end point sample plan has been included as Figure 15. This plan will be modified based on the final extent of the hotspot excavation.

5.3 ESTIMATED MATERIAL REMOVAL QUANTITIES

The estimated quantity of soil/fill to be removed from the Site is estimated at 3,160 cubic yards. This quantity may increase if additional grossly contaminated material is encountered and removed during the planned hot spot remediation. No soil/fill will be reused/relocated onsite.

5.4 SOIL MANAGEMENT PLAN

5.4.1 Soil Screening Methods

Visual, olfactory and PID soil screening and assessment will be performed by a qualified environmental professional or experienced field geologist under the direction of the Remedial Engineer during all remedial and development excavations into known or potentially contaminated material. Soil screening will be performed regardless of when the invasive work is done and will include all excavation and invasive work performed during the remedy and during development phase, such as excavations for foundations and utility work, prior to issuance of the COC.

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

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

5.4.2 Stockpile Methods

Stockpiles will be inspected at a minimum once each week. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by NYSDEC.

Stockpiles will be kept covered at all times with appropriately anchored tarps to mitigate any potential dusting. Stockpiles will be routinely inspected and damaged tarp covers will be promptly replaced.

If needed, hay bales will be used as needed near catch basins and other discharge points.

Water will be available on-site at suitable supply and pressure for use in dust control.

5.4.3 Materials Excavation and Load Out

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

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

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

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

A truck inspection and washing station will be operated at the exit point within the building. A tracking pad will be included at this inspection and wash point and any loose debris around the truck or on the wheel will be manually removed using hand tools and/or water. Water will be collected within truck wash station area and maintained within the Site boundaries. The Remedial Engineer will be responsible for ensuring that all outbound trucks will be washed at the truck wash station before leaving the Site until the remedial construction is complete.

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

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

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

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

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

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

If deemed necessary drying agents (i.e. lime, fly ash, etc.) would be added to the wet soils prior to load out.

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

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

5.4.4 Materials Transport Off-Site

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

All trucks loaded with Site materials will exit the vicinity of the Site using only these approved truck routes.

Proposed in-bound and out-bound truck routes to the Site are shown in Figure 16. This is the most appropriate route and takes into account: (a) limiting transport through residential areas and past sensitive sites; (b) use of city mapped truck routes; (c) prohibiting off- Site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport.

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

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

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

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

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

5.4.5 Materials Disposal Off-Site

The total quantity of material expected to be disposed off-Site is estimated at approximately 3,160 cy. The disposal facility information will be provided to NYSDEC following completion of waste characterization and facility acceptance of the material. Disposal of Site soils will be conducted in accordance with local, state and federal regulations.

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

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

The following documentation will be obtained and reported by the Remedial Engineer for each disposal location used in this project to fully demonstrate and document that the disposal of material derived from the Site conforms with all applicable laws: (1) a letter from the Remedial

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

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

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

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

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

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

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

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

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

5.4.6 Materials Reuse On-Site

No soils are planned for reuse at the Site. The remedial action proposes to remove grossly contaminated soils, including petroleum impacted soils and fill material displaced by the installation of the new foundation elements and composite cover system.

The Remedial Engineer will ensure that procedures defined for materials reuse in this RAWP are followed and that unacceptable material will not remain on-Site.

Concrete crushing or processing on-Site is prohibited.

Contaminated on-Site material, including historic fill and contaminated soil, removed for grading or other purposes will not be reused. This will be expressed in the final Site Management Plan.

5.4.7 Fluids Management

All liquids to be removed from the Site, including dewatering fluids, will be handled, transported and disposed in accordance with applicable local, State, and Federal regulations. Liquids discharged into the New York City sewer system will be addressed through approval by NYCDEP.

Dewatered fluids will not be recharged back to the land surface or subsurface of the Site. Dewatering fluids will be managed off-Site.

Discharge of water generated during remedial construction to surface waters (i.e. a local pond, stream or river) is prohibited without a SPDES permit.

5.4.8 Demarcation

The composite cover system will act as the physical demarcation layer between the Site inhabitants and the residual fill to remain below the Site. This demarcation layer will constitute the top of the 'Residuals Management Zone', the zone that requires adherence to special conditions for disturbance of contaminated residual soils defined in the Site Management Plan. The survey will measure the grade covered by the demarcation layer before the placement of cover soils, pavement and sub-soils, structures, or other materials. This survey and the demarcation layer placed on this grade surface will constitute the physical and written record of the upper surface of the 'Residuals Management Zone' in the Site Management Plan. A map showing the survey results will be included in the Final Engineering Report and the Site Management Plan.

5.4.9 Backfill from Off-Site Sources

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

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

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

All imported soils will meet NYSDEC approved backfill or cover soil quality objectives for this Site. All backfill material or cover soil imported to the Site will meet the requirements for the identified site use as set forth in 6 NYCRR Part 375-6.7(d), including, but not limited to, the backfill may not exceed the lower of protection of groundwater or commercial use soil cleanup objectives set forth in Table 375-6.8(b) and the geotechnical requirements for this project. Non-compliant soils will not be imported onto the Site without prior approval by NYSDEC. Nothing in the approved Remedial Action Work Plan or its approval by NYSDEC should be construed as an approval for this purpose.

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

Solid waste will not be imported onto the Site.

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

5.4.10 Stormwater Pollution Prevention

A SWPPP will not be required for this project as the Site work will be conducted within a building and the Site is less than one acre in size.

If any barriers, hay bale or other water runoff controls are required at this Site, they will be inspected periodically. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by NYSDEC. All necessary repairs shall be made immediately. Any accumulated sediments will be removed as required to keep the barrier and hay bale check functional.

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

5.4.11 Contingency Plan

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

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

5.4.12 Community Air Monitoring Plan

The remedial activities will be conducted under a Site-specific Health and Safety Plan (HASP). The HASP is provided as Appendix H. During invasive activities such as soil boring, monitoring well installation, or excavation air monitoring will be continuously conducted with a PID in the work zone to measure ambient VOC concentrations for all indoor activities. Periodic monitoring will be completed during soil excavation. Background readings will be taken at the beginning of each workday. The indoor VOC concentrations will be measured at a minimum of every 15 minutes during active excavation or if a potential vapors/odors in the air. If the VOC concentrations exceed 5 ppm for a period of greater than 15 minutes, work activities will be temporarily halted until concentrations decrease below 5 ppm. The procedures for air monitoring are outlined in the Community Air Monitoring Plan (CAMP) provided in Appendix C. A Community Health and Safety Plan was developed to provide the steps that will be taken during intrusive activities to prevent any exposure to the public. A copy of this plan is provided in Appendix I.

A project logbook will be kept and background readings as well as any readings that exceed action levels, thereby triggering a response, will be recorded within it. This record will be available for review by the NYSDEC/NYSDOH. The required action levels and responses are addressed in the HASP. Additionally, Site workers will ensure investigation-derived wastes (IDW) are quickly containerized and covered in order to minimize nuisance odors during field work.

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

5.4.13 Odor, Dust and Nuisance Control Plan

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

5.4.13.1 Odor Control Plan

This odor control plan is capable of controlling emissions of nuisance odors off-Site. Specific odor control methods to be used on a routine basis will include limiting the area of open excavations, direct load-out of soils to trucks for off-Site disposal and shrouding open excavations with tarps and other covers. If nuisance odors are identified, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and NYSDOH will be notified of all odor events and of all other complaints about the project. Implementation of all odor controls, including the halt of work, will be the responsibility of the Volunteer's Remedial Engineer, who is responsible for certifying the Final Engineering Report.

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

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

5.4.13.2 Dust Control Plan

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

- Water will be available on-site at suitable supply and pressure for use in dust control.

5.4.13.3 Other Nuisances

A plan for rodent control will be developed and utilized by the contractor prior to all remedial work.

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

6.0 RESIDUAL CONTAMINATION TO REMAIN ON-SITE

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

ECs will be implemented to protect public health and the environment by appropriately managing residual contamination. The Controlled Property (the Site) will have two primary EC systems consisting of a composite cover system and passive SSDS. The engineered composite cover system will cover the entire Site. A passive SSDS will be installed beneath the new slab section of the building. Additional evaluation of sub-slab soil vapor quality under the existing building slab to remain will determine the need for potential mitigation in this area. If NYSDEC and NYSDOH determine mitigation is required for this area based on the additional samples to be collected before construction, FLS will provide design details for installation of a retrofitted SSDS, prior to construction.

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

7.0 ENGINEERING CONTROLS

Exposure to residual contaminated soils will be prevented by an engineered, composite cover system that will be built on the Site. This composite cover system will be comprised of a new concrete building slab and associated concrete foundation elements. The proposed remediation is intended to meet Track 2 and Track 4 SCOs that are compatible with commercial use Sites, as set forth in 6 NYCRR Subpart 375-6 and supplemented by CP-51.

A SSDS will be installed under the new slab section of the building, as a second engineering control. Additional evaluation of sub-slab soil vapor quality under the existing building slab to remain will determine the need for potential mitigation in this area. If NYSDEC and NYSDOH determine mitigation is required for this area based on the additional samples to be collected before construction, FLS will provide design details for installation of a retrofitted SSDS, prior to construction.

Engineering and institutional controls are proposed for restriction of site groundwater use and for vapor intrusion control purposes based on the utilization of the CUSCOs for commercial use as the remedial endpoint. Regional urban fill that indicate slight exceedances of the CUSCO of typical urban fill contaminants will not be removed and will remain in place under the proposed engineered composite cover system. Attainment of the proposed Site Specific SCOs as per CP-51 will be documented by supportive analytical data. The proposed renovation activities (foundation elements) and composite cover system are expected to eliminate the potential direct contact exposure pathways to the ecological community. Figure 17 depicts the final layout of the planned composite cover system with the applicable Track remedy.

Excavation, removal and off-site disposal of impacted soils is proposed for grossly contaminated/impacted soils specifically petroleum impacted soils containing gasoline related compounds above the commercial use SCO (Table 375-6.8(b).

Pre-remedial activities documented the presence of vapors in the soil gas below the Site. The mitigation of the suspected product-impacted soil and groundwater is anticipated to result in a reduction in the mass of soil vapors at the Site. However, vapor intrusion control systems, as discussed in Section 8.0, will be installed beneath the entire new foundation slab.

A Post Remediation SoMP will be included in the SMP and will outline the procedures to be followed in the event that the composite cover system and underlying residual contamination are disturbed after the Remedial Action is complete. The SMP will describe quarterly groundwater monitoring to be conducted at the Site. Analytical results of this quarterly groundwater monitoring will be evaluated to determine if residual groundwater contamination remains and requires further groundwater remediation. If necessary, in-situ treatment of on-site groundwater will be implemented within two years of source removal.

Maintenance of this composite cover system and SSDS will be described in the Site Management Plan in the FER.

8.0 CRITERIA FOR COMPLETION OF REMEDIATION/TERMINATION OF REMEDIAL SYSTEMS

8.1 COMPOSITE COVER SYSTEM

The composite cover system is a permanent control and the quality and integrity of this system will be inspected at defined, regular intervals in perpetuity. The composite cover system will cover the entire site. Any portion of the concrete slab to remain will be renovated to ensure that it eliminates any contact with underlying fill.

8.2 SUB-SLAB DEPRESSURIZATION SYSTEM

The SSDS is being installed as a proactive measure as part of construction. Post remediation and construction sampling will take place to determine whether this SSDS is required to operate as active or passive. This sampling event will include simultaneous sampling of sub-slab soil vapor and indoor air samples to determine if there is any potential for soil vapor intrusion after remediation. If the additional evaluation of sub-slab soil vapor quality under the existing building slab to remain determines the need for potential mitigation in this area, a retrofitted SSDS will be installed in this area as well. If either SSDS footprint is required to operate as an active system, they will be a permanent engineering control. The quality and integrity of these systems will be inspected at defined, regular intervals in perpetuity.

8.3 GROUNDWATER MONITORING

Groundwater monitoring activities will continue to assess natural attenuation, as determined by NYSDOH and NYSDEC, until residual groundwater concentrations are found to be below NYSDEC standards or have become asymptotic over an extended period. If necessary, in-situ treatment of on-site groundwater will be implemented within two years of source removal. Monitoring of groundwater onsite will continue until permission to discontinue is granted in writing by NYSDEC and NYSDOH. Monitoring activities are outlined in the Monitoring Plan of the SMP.

9.0 INSTITUTIONAL CONTROLS

After the remedy is complete, the Site will have residual contamination remaining in place. Engineering Controls (ECs) for the residual contamination have been incorporated into the remedy to render the overall Site remedy protective of public health and the environment. Two elements have been designed to ensure continual and proper management of residual contamination in perpetuity: an Environmental Easement and a Site Management Plan.

All as-built drawings, diagrams, calculation and manufacturer documentation for treatment systems will be presented in the FER. A Site -specific Environmental Easement will be recorded with New York City County to provide an enforceable means of ensuring the continual and proper management of residual contamination and protection of public health and the environment in perpetuity or until released in writing by NYSDEC. It requires that the grantor of the Environmental Easement and the grantor's successors and assigns adhere to all Engineering and Institutional Controls (ECs/ICs) placed on this Site by this NYSDEC-approved remedy. ICs provide restrictions on Site usage and mandate operation, maintenance, monitoring and reporting measures for all ECs and ICs. The SMP describes appropriate methods and procedures to ensure compliance with all ECs and ICs that are required by the Environmental Easement. Once the SMP has been approved by the NYSDEC, compliance with the SMP is required by the grantor of the Environmental Easement and grantor's successors and assigns.

9.1 ENVIRONMENTAL EASEMENT

An Environmental Easement, as defined in Article 71 Title 36 of the Environmental Conservation Law, is required when residual contamination is left on-Site after the Remedial Action is complete. As part of this remedy, an Environmental Easement approved by NYSDEC will be filed and recorded with the New York City Office of the City Register. The Environmental Easement will be submitted as part of the Final Engineering Report.

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

The Institutional Controls that support Engineering Controls are:

- Compliance with the Environmental Easement by the Grantee and the Grantee's successors and adherence of all elements of the SMP is required;
- All Engineering Controls must be operated and maintained as specified in this SMP;
- A composite cover system consisting of a concrete cap, asphalt and/or one foot of acceptable soil must be inspected, certified and maintained as required in the SMP;
- A SSDS must be inspected, certified, and maintained as required in the SMP;
- All Engineering Controls on the Controlled Property must be inspected and certified at a frequency and in a manner defined in the SMP;
- Groundwater and other environmental or public health monitoring must be performed as defined in the SMP;
- Data and information pertinent to Site Management for the Controlled Property must be reported at the frequency and in a manner defined in the SMP;
- On-Site environmental monitoring devices, including groundwater monitor wells, must be protected and replaced as necessary to ensure proper functioning in the manner specified in the SMP;
- Engineering Controls may not be discontinued without an amendment or extinguishment of the Environmental Easement.

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

- Vegetable gardens and farming on the Controlled Property are prohibited;
- Use of groundwater underlying the Controlled Property is prohibited without treatment rendering it safe for intended purpose;
- All future activities on the Controlled Property that will disturb residual contaminated material are prohibited unless they are conducted in accordance with the soil management provisions in the Site Management Plan;
- The Controlled Property may be used for commercial and industrial use only, provided the long-term Engineering and Institutional Controls included in the Site Management Plan are employed;
- The Controlled Property may not be used for a higher level of use, such as restricted residential use without an amendment or extinguishment of this Environmental Easement;

Grantor agrees to submit to NYSDEC a written statement that certifies, under penalty of perjury, that: (1) controls employed at the Controlled Property are unchanged from the previous certification or that any changes to the controls were approved by the NYSDEC; and, (2) nothing has occurred that impairs the ability of the controls to protect public health and environment or that constitute a violation or failure to comply with the SMP. NYSDEC retains the right to access such Controlled Property at any time in order to evaluate the continued maintenance of any and all controls. This certification shall be submitted annually, or an alternate period of time that NYSDEC may allow. This annual statement must be certified by an expert that the NYSDEC finds acceptable.

9.2 SITE MANAGEMENT PLAN

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

The SMP is intended to provide a detailed description of the procedures required to manage residual contamination left in place at the Site following completion of the Remedial Action in accordance with the BCA with the NYSDEC. This includes: (1) development, implementation, and management of all Engineering and Institutional Controls; (2) development and implementation of monitoring systems and a Monitoring Plan; (3) development of a plan to operate and maintain any treatment, collection, containment, or recovery systems (including, where appropriate, preparation of an Operation and Maintenance Manual); (4) submittal of Site Management Reports, performance of inspections and certification of results, and demonstration of proper communication of Site information to NYSDEC; and (5) defining criteria for termination of treatment system operation.

To address these needs, this SMP will include four plans: (1) an Engineering and Institutional Control Plan for implementation and management of EC/ICs; (2) a Monitoring Plan for implementation of Site Monitoring; (3) an Operation and Maintenance Plan for implementation of remedial collection, containment, treatment, and recovery systems; and (4) a Site Management Reporting Plan for submittal of data, information, recommendations, and certifications to NYSDEC. The SMP will be prepared in accordance with the requirements in NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation and the guidelines provided by NYSDEC.

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

The Site Management Plan in the Final Engineering Report will include a monitoring plan for groundwater at the down-gradient Site perimeter to evaluate Site -wide performance of the remedy. Appropriately placed groundwater monitor wells will also be installed immediately down-gradient of all VOC remediation areas for the purpose of evaluation of the effectiveness of the remedy that is implemented. The SMP will describe quarterly groundwater monitoring to be conducted at the Site. Analytical results of this quarterly groundwater monitoring will be evaluated to determine if residual groundwater contamination remains and requires further groundwater remediation. If necessary, in-situ treatment of on-site groundwater will be implemented within two years of source removal.

No exclusions for handling of residual contaminated soils will be provided in the SMP. All handling of residual contaminated material will be subject to provisions contained in the SMP.

10.0 FINAL ENGINEERING REPORT

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

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

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

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

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

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

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

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

10.1 CERTIFICATIONS

The following certification will appear in front of the Executive Summary of the Final Engineering Report. The certification will be signed by the Remedial Engineer, Arnold F. Fleming, who is a Professional Engineer registered in New York State This certification will be appropriately signed and stamped. The certification will include the following statements:

I, Arnold F. Fleming, am currently a registered professional engineer licensed by the State of New York. I had primary direct responsibility for implementation of the remedial program for the 511 West 21st Street, Manhattan Site (NYSDEC BCA Index No. C231080-02-13; Site No. C231080).

I certify that the Site description presented in this FER is identical to the Site descriptions presented in the Environmental Easement, the Site Management Plan, and the Brownfield Cleanup Agreement for 511 West 21st Street, Manhattan Site and related amendments.

I certify that the Remedial Action Work Plan dated November 2014 and Stipulations [if any] in a letter dated [month day year] and approved by the NYSDEC were implemented and that all requirements in those documents have been substantively complied with.

I certify that the remedial activities were observed by qualified environmental professionals under my supervision and that the remediation requirements set forth in the Remedial Action Work Plan and any other relevant provisions of ECL 27-1419 have been achieved.

I certify that all use restrictions, Institutional Controls, Engineering Controls, and all operation and maintenance requirements applicable to the Site are contained in an Environmental Easement created and recorded pursuant ECL 71-3605 and that all affected local governments, as defined in ECL 71-3603, have been notified that such easement has been recorded. A Site Management Plan has been submitted by the Volunteer for the continual and proper operation, maintenance, and monitoring of all Engineering Controls employed at the Site, including the proper maintenance of all remaining monitoring wells, and that such plan has been approved by the NYSDEC.

I certify that the export of all contaminated soil, fill, water or other material from the property was performed in accordance with the Remedial Action Work Plan, and were taken to facilities licensed to accept this material in full compliance with all Federal, State and local laws.

I certify that all import of soils from off-Site, including source approval and sampling, has been performed in a manner that is consistent with the methodology defined in the Remedial Action Work Plan.

I certify that all invasive work during the remediation and all invasive development work were conducted in accordance with dust and odor suppression methodology and soil screening methodology defined in the Remedial Action Work Plan.

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

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

11.0 SCHEDULE

A Remedial Action schedule is included in Table 15. The schedule will be revised prior to the start of remediation and construction. Major deviations will be reported to the NYSDEC during the execution of the RAWP.

TABLES

Table 1 - 6 NYCRR Part 375-6 - Track 1 Unrestricted Use Soil Cleanup Objectives
and Track Commercial Use Soil Cleanup Objectives
511 21st West Street New York, New York

Contaminant	Units	Unrestricted Use	Commercial	Protection of Groundwater
Volatile organic compounds				
1,1,1-Trichloroethane	mg/kg	0.68	500	0.68
1,1-Dichloroethane	mg/kg	0.27	240	0.27
1,1-Dichloroethene	mg/kg	0.33	500	0.33
1,2-Dichlorobenzene	mg/kg	1.1	500	1.1
1,2-Dichloroethane	mg/kg	0.02	30	0.02
cis -1,2-Dichloroethene	mg/kg	0.25	500	0.25
trans-1,2-Dichloroethene	mg/kg	0.19	500	0.19
1,3-Dichlorobenzene	mg/kg	2.4	280	2.4
1,4-Dichlorobenzene	mg/kg	1.8	130	1.8
1,4-Dioxane	mg/kg	0.1	130	0.1
Acetone	mg/kg	0.05	500	0.05
Benzene	mg/kg	0.06	44	0.06
n-Butylbenzene	mg/kg	12	500	12
Carbon tetrachloride	mg/kg	0.76	22	0.76
Chlorobenzene	mg/kg	1.1	500	1.1
Chloroform	mg/kg	0.37	350	0.37
Ethylbenzene	mg/kg	1	390	1
Hexachlorobenzene	mg/kg	0.33	6	1.4
Methyl ethyl ketone	mg/kg	0.12	500	0.3
Methyl tert-butyl ether	mg/kg	0.93	500	0.93
Methylene chloride	mg/kg	0.05	500	0.05
n - Propylbenzene	mg/kg	3.9	500	3.9
sec-Butylbenzene	mg/kg	11	500	11
tert-Butylbenzene	mg/kg	5.9	500	5.9
Tetrachloroethene	mg/kg	1.3	150	1.3
Toluene	mg/kg	0.7	500	0.7
Trichloroethene	mg/kg	0.47	200	0.47
1,2,4-Trimethylbenzene	mg/kg	3.6	190	3.6
1,3,5-Trimethylbenzene	mg/kg	8.4	190	8.4
Vinyl chloride	mg/kg	0.02	13	0.02
Xylene (mixed)	mg/kg	0.26	500	1.6
Metals				
Arsenic	mg/kg	13	16	16
Barium	mg/kg	350	400	820
Beryllium	mg/kg	7.2	590	47
Cadmium	mg/kg	2.5	9.3	7.5
Chromium, hexavalent	mg/kg	1	400	19
Chromium, trivalent	mg/kg	30	1,500	
Copper	mg/kg	50	270	1720
Total Cyanide	mg/kg	27	27	40
Lead	mg/kg	63	1,000	450
Manganese	mg/kg	1600	10,000	2000
Total Mercury	mg/kg	0.18	2.8	0.73
Nickel	mg/kg	30	310	130
Selenium	mg/kg	3.9	1,500	4
Silver	mg/kg	2	1,500	8.3
Zinc	mg/kg	109	10,000	2480

Contaminant	Units	Unrestricted Use	Commercial	Protection of Groundwater
Semivolatile organic compounds				
Acenaphthene	mg/kg	20	500	98
Acenapthylene	mg/kg	100	500	107
Anthracene	mg/kg	100	500	1000
Benz(a)anthracene	mg/kg	1	5.6	1
Benzo(a)pyrene	mg/kg	1	1	22
Benzo(b)fluoranthene	mg/kg	1	5.6	1.7
Benzo(g,h,i)perylene	mg/kg	100	500	1000
Benzo(k)fluoranthene	mg/kg	0.8	56	1.7
Chrysene	mg/kg	1	56	1
Dibenz(a,h)anthracene	mg/kg	0.33	0.56	1000
Fluoranthene	mg/kg	100	500	1000
Fluorene	mg/kg	30	500	386
Indeno(1,2,3-cd)pyrene	mg/kg	0.5	5.6	8.2
m-Cresol	mg/kg	0.33	500	0.33
Naphthalene	mg/kg	12	500	12
o-Cresol	mg/kg	0.33	500	0.33
p-Cresol	mg/kg	0.33	500	0.33
Pentachlorophenol	mg/kg	0.8	6.7	0.8
Phenanthrene	mg/kg	100	500	1000
Phenol	mg/kg	0.33	500	0.33
Pyrene	mg/kg	100	500	1000
PCBs/Pesticides				
2,4,5-TP Acid (Silvex)	mg/kg	3.8	500	3.8
4,4'-DDE	mg/kg	0.0033	62	17
4,4'-DDT	mg/kg	0.0033	47	136
4,4'-DDD	mg/kg	0.0033	92	14
Aldrin	mg/kg	0.005	0.68	0.19
alpha-BHC	mg/kg	0.02	3.4	0.02
beta-BHC	mg/kg	0.036	3	0.03
Chlordane (alpha)	mg/kg	0.094	24	2.9
delta-BHC	mg/kg	0.04	500	0.25
Dibenzofuran	mg/kg	7	350	6.2
Dieldrin	mg/kg	0.005	1.4	0.1
Endosulfan I	mg/kg	2.4	200	102
Endosulfan II	mg/kg	2.4	200	102
Endosulfan sulfate	mg/kg	2.4	200	1000
Endrin	mg/kg	0.014	89	0.06
Heptachlor	mg/kg	0.042	15	0.38
Lindane	mg/kg	0.1	9.2	0.1
Polychlorinated biphenyls	mg/kg	0.1	1	3.2

Table 2 -Technical and Operational Guidance Series 1.1.1 Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations – Class GA
511 West 21st Street New York, New York

Contaminant	Units	NY TOGS Class GA GW Standards (NYSDEC 6/2004)
Volatile organic compounds		
Acetone	ug/L	-
Benzene	ug/L	1
Bromodichloromethane	ug/L	-
Bromoform	ug/L	-
Bromomethane	ug/L	5
2-Butanone (MEK)	ug/L	-
Carbon disulfide	ug/L	60
Carbon tetrachloride	ug/L	5
Chlorobenzene	ug/L	5
Chloroethane	ug/L	5
Chloroform	ug/L	7
Chloromethane	ug/L	5
Cyclohexane	ug/L	-
1,2-Dibromo-3-chloropropane	ug/L	0.04
Dibromochloromethane	ug/L	-
1,2-Dibromoethane	ug/L	0.0006
1,2-Dichlorobenzene	ug/L	3
1,3-Dichlorobenzene	ug/L	3
1,4-Dichlorobenzene	ug/L	3
Dichlorodifluoromethane	ug/L	5
1,1-Dichloroethane	ug/L	5
1,2-Dichloroethane	ug/L	0.6
1,1-Dichloroethene	ug/L	5
cis-1,2-Dichloroethene	ug/L	5
trans-1,2-Dichloroethene	ug/L	5
1,2-Dichloropropane	ug/L	1
cis-1,3-Dichloropropene	ug/L	-
trans-1,3-Dichloropropene	ug/L	-
Ethylbenzene	ug/L	5
Freon 113	ug/L	5
2-Hexanone	ug/L	-
Isopropylbenzene	ug/L	5
Methyl Acetate	ug/L	-
Methylcyclohexane	ug/L	-
Methyl Tert Butyl Ether	ug/L	10
4-Methyl-2-pentanone(MIBK)	ug/L	-
Methylene chloride	ug/L	5
Styrene	ug/L	5
1,1,2,2-Tetrachloroethane	ug/L	5
Tetrachloroethene	ug/L	5
Toluene	ug/L	5
1,2,4-Trichlorobenzene	ug/L	5
1,1,1-Trichloroethane	ug/L	5
1,1,2-Trichloroethane	ug/L	1
Trichloroethene	ug/L	5
Trichlorofluoromethane	ug/L	5
Vinyl chloride	ug/L	2
Xylene (total)	ug/L	5

Contaminant	Units	NY TOGS Class GA GW Standards (NYSDEC 6/2004)
Semivolatile organic compounds		
2-Chlorophenol	ug/L	-
4-Chloro-3-methyl phenol	ug/L	-
2,4-Dichlorophenol	ug/L	1
2,4-Dimethylphenol	ug/L	1
2,4-Dinitrophenol	ug/L	1
4,6-Dinitro-o-cresol	ug/L	-
2-Methylphenol	ug/L	-
3&4-Methylphenol	ug/L	-
2-Nitrophenol	ug/L	-
4-Nitrophenol	ug/L	-
Pentachlorophenol	ug/L	1
Phenol	ug/L	1
2,4,5-Trichlorophenol	ug/L	-
2,4,6-Trichlorophenol	ug/L	-
Acenaphthene	ug/L	-
Acenaphthylene	ug/L	-
Acetophenone	ug/L	-
Anthracene	ug/L	-
Atrazine	ug/L	7.5
Benzaldehyde	ug/L	-
Benzo(a)anthracene	ug/L	-
Benzo(a)pyrene	ug/L	ND
Benzo(b)fluoranthene	ug/L	-
Benzo(g,h,i)perylene	ug/L	-
Benzo(k)fluoranthene	ug/L	-
4-Bromophenyl phenyl ether	ug/L	-
Butyl benzyl phthalate	ug/L	-
1,1'-Biphenyl	ug/L	5
2-Chloronaphthalene	ug/L	-
4-Chloroaniline	ug/L	5
Carbazole	ug/L	-
Caprolactam	ug/L	-
Chrysene	ug/L	-
bis(2-Chloroethoxy)methane	ug/L	5
bis(2-Chloroethyl)ether	ug/L	1
bis(2-Chloroisopropyl)ether	ug/L	5
4-Chlorophenyl phenyl ether	ug/L	-
2,4-Dinitrotoluene	ug/L	5
2,6-Dinitrotoluene	ug/L	5
3,3'-Dichlorobenzidine	ug/L	5
Dibenzo(a,h)anthracene	ug/L	-
Dibenzofuran	ug/L	-
Di-n-butyl phthalate	ug/L	50
Di-n-octyl phthalate	ug/L	-
Diethyl phthalate	ug/L	-
Dimethyl phthalate	ug/L	-
bis(2-Ethylhexyl)phthalate	ug/L	5
Fluoranthene	ug/L	-
Fluorene	ug/L	-
Hexachlorobenzene	ug/L	0.04
Hexachlorobutadiene	ug/L	0.5
Hexachlorocyclopentadiene	ug/L	5
Hexachloroethane	ug/L	5
Indeno(1,2,3-cd)pyrene	ug/L	-
Isophorone	ug/L	-
2-Methylnaphthalene	ug/L	-
2-Nitroaniline	ug/L	5
3-Nitroaniline	ug/L	5
4-Nitroaniline	ug/L	5
Naphthalene	ug/L	-
Nitrobenzene	ug/L	0.4
N-Nitroso-di-n-propylamine	ug/L	-
N-Nitrosodiphenylamine	ug/L	-
Phenanthrene	ug/L	-
Pyrene	ug/L	-

Contaminant	Units	NY TOGS Class GA GW Standards (NYSDEC 6/2004)
Metals		
Aluminum	ug/L	-
Antimony	ug/L	3
Arsenic	ug/L	25
Barium	ug/L	1000
Beryllium	ug/L	-
Cadmium	ug/L	5
Calcium	ug/L	-
Chromium	ug/L	50
Cobalt	ug/L	-
Copper	ug/L	200
Iron	ug/L	300
Lead	ug/L	25
Magnesium	ug/L	-
Manganese	ug/L	300
Mercury	ug/L	0.7
Nickel	ug/L	100
Potassium	ug/L	-
Selenium	ug/L	10
Silver	ug/L	50
Sodium	ug/L	20000
Thallium	ug/L	-
Vanadium	ug/L	-
Zinc	ug/L	-

Table 3 - New York State Department of Health Air Guidance Values
511 West 21st Street New York, New York

Contaminant	Units	NYSDOH Air Guidance Values
Methylene chloride	ug/m3	60
Tetrachloroethylene	ug/m3	30
Trichloroethylene	ug/m3	5

Table 4 - Summary of Soil Analytical Results
511 West 21st Street New York, New York

Compound	UUSCO (mg/kg)	CUSCO (mg/kg)	PGSCO (mg/kg)	Number of Samples Exceeding	Max Conc. (mg/kg)	Samples from 0'-5' exceeding UUSCO	Samples from 0'-5' exceeding PGSCO	Samples from 0'-5' exceeding CUSCO	Samples from 5'-10' exceeding UUSCO	Samples from 5'-10' exceeding PGSCO	Samples from 5'-10' exceeding CUSCO
Volatile Organic Compounds											
Benzene	0.06	44	0.06	3	1.86	-	-	-	SB-9, SB-5, SB-14	SB-9, SB-5, SB-14	-
Ethylbenzene	1	390	1	2	17.7	-	-	-	SB-9, SB-5	SB-9, SB-5	-
Methyl Tert Butyl Ether	0.93	500	0.93	1	8.7	-	-	-	SB-14	SB-14	-
Methylene chloride	0.05	500	0.05	3	0.457	-	-	-	SB-1, SB-2, SB-14	SB-1, SB-2, SB-14	-
Toluene	0.7	500	0.7	1	1.44	-	-	-	SB-14	SB-14	-
m,p-Xylene	0.26	500	1.6	2	8.13	-	-	-	SB-9, SB-14	SB-9	-
o-Xylene	0.26	500	1.6	2	0.308	-	-	-	SB-9, SB-14	-	-
Xylene (total)	0.26	500	1.6	2	8.44	-	-	-	SB-9, SB-14	SB-9	-
Semi Volatile Organic Compounds											
Benzo(a)anthracene	1	5.6	1	4	5.2	SB-3, SB-6, SB-9, SB-12	SB-3, SB-6, SB-9, SB-12	-	-	-	-
Benzo(a)pyrene	1	1	22	4	4.84	SB-3, SB-9, SB-11, SB-12	-	SB-3, SB-9, SB-11, SB-12	-	-	-
Benzo(b)fluoranthene	1	5.6	1.7	5	5.4	SB-3, SB-6, SB-9, SB-11, SB-12	-	-	-	-	-
Benzo(k)fluoranthene	0.8	56	1.7	1	1.94	SB-9	SB-9	-	-	-	-
Chrysene	1	56	1	5	5.33	SB-3, SB-6, SB-9, SB-11, SB-12	SB-3, SB-6, SB-9, SB-11, SB-12	-	-	-	-
Dibenzo(a,h)anthracene	0.33	0.56	1000	1	0.805	SB-9	-	SB-9	-	-	-
2-Methylnaphthalene	-	-	36.4	1	39.4	-	-	-	-	SB-1	-
Indeno(1,2,3-cd)pyrene	0.5	5.6	8.2	5	2.82	SB-3, SB-9, SB-11, SB-12, SB-14	-	-	-	-	-
Pesticides											
4,4'-DDT	0.0033	47	136	6	0.0107	SB-3, SB-6, SB-9, SB-10, SB-11, SB-12	-	-	-	-	-

Table 4 - Summary of Soil Analytical Results
511 West 21st Street New York, New York

Compound	UUSCO (mg/kg)	CUSCO (mg/kg)	PGSCO (mg/kg)	Number of Samples Exceeding	Max Conc. (mg/kg)	Samples from 0'-5' exceeding UUSCO	Samples from 0'-5' exceeding PGSCO	Samples from 0'-5' exceeding CUSCO	Samples from 5'-10' exceeding UUSCO	Samples from 5'-10' exceeding PGSCO	Samples from 5'-10' exceeding CUSCO
Metals											
Cadmium	2.5	9.3	7.5	1	2.7	SB-10	-	-	-	-	-
Copper	50	270	1720	11	592	SB-1, SB-2, SB-3, SB-4, SB-5, SB-6, SB-7, SB-10, SB-11, SB-12, SB-20	-	SB-1	-	-	-
Lead	63	1000	450	17	358	SB-1, SB-2, SB-3, SB-4, SB-5, SB-6, SB-7, SB-8, SB-9, SB-10, SB-11, SB-12, SB-13, SB-14, SB-20	-	-	SB-9, SB-11	-	-
Mercury	0.18	2.8	0.73	9	2.7	SB-3, SB-5, SB-7, SB-9, SB-10, SB-11, SB-12, SB-20	SB-9, SB-11, SB-12	-	SB-9	-	-
Silver	2	1500	8.3	1	4	SB-5	-	-		-	-
Zinc	109	10000	2480	9	241	SB-1, SB-3, SB-4, SB-5, SB-7, SB-10, SB-11, SB-12, SB-20	-	-	-	-	-

UUSCO - Unrestricted Use Soil Cleanup Objectives, 6 NYCRR Part 375
CUSCO - Commercial Use Soil Cleanup Objectives, 6 NYCRR Part 375
PGSCO - Protection of Groundwater Soil Cleanup Objectives, CP-51, 6 NYCRR Part 375
Sample Data: December 9, 10, & 12, 2013

Table 5 - Volatile Organic Compounds in Soil Samples
511 West 21st Street, New York, NY

Client Sample ID:		NY SCO - Unrestricted Use (6 NYCRR 375-6 12/06)	NY SCO - Commercial w/CP-51 (10/10) (6 NYCRR 375-6 12/06)	NY SCO - Protection of Groundwater w/CP-51 (10/10) (6 NYCRR 375-6 12/06)	SB-1(0-2')	SB-1(7-9')	SB-2(0-2')	SB-2(8-10')	SB-3(0-2')	SB-3(8-10')	SB-4(0-2')	SB-4(8-10')	SB-5(3-5')	SB-5(6-8')	SB-6(3-5')	SB-6(6-8')	SB-7(3-5')	SB-7(6-8')
Lab Sample ID:					JB55187-7	JB55187-8	JB55187-3	JB55187-4	JB55187-5	JB55187-6	JB55187-1	JB55187-2	JB55187-25	JB55187-26	JB55187-27	JB55187-28	JB55187-29	JB55187-30
Date Sampled:					12/10/2013	12/10/2013	12/9/2013	12/9/2013	12/9/2013	12/9/2013	12/9/2013	12/9/2013	12/12/2013	12/12/2013	12/12/2013	12/12/2013	12/12/2013	12/12/2013
Matrix:					Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
GC/MS Volatiles (SW846																		
Acetone	mg/kg	0.05	500	0.05	0.0051 J	ND (0.27)	0.0052 J	ND (0.25)	0.0127	0.0126	0.0114 J	0.0123	0.0106	ND (0.70)	ND (0.0040)	ND (0.30)	ND (0.0046)	0.0079 J
Benzene	mg/kg	0.06	44	0.06	0.00060 J	0.0471 J	ND (0.00012)	ND (0.0070)	0.00029 J	ND (0.00012)	0.00051 J	ND (0.00011)	0.00059 J	**0.328**	0.00030 J	ND (0.0082)	ND (0.00013)	ND (0.00013)
Bromochloromethane	mg/kg	-	-	-	ND (0.00055)	ND (0.031)	ND (0.00049)	ND (0.029)	ND (0.00064)	ND (0.00051)	ND (0.00079)	ND (0.00043)	ND (0.00047)	ND (0.080)	ND (0.00046)	ND (0.034)	ND (0.00053)	ND (0.00055)
Bromodichloromethane	mg/kg	-	-	-	ND (0.00030)	ND (0.017)	ND (0.00026)	ND (0.016)	ND (0.00035)	ND (0.00028)	ND (0.00043)	ND (0.00023)	ND (0.00025)	ND (0.043)	ND (0.00025)	ND (0.018)	ND (0.00029)	ND (0.00030)
Bromoform	mg/kg	-	-	-	ND (0.00028)	ND (0.016)	ND (0.00025)	ND (0.015)	ND (0.00033)	ND (0.00026)	ND (0.00040)	ND (0.00022)	ND (0.00024)	ND (0.040)	ND (0.00023)	ND (0.017)	ND (0.00027)	ND (0.00028)
Bromomethane	mg/kg	-	-	-	ND (0.00051)	ND (0.029)	ND (0.00045)	ND (0.027)	ND (0.00060)	ND (0.00048)	ND (0.00073)	ND (0.00040)	ND (0.00043)	ND (0.074)	ND (0.00042)	ND (0.031)	ND (0.00049)	ND (0.00051)
2-Butanone (MEK)	mg/kg	0.12	500	0.3	ND (0.0046)	ND (0.26)	ND (0.0041)	ND (0.25)	ND (0.0055)	ND (0.0044)	ND (0.0067)	ND (0.0037)	ND (0.0040)	ND (0.68)	ND (0.0039)	ND (0.29)	ND (0.0045)	ND (0.0046)
Carbon disulfide	mg/kg	-	-	2.7	ND (0.00015)	ND (0.0084)	ND (0.00013)	ND (0.0079)	ND (0.00017)	ND (0.00014)	ND (0.00021)	ND (0.00012)	ND (0.00013)	ND (0.022)	0.0011 J	ND (0.0092)	ND (0.00014)	ND (0.00015)
Carbon tetrachloride	mg/kg	0.76	22	0.76	ND (0.00026)	ND (0.015)	ND (0.00023)	ND (0.014)	ND (0.00031)	ND (0.00025)	ND (0.00038)	ND (0.00021)	ND (0.00023)	ND (0.039)	ND (0.00022)	ND (0.016)	ND (0.00026)	ND (0.00026)
Chlorobenzene	mg/kg	1.1	500	1.1	ND (0.00021)	ND (0.012)	ND (0.00018)	ND (0.011)	ND (0.00024)	ND (0.00020)	ND (0.00030)	ND (0.00016)	ND (0.00018)	ND (0.030)	ND (0.00017)	ND (0.013)	ND (0.00020)	ND (0.00021)
Chloroethane	mg/kg	-	-	1.9	ND (0.0010)	ND (0.059)	ND (0.00093)	ND (0.056)	ND (0.0012)	ND (0.00099)	ND (0.0015)	ND (0.00083)	ND (0.00090)	ND (0.15)	ND (0.00087)	ND (0.065)	ND (0.0010)	ND (0.0011)
Chloroform	mg/kg	0.37	350	0.37	ND (0.00027)	ND (0.015)	ND (0.00024)	ND (0.014)	ND (0.00032)	ND (0.00025)	ND (0.00039)	ND (0.00021)	ND (0.00023)	ND (0.039)	ND (0.00022)	ND (0.017)	ND (0.00026)	ND (0.00027)
Chloromethane	mg/kg	-	-	-	ND (0.00036)	ND (0.020)	ND (0.00032)	ND (0.019)	ND (0.00043)	ND (0.00034)	ND (0.00052)	ND (0.00029)	ND (0.00031)	ND (0.053)	ND (0.00030)	ND (0.022)	ND (0.00035)	ND (0.00036)
Cyclohexane	mg/kg	-	-	-	ND (0.00027)	0.697	ND (0.00024)	ND (0.014)	ND (0.00032)	ND (0.00025)	ND (0.00039)	ND (0.00021)	0.0019 J	1.91	0.016	0.287 J	ND (0.00026)	ND (0.00027)
1,2-Dibromo-3-chloropropane	mg/kg	-	-	-	ND (0.0014)	ND (0.079)	ND (0.0012)	ND (0.074)	ND (0.0016)	ND (0.0013)	ND (0.0020)	ND (0.0011)	ND (0.0012)	ND (0.21)	ND (0.0012)	ND (0.086)	ND (0.0014)	ND (0.0014)
Dibromochloromethane	mg/kg	-	-	-	ND (0.00025)	ND (0.014)	ND (0.00023)	ND (0.014)	ND (0.00030)	ND (0.00024)	ND (0.00037)	ND (0.00020)	ND (0.00022)	ND (0.037)	ND (0.00021)	ND (0.016)	ND (0.00025)	ND (0.00026)
1,2-Dibromoethane	mg/kg	-	-	-	ND (0.00058)	ND (0.033)	ND (0.00051)	ND (0.031)	ND (0.00068)	ND (0.00054)	ND (0.00083)	ND (0.00046)	ND (0.00049)	ND (0.085)	ND (0.00048)	ND (0.036)	ND (0.00056)	ND (0.00058)
1,2-Dichlorobenzene	mg/kg	1.1	500	1.1	ND (0.00036)	ND (0.020)	ND (0.00032)	ND (0.019)	ND (0.00042)	ND (0.00033)	ND (0.00051)	ND (0.00028)	ND (0.00030)	ND (0.052)	ND (0.00030)	ND (0.022)	ND (0.00034)	ND (0.00036)
1,3-Dichlorobenzene	mg/kg	2.4	280	2.4	ND (0.00023)	ND (0.013)	ND (0.00020)	ND (0.012)	ND (0.00027)	ND (0.00022)	ND (0.00033)	ND (0.00018)	ND (0.00020)	ND (0.034)	ND (0.00019)	ND (0.014)	ND (0.00022)	ND (0.00023)
1,4-Dichlorobenzene	mg/kg	1.8	130	1.8	ND (0.00026)	ND (0.015)	ND (0.00023)	ND (0.014)	ND (0.00031)	ND (0.00025)	ND (0.00038)	ND (0.00021)	ND (0.00023)	ND (0.039)	ND (0.00022)	ND (0.016)	ND (0.00026)	ND (0.00026)
Dichlorodifluoromethane	mg/kg	-	-	-	ND (0.00037)	ND (0.021)	ND (0.00033)	ND (0.020)	ND (0.00044)	ND (0.00035)	ND (0.00054)	ND (0.00030)	ND (0.00032)	ND (0.055)	ND (0.00031)	ND (0.023)	ND (0.00036)	ND (0.00037)
1,1-Dichloroethane	mg/kg	0.27	240	0.27	ND (0.00033)	ND (0.019)	ND (0.00029)	ND (0.018)	ND (0.00039)	ND (0.00031)	ND (0.00048)	ND (0.00026)	ND (0.00028)	ND (0.049)	ND (0.00028)	ND (0.020)	ND (0.00032)	ND (0.00033)
1,2-Dichloroethane	mg/kg	0.02	30	0.02	ND (0.00034)	ND (0.019)	ND (0.00030)	ND (0.018)	ND (0.00040)	ND (0.00032)	ND (0.00049)	ND (0.00027)	ND (0.00029)	ND (0.050)	ND (0.00028)	ND (0.021)	ND (0.00033)	ND (0.00034)
1,1-Dichloroethene	mg/kg	0.33	500	0.33	ND (0.00030)	ND (0.017)	ND (0.00027)	ND (0.016)	ND (0.00036)	ND (0.00028)	ND (0.00044)	ND (0.00024)	ND (0.00026)	ND (0.044)	ND (0.00025)	ND (0.019)	ND (0.00029)	ND (0.00030)
cis-1,2-Dichloroethene	mg/kg	0.25	500	0.25	ND (0.00022)	ND (0.012)	ND (0.00019)	ND (0.012)	ND (0.00026)	ND (0.00021)	ND (0.00031)	ND (0.00017)	ND (0.00019)	ND (0.032)	ND (0.00018)	ND (0.013)	ND (0.00021)	ND (0.00022)
trans-1,2-Dichloroethene	mg/kg	0.19	500	0.19	ND (0.00045)	ND (0.025)	ND (0.00040)	ND (0.024)	ND (0.00052)	ND (0.00042)	ND (0.00064)	ND (0.00035)	ND (0.00038)	ND (0.065)	ND (0.00037)	ND (0.027)	ND (0.00043)	ND (0.00045)
1,2-Dichloropropane	mg/kg	-	-	-	ND (0.00046)	ND (0.026)	ND (0.00041)	ND (0.024)	ND (0.00054)	ND (0.00043)	ND (0.00066)	ND (0.00036)	ND (0.00039)	ND (0.067)	ND (0.00038)	ND (0.028)	ND (0.00044)	ND (0.00046)
cis-1,3-Dichloropropene	mg/kg	-	-	-	ND (0.00024)	ND (0.013)	ND (0.00021)	ND (0.013)	ND (0.00028)	ND (0.00022)	ND (0.00035)	ND (0.00019)	ND (0.00020)	ND (0.035)	ND (0.00020)	ND (0.015)	ND (0.00023)	ND (0.00024)
trans-1,3-Dichloropropene	mg/kg	-	-	-	ND (0.00028)	ND (0.016)	ND (0.00025)	ND (0.015)	ND (0.00033)	ND (0.00027)	ND (0.00041)	ND (0.00023)	ND (0.00024)	ND (0.042)	ND (0.00024)	ND (0.018)	ND (0.00027)	ND (0.00028)
Ethylbenzene	mg/kg	1	390	1	ND (0.00018)	0.0318 J	ND (0.00016)	ND (0.0098)	ND (0.00022)	ND (0.00017)	ND (0.00027)	ND (0.00015)	0.0035	**1.32**	0.0214	0.0339 J	ND (0.00018)	ND (0.00018)
Freon 113	mg/kg	-	-	6	ND (0.00046)	ND (0.026)	ND (0.00041)	ND (0.024)	ND (0.00054)	ND (0.00043)	ND (0.00066)	ND (0.00036)	ND (0.00039)	ND (0.067)	ND (0.00038)	ND (0.028)	ND (0.00044)	ND (0.00046)
2-Hexanone	mg/kg	-	-	-	ND (0.0019)	ND (0.11)	ND (0.0017)	ND (0.099)	ND (0.0022)	ND (0.0018)	ND (0.0027)	ND (0.0015)	ND (0.0016)	ND (0.27)	ND (0.0016)	ND (0.12)	ND (0.0018)	ND (0.0019)
Isopropylbenzene	mg/kg	-	-	2.3	ND (0.00015)	0.71	ND (0.00014)	0.372	ND (0.00018)	ND (0.00015)	ND (0.00022)	ND (0.00012)	0.00033 J	8.78	0.0044	0.517	ND (0.00015)	ND (0.00016)
Methyl Acetate	mg/kg	-	-	-	ND (0.0018)	ND (0.099)	ND (0.0016)	ND (0.093)	ND (0.0021)	ND (0.0017)	ND (0.0025)	ND (0.0014)	ND (0.0015)	ND (0.26)	ND (0.0015)	ND (0.11)	ND (0.0017)	ND (0.0018)
Methylcyclohexane	mg/kg	-	-	-	0.00052 J	3.17	ND (0.00015)	0.0896 J	ND (0.00020)	ND (0.00016)	ND (0.00025)	ND (0.00014)	0.0024 J	12	0.0302	2.12	ND (0.00017)	ND (0.00017)
Methyl Tert Butyl Ether	mg/kg	0.93	500	0.93	ND (0.00036)	ND (0.020)	ND (0.00032)	ND (0.019)	ND (0.00043)	ND (0.00034)	ND (0.00052)	ND (0.00029)	ND (0.00031)	ND (0.053)	ND (0.00030)	ND (0.022)	ND (0.00035)	ND (0.00036)
4-Methyl-2-pentanone(MIBK)	mg/kg	-	-	1	ND (0.0014)	ND (0.078)	ND (0.0012)	ND (0.074)	ND (0.0016)	ND (0.0013)	ND (0.0020)	ND (0.0011)	ND (0.0012)	ND (0.20)	ND (0.0012)	ND (0.086)	ND (0.0013)	ND (0.0014)
Methylene chloride	mg/kg	0.05	500	0.05	ND (0.0018)	**0.457**	ND (0.0016)	**0.381**	ND (0.0021)	ND (0.0017)	0.0046 J	ND (0.0014)	ND (0.0015)	ND (0.26)	ND (0.0015)	ND (0.11)	ND (0.0017)	ND (0.0018)
Styrene	mg/kg	-	-	-	ND (0.00024)	ND (0.014)	ND (0.00022)	ND (0.013)	ND (0.00029)	ND (0.00023)	ND (0.00035)	ND (0.00019)	ND (0.00021)	ND (0.036)	ND (0.00020)	ND (0.015)	ND (0.00024)	ND (0.00024)
1,1,2,2-Tetrachloroethane	mg/kg	-	-	0.6	ND (0.00036)	ND (0.020)	ND (0.00032)	ND (0.019)	ND (0.00042)	ND (0.00034)	ND (0.00052)	ND (0.00029)	ND (0.00031)	ND (0.053)	ND (0.00030)	ND (0.022)	ND (0.00035)	ND (0.00036)
Tetrachloroethene	mg/kg	1.3	150	1.3	ND (0.00043)	ND (0.024)	0.0011 J	ND (0.023)	ND (0.00051)	ND (0.00041)	ND (0.00062)	ND (0.00034)	ND (0.00037)	ND (0.063)	ND (0.00036)	ND (0.027)	ND (0.00042)	ND (0.00043)
Toluene	mg/kg	0.7	500	0.7	0.00043 J	0.0344 J	ND (0.00013)	0.0337 J	ND (0.00018)	ND (0.00014)	0.00054 J	ND (0.00012)	0.0023	ND (0.022)	0.0025	ND (0.0092)	ND (0.00014)	ND (0.00015)
1,2,3-Trichlorobenzene	mg/kg	-	-	-	ND (0.00022)	ND (0.012)	ND (0.00019)	ND (0.012)	ND (0.00026)	ND (0.00021)	ND (0.00031)	ND (0.00017)	ND (0.00019)	ND (0.032)	ND (0.00018)	ND (0.013)	ND (0.00021)	ND (0.00022)
1,2,4-Trichlorobenzene	mg/kg	-	-	3.4	ND (0.00019)	ND (0.011)	ND (0.00017)	ND (0.010)	ND (0.00022)	ND (0.00018)	ND (0.00028)	ND (0.00015)	ND (0.00016)	ND (0.028)	ND (0.00016)	ND (0.012)	ND (0.00018)	ND (0.00019)
1,1,1-Trichloroethane	mg/kg	0.68	500	0.68	ND (0.00030)	ND (0.017)	ND (0.00027)	ND (0.016)	ND (0.00036)	ND (0.00028)	ND (0.00044)	ND (0.00024)	ND (0.00026)	ND (0.044)	ND (0.00025)	ND (0.019)	ND (0.00029)	ND (0.00030)
1,1,2-Trichloroethane	mg/kg	-	-	-	ND (0.00086)	ND (0.049)	ND (0.00077)	ND (0.046)	ND (0.0010)	ND (0.00081)	ND (0.0012)	ND (0.00069)	ND (0.00074)	ND (0.13)	ND (0.00072)	ND (0.053)	ND (0.00083)	ND (0.00087)
Trichloroethene	mg/kg	0.47	200	0.47	ND (0.00037)	ND (0.021)	ND (0.00033)	ND (0.020)	ND (0.00043)	ND (0.00035)	ND (0.00053)	ND (0.00029)	ND (0.00032)	ND (0.054)	ND (0.00031)	ND (0.023)	ND (0.00036)	ND (0.00037)
Trichlorofluoromethane	mg/kg	-	-	-	ND (0.00024)	ND (0.013)	ND (0.00021)	ND (0.013)	ND (0.00028)	ND (0.00022)	ND (0.00034)	ND (0.00019)	ND (0.00020)	ND (0.035)	ND (0.00020)	ND (0.015)	ND (0.00023)	ND (0.00024)
Vinyl chloride	mg/kg	0.02	13	0.02	ND (0.00036)	ND (0.020)	ND (0.00032)	ND (0.019)	ND (0.00042)	ND (0.00034)	ND (0.00052)	ND (0.00029)	ND (0.00031)	ND (0.053)	ND (0.00030)	ND (0.022)	ND (0.00035)	ND (0.00036)
m,p-Xylene	mg/kg	0.26	500	1.6	ND (0.00051)	ND (0.029)	ND (0.00045)	ND (0.027)	ND (0.00060)	ND (0.00048)	ND (0.00074)	ND (0.00040)	0.0078	0.253	0.0658	ND (0.031)	ND (0.00049)	ND (0.00051)
o-Xylene	mg/kg	0.26	500	1.6	ND (0.00019)	0.0178 J	ND (0.00017)	ND (0.0099)	ND (0.00022)	ND (0.00018)	ND (0.00027)	ND (0.00015)	0.003	ND (0.027)	0.0253	0.0246 J	ND (0.00018)	ND (0.00019)
Xylene (total)	mg/kg	0.26	500	1.6	0.00030 J	0.0306 J	ND (0.00017)	ND (0.0099)	ND (0.00022)	ND (0.00018)	0.00064 J	ND (0.00015)	0.0108	0.253	0.0911	0.0387 J	0.00023 J	ND (0.00019)
GC/MS Volatile TIC																		
Total TIC, Volatile	mg/kg	-	-	-	0.0925 J	195.3 J	0	314 J	0	0	0	0	0.0308 J	857 J	0.453 J	141 J	0	0
General Chemistry																		
Solids, Percent	%	-	-	-	91.4	87.3	93.8	88.7	91.6	80.1	91.3	86.7	91	72.6	87.7	82.3	89.4	75.2

Legend:
Hit
Exceedance of UUSCO
Exceedance of Commercial Use SCO
Exceedance of Protection of Groundwater SCO and UUSCO
J - Estimated Value

Table 5 - Volatile Organic Compounds in Soil Samples
511 West 21st Street, New York, NY

Client Sample ID:		NY SCO - Unrestricted Use (6 NYCRR 375-6 12/06)	NY SCO - Commercial w/CP-51 (10/10) (6 NYCRR 375-6 12/06)	NY SCO - Protection of Groundwater w/CP-51 (10/10) (6 NYCRR 375-6 12/06)	SB-8(0-2')	SB-8(6-8')	SB-9(3-5')	SB-9(6-8')	SB-10(0-2')	SB-10(6-8')
Lab Sample ID:					JB55187-13	JB55187-14	JB55187-23	JB55187-24	JB55187-19	JB55187-20
Date Sampled:					12/11/2013	12/11/2013	12/12/2013	12/12/2013	12/12/2013	12/12/2013
Matrix:					Soil	Soil	Soil	Soil	Soil	Soil
GC/MS Volatiles (SW846 8260C)										
Acetone	mg/kg	0.05	500	0.05	ND (0.0042)	ND (0.0051)	ND (0.0038)	ND (0.29)	ND (0.0051)	0.035
Benzene	mg/kg	0.06	44	0.06	0.00022 J	ND (0.00014)	0.001	**1.86**	ND (0.00014)	0.00030 J
Bromochloromethane	mg/kg	-	-	-	ND (0.00047)	ND (0.00058)	ND (0.00043)	ND (0.033)	ND (0.00058)	ND (0.00051)
Bromodichloromethane	mg/kg	-	-	-	ND (0.00026)	ND (0.00031)	ND (0.00023)	ND (0.018)	ND (0.00032)	ND (0.00028)
Bromoform	mg/kg	-	-	-	ND (0.00024)	ND (0.00029)	ND (0.00022)	ND (0.017)	ND (0.00029)	ND (0.00026)
Bromomethane	mg/kg	-	-	-	ND (0.00044)	ND (0.00054)	ND (0.00040)	ND (0.030)	ND (0.00054)	ND (0.00047)
2-Butanone (MEK)	mg/kg	0.12	500	0.3	ND (0.0040)	ND (0.0049)	ND (0.0037)	ND (0.28)	ND (0.0049)	ND (0.0043)
Carbon disulfide	mg/kg	-	-	2.7	0.00036 J	ND (0.00016)	ND (0.00012)	0.102 J	ND (0.00016)	0.00062 J
Carbon tetrachloride	mg/kg	0.76	22	0.76	ND (0.00023)	ND (0.00028)	ND (0.00021)	ND (0.016)	ND (0.00028)	ND (0.00025)
Chlorobenzene	mg/kg	1.1	500	1.1	ND (0.00018)	ND (0.00022)	ND (0.00016)	ND (0.012)	ND (0.00022)	ND (0.00019)
Chloroethane	mg/kg	-	-	1.9	ND (0.00091)	ND (0.0011)	ND (0.00083)	ND (0.063)	ND (0.0011)	ND (0.00098)
Chloroform	mg/kg	0.37	350	0.37	ND (0.00023)	ND (0.00028)	ND (0.00021)	ND (0.016)	ND (0.00029)	ND (0.00025)
Chloromethane	mg/kg	-	-	-	ND (0.00031)	ND (0.00038)	ND (0.00029)	ND (0.022)	ND (0.00039)	ND (0.00034)
Cyclohexane	mg/kg	-	-	-	ND (0.00023)	ND (0.00029)	0.00027 J	11.6	ND (0.00029)	ND (0.00025)
1,2-Dibromo-3-chloropropane	mg/kg	-	-	-	ND (0.0012)	ND (0.0015)	ND (0.0011)	ND (0.084)	ND (0.0015)	ND (0.0013)
Dibromochloromethane	mg/kg	-	-	-	ND (0.00022)	ND (0.00027)	ND (0.00020)	ND (0.015)	ND (0.00027)	ND (0.00024)
1,2-Dibromoethane	mg/kg	-	-	-	ND (0.00050)	ND (0.00061)	ND (0.00046)	ND (0.035)	ND (0.00062)	ND (0.00054)
1,2-Dichlorobenzene	mg/kg	1.1	500	1.1	ND (0.00031)	ND (0.00038)	ND (0.00028)	ND (0.021)	ND (0.00038)	ND (0.00033)
1,3-Dichlorobenzene	mg/kg	2.4	280	2.4	ND (0.00020)	ND (0.00024)	ND (0.00018)	ND (0.014)	ND (0.00025)	ND (0.00021)
1,4-Dichlorobenzene	mg/kg	1.8	130	1.8	ND (0.00023)	ND (0.00028)	ND (0.00021)	ND (0.016)	ND (0.00028)	ND (0.00025)
Dichlorodifluoromethane	mg/kg	-	-	-	ND (0.00032)	ND (0.00039)	ND (0.00029)	ND (0.022)	ND (0.00040)	ND (0.00035)
1,1-Dichloroethane	mg/kg	0.27	240	0.27	ND (0.00029)	ND (0.00035)	ND (0.00026)	ND (0.020)	ND (0.00035)	ND (0.00031)
1,2-Dichloroethane	mg/kg	0.02	30	0.02	ND (0.00029)	ND (0.00036)	ND (0.00027)	ND (0.020)	ND (0.00036)	ND (0.00031)
1,1-Dichloroethene	mg/kg	0.33	500	0.33	ND (0.00026)	ND (0.00032)	ND (0.00024)	ND (0.018)	ND (0.00032)	ND (0.00028)
cis-1,2-Dichloroethene	mg/kg	0.25	500	0.25	ND (0.00019)	ND (0.00023)	ND (0.00017)	ND (0.013)	ND (0.00023)	ND (0.00020)
trans-1,2-Dichloroethene	mg/kg	0.19	500	0.19	ND (0.00039)	ND (0.00047)	ND (0.00035)	ND (0.027)	ND (0.00048)	ND (0.00041)
1,2-Dichloropropane	mg/kg	-	-	-	ND (0.00040)	ND (0.00049)	ND (0.00036)	ND (0.028)	ND (0.00049)	ND (0.00043)
cis-1,3-Dichloropropene	mg/kg	-	-	-	ND (0.00021)	ND (0.00025)	ND (0.00019)	ND (0.014)	ND (0.00026)	ND (0.00022)
trans-1,3-Dichloropropene	mg/kg	-	-	-	ND (0.00025)	ND (0.00030)	ND (0.00023)	ND (0.017)	ND (0.00030)	ND (0.00026)
Ethylbenzene	mg/kg	1	390	1	ND (0.00016)	ND (0.00019)	ND (0.00015)	**17.7**	ND (0.00020)	ND (0.00017)
Freon 113	mg/kg	-	-	6	ND (0.00040)	ND (0.00048)	ND (0.00036)	ND (0.027)	ND (0.00049)	ND (0.00043)
2-Hexanone	mg/kg	-	-	-	ND (0.0016)	ND (0.0020)	ND (0.0015)	ND (0.11)	ND (0.0020)	ND (0.0017)
Isopropylbenzene	mg/kg	-	-	2.3	ND (0.00013)	ND (0.00016)	ND (0.00012)	3.44	ND (0.00017)	ND (0.00014)
Methyl Acetate	mg/kg	-	-	-	ND (0.0015)	ND (0.0019)	ND (0.0014)	ND (0.11)	ND (0.0019)	ND (0.0016)
Methylcyclohexane	mg/kg	-	-	-	ND (0.00015)	ND (0.00018)	0.00083 J	31.3	0.00031 J	0.00051 J
Methyl Tert Butyl Ether	mg/kg	0.93	500	0.93	0.0049	0.00094 J	0.00041 J	0.734	ND (0.00039)	ND (0.00034)
4-Methyl-2-pentanone(MIBK)	mg/kg	-	-	1	ND (0.0012)	ND (0.0015)	ND (0.0011)	ND (0.083)	ND (0.0015)	ND (0.0013)
Methylene chloride	mg/kg	0.05	500	0.05	ND (0.0016)	0.0023 J	ND (0.0014)	ND (0.11)	ND (0.0019)	ND (0.0017)
Styrene	mg/kg	-	-	-	ND (0.00021)	ND (0.00026)	ND (0.00019)	ND (0.015)	ND (0.00026)	ND (0.00023)
1,1,2,2-Tetrachloroethane	mg/kg	-	-	0.6	ND (0.00031)	ND (0.00038)	ND (0.00029)	ND (0.022)	ND (0.00038)	ND (0.00034)
Tetrachloroethene	mg/kg	1.3	150	1.3	ND (0.00037)	ND (0.00046)	ND (0.00034)	ND (0.026)	ND (0.00046)	ND (0.00040)
Toluene	mg/kg	0.7	500	0.7	0.00029 J	ND (0.00016)	0.00053 J	0.681	ND (0.00016)	0.00039 J
1,2,3-Trichlorobenzene	mg/kg	-	-	-	ND (0.00019)	ND (0.00023)	ND (0.00017)	ND (0.013)	ND (0.00023)	ND (0.00020)
1,2,4-Trichlorobenzene	mg/kg	-	-	3.4	ND (0.00017)	ND (0.00020)	ND (0.00015)	ND (0.011)	ND (0.00020)	ND (0.00018)
1,1,1-Trichloroethane	mg/kg	0.68	500	0.68	ND (0.00026)	ND (0.00032)	ND (0.00024)	ND (0.018)	ND (0.00032)	ND (0.00028)
1,1,2-Trichloroethane	mg/kg	-	-	-	ND (0.00075)	ND (0.00091)	ND (0.00068)	ND (0.052)	ND (0.00092)	ND (0.00080)
Trichloroethene	mg/kg	0.47	200	0.47	ND (0.00032)	ND (0.00039)	ND (0.00029)	ND (0.022)	ND (0.00039)	ND (0.00034)
Trichlorofluoromethane	mg/kg	-	-	-	ND (0.00021)	ND (0.00025)	ND (0.00019)	ND (0.014)	ND (0.00025)	ND (0.00022)
Vinyl chloride	mg/kg	0.02	13	0.02	ND (0.00031)	ND (0.00038)	ND (0.00029)	ND (0.022)	ND (0.00038)	ND (0.00034)
m,p-Xylene	mg/kg	0.26	500	1.6	ND (0.00044)	ND (0.00054)	ND (0.00040)	**8.13**	ND (0.00054)	ND (0.00047)
o-Xylene	mg/kg	0.26	500	1.6	ND (0.00016)	ND (0.00020)	ND (0.00015)	**0.308**	ND (0.00020)	0.00024 J
Xylene (total)	mg/kg	0.26	500	1.6	ND (0.00016)	ND (0.00020)	0.00032 J	**8.44**	ND (0.00020)	0.00065 J
GC/MS Volatile TIC										
Total TIC, Volatile	mg/kg	-	-	-	0.0046 J	0	0	195.3 J	0	0.1932 J
General Chemistry										
Solids, Percent	%	-	-	-	94.5	81.7	90.8	81.6	79.4	85

Client Sample ID:	SB-11(0-2')	SB-11(8-10')	SB-12(0-2')	SB-12(6-8')	SB-13(0-2')	SB-13(8-10')	SB-14(0-2')	SB-14(8-10')	SB-20(0-2')	SB-20(6-8')
Lab Sample ID:	JB55187-17	JB55187-18	JB55187-15	JB55187-16	JB55187-9	JB55187-10	JB55187-11	JB55187-12	JB55187-21	JB55187-22
Date Sampled:	12/12/2013	12/12/2013	12/12/2013	12/12/2013	12/11/2013	12/11/2013	12/11/2013	12/11/2013	12/12/2013	12/12/2013
Matrix:	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
GC/MS Volatiles (SW846 8260C)										
Acetone	ND (0.0042)	ND (0.0046)	ND (0.0038)	ND (0.0039)	ND (0.0046)	ND (0.0041)	ND (0.0039)	ND (0.27)	ND (0.0047)	0.0267
Benzene	ND (0.00011)	0.00032 J	ND (0.00011)	ND (0.00011)	ND (0.00013)	ND (0.00011)	ND (0.00011)	**0.358**	0.00056 J	0.00044 J
Bromochloromethane	ND (0.00047)	ND (0.00052)	ND (0.00043)	ND (0.00045)	ND (0.00052)	ND (0.00046)	ND (0.00045)	ND (0.031)	ND (0.00054)	ND (0.00051)
Bromodichloromethane	ND (0.00026)	ND (0.00028)	ND (0.00023)	ND (0.00024)	ND (0.00028)	ND (0.00025)	ND (0.00024)	ND (0.017)	ND (0.00029)	ND (0.00028)
Bromoform	ND (0.00024)	ND (0.00026)	ND (0.00022)	ND (0.00023)	ND (0.00026)	ND (0.00023)	ND (0.00023)	ND (0.016)	ND (0.00027)	ND (0.00026)
Bromomethane	ND (0.00044)	ND (0.00049)	ND (0.00040)	ND (0.00041)	ND (0.00049)	ND (0.00043)	ND (0.00042)	ND (0.029)	ND (0.00050)	ND (0.00047)
2-Butanone (MEK)	ND (0.0040)	ND (0.0044)	ND (0.0037)	ND (0.0038)	ND (0.0044)	ND (0.0039)	ND (0.0038)	ND (0.26)	ND (0.0045)	ND (0.0043)
Carbon disulfide	ND (0.00013)	ND (0.00014)	ND (0.00012)	0.0049	ND (0.00014)	ND (0.00013)	0.00043 J	ND (0.0084)	ND (0.00015)	0.0019 J
Carbon tetrachloride	ND (0.00023)	ND (0.00025)	ND (0.00021)	ND (0.00022)	ND (0.00025)	ND (0.00022)	ND (0.00022)	ND (0.015)	ND (0.00026)	ND (0.00025)
Chlorobenzene	ND (0.00018)	ND (0.00020)	ND (0.00016)	ND (0.00017)	ND (0.00020)	ND (0.00018)	ND (0.00017)	ND (0.012)	ND (0.00020)	ND (0.00019)
Chloroethane	ND (0.00091)	ND (0.0010)	ND (0.00083)	ND (0.00086)	ND (0.0010)	ND (0.00089)	ND (0.00086)	ND (0.059)	ND (0.0010)	ND (0.00098)
Chloroform	ND (0.00023)	ND (0.00026)	ND (0.00021)	ND (0.00022)	ND (0.00026)	ND (0.00023)	ND (0.00022)	ND (0.015)	ND (0.00026)	ND (0.00025)
Chloromethane	ND (0.00031)	ND (0.00035)	ND (0.00029)	ND (0.00030)	ND (0.00035)	ND (0.00031)	ND (0.00030)	ND (0.020)	ND (0.00035)	ND (0.00034)
Cyclohexane	ND (0.00023)	ND (0.00026)	ND (0.00021)	ND (0.00022)	0.00066 J	ND (0.00023)	ND (0.00022)	0.0875 J	ND (0.00027)	ND (0.00025)
1,2-Dibromo-3-chloropropane	ND (0.0012)	ND (0.0013)	ND (0.0011)	ND (0.0011)	ND (0.0013)	ND (0.0012)	ND (0.0011)	ND (0.079)	ND (0.0014)	ND (0.0013)
Dibromochloromethane	ND (0.00022)	ND (0.00024)	ND (0.00020)	ND (0.00021)	ND (0.00024)	ND (0.00022)	ND (0.00021)	ND (0.014)	ND (0.00025)	ND (0.00024)
1,2-Dibromoethane	ND (0.00050)	ND (0.00055)	ND (0.00046)	ND (0.00047)	ND (0.00055)	ND (0.00049)	ND (0.00047)	ND (0.033)	ND (0.00057)	ND (0.00054)
1,2-Dichlorobenzene	ND (0.00031)	ND (0.00034)	ND (0.00028)	ND (0.00029)	ND (0.00034)	ND (0.00030)	ND (0.00029)	ND (0.020)	ND (0.00035)	ND (0.00033)
1,3-Dichlorobenzene	ND (0.00020)	ND (0.00022)	ND (0.00018)	ND (0.00019)	ND (0.00022)	ND (0.00019)	ND (0.00019)	ND (0.013)	ND (0.00022)	ND (0.00021)
1,4-Dichlorobenzene	ND (0.00023)	ND (0.00025)	ND (0.00021)	ND (0.00022)	ND (0.00025)	ND (0.00022)	ND (0.00022)	ND (0.015)	ND (0.00026)	ND (0.00025)
Dichlorodifluoromethane	ND (0.00032)	ND (0.00036)	ND (0.00029)	ND (0.00030)	ND (0.00036)	ND (0.00031)	ND (0.00031)	ND (0.021)	ND (0.00036)	ND (0.00035)
1,1-Dichloroethane	ND (0.00029)	ND (0.00032)	ND (0.00026)	ND (0.00027)	ND (0.00032)	ND (0.00028)	ND (0.00027)	ND (0.019)	ND (0.00032)	ND (0.00031)
1,2-Dichloroethane	ND (0.00029)	ND (0.00032)	ND (0.00027)	ND (0.00028)	ND (0.00032)	ND (0.00029)	ND (0.00028)	ND (0.019)	ND (0.00033)	ND (0.00031)
1,1-Dichloroethene	ND (0.00026)	ND (0.00029)	ND (0.00024)	ND (0.00025)	ND (0.00029)	ND (0.00026)	ND (0.00025)	ND (0.017)	ND (0.00030)	ND (0.00028)
cis-1,2-Dichloroethene	ND (0.00019)	ND (0.00021)	ND (0.00017)	ND (0.00018)	ND (0.00021)	ND (0.00018)	ND (0.00018)	ND (0.012)	ND (0.00021)	ND (0.00020)
trans-1,2-Dichloroethene	ND (0.00039)	ND (0.00043)	ND (0.00035)	ND (0.00036)	ND (0.00043)	ND (0.00038)	ND (0.00037)	ND (0.025)	ND (0.00044)	ND (0.00041)
1,2-Dichloropropane	ND (0.00040)	ND (0.00044)	ND (0.00036)	ND (0.00038)	ND (0.00044)	ND (0.00039)	ND (0.00038)	ND (0.026)	ND (0.00045)	ND (0.00043)
cis-1,3-Dichloropropene	ND (0.00021)	ND (0.00023)	ND (0.00019)	ND (0.00020)	ND (0.00023)	ND (0.00020)	ND (0.00020)	ND (0.014)	ND (0.00023)	ND (0.00022)
trans-1,3-Dichloropropene	ND (0.00025)	ND (0.00027)	ND (0.00023)	ND (0.00023)	ND (0.00027)	ND (0.00024)	ND (0.00023)	ND (0.016)	ND (0.00028)	ND (0.00026)
Ethylbenzene	ND (0.00016)	0.00039 J	ND (0.00015)	ND (0.00015)	ND (0.00018)	ND (0.00016)	ND (0.00015)	0.25	ND (0.00018)	ND (0.00017)
Freon 113	ND (0.00040)	ND (0.00044)	ND (0.00036)	ND (0.00037)	ND (0.00044)	ND (0.00039)	ND (0.00038)	ND (0.026)	ND (0.00045)	ND (0.00043)
2-Hexanone	ND (0.0016)	ND (0.0018)	ND (0.0015)	ND (0.0015)	ND (0.0018)	ND (0.0016)	ND (0.0015)	ND (0.11)	ND (0.0018)	ND (0.0017)
Isopropylbenzene	ND (0.00013)	ND (0.00015)	ND (0.00012)	ND (0.00013)	0.00023 J	ND (0.00013)	ND (0.00013)	0.0302 J	ND (0.00015)	ND (0.00014)
Methyl Acetate	ND (0.0015)	ND (0.0017)	ND (0.0014)	ND (0.0014)	ND (0.0017)	ND (0.0015)	ND (0.0014)	ND (0.10)	ND (0.0017)	ND (0.0016)
Methylcyclohexane	ND (0.00015)	0.0014 J	ND (0.00014)	ND (0.00014)	0.0015 J	ND (0.00015)	ND (0.00014)	0.125 J	0.0016 J	ND (0.00016)
Methyl Tert Butyl Ether	ND (0.00031)	ND (0.00035)	ND (0.00029)	ND (0.00030)	ND (0.00035)	ND (0.00031)	ND (0.00030)	**8.7**	ND (0.00035)	ND (0.00034)
4-Methyl-2-pentanone(MIBK)	ND (0.0012)	ND (0.0013)	ND (0.0011)	ND (0.0011)	ND (0.0013)	ND (0.0012)	ND (0.0011)	ND (0.079)	ND (0.0014)	ND (0.0013)
Methylene chloride	ND (0.0016)	ND (0.0017)	ND (0.0014)	ND (0.0015)	0.0021 J	0.0017 J	ND (0.0015)	**0.352**	ND (0.0018)	ND (0.0017)
Styrene	ND (0.00021)	ND (0.00023)	ND (0.00019)	ND (0.00020)	ND (0.00023)	ND (0.00021)	ND (0.00020)	ND (0.014)	ND (0.00024)	ND (0.00023)
1,1,2,2-Tetrachloroethane	ND (0.00031)	ND (0.00035)	ND (0.00029)	ND (0.00029)	ND (0.00035)	ND (0.00030)	ND (0.00030)	ND (0.020)	ND (0.00035)	ND (0.00034)
Tetrachloroethene	ND (0.00037)	ND (0.00041)	ND (0.00034)	ND (0.00035)	ND (0.00041)	ND (0.00036)	ND (0.00035)	ND (0.024)	ND (0.00042)	ND (0.00040)
Toluene	ND (0.00013)	0.00039 J	ND (0.00012)	ND (0.00012)	0.00023 J	ND (0.00013)	ND (0.00012)	**1.44**	0.00050 J	0.00050 J
1,2,3-Trichlorobenzene	ND (0.00019)	ND (0.00021)	ND (0.00017)	ND (0.00018)	ND (0.00021)	ND (0.00018)	ND (0.00018)	ND (0.012)	ND (0.00021)	ND (0.00020)
1,2,4-Trichlorobenzene	ND (0.00017)	ND (0.00018)	ND (0.00015)	ND (0.00016)	ND (0.00018)	ND (0.00016)	ND (0.00016)	ND (0.011)	ND (0.00019)	ND (0.00018)
1,1,1-Trichloroethane	ND (0.00026)	ND (0.00029)	ND (0.00024)	ND (0.00025)	ND (0.00029)	ND (0.00026)	ND (0.00025)	ND (0.017)	ND (0.00030)	ND (0.00028)
1,1,2-Trichloroethane	ND (0.00075)	ND (0.00083)	ND (0.00069)	ND (0.00071)	ND (0.00083)	ND (0.00073)	ND (0.00071)	ND (0.049)	ND (0.00085)	ND (0.00081)
Trichloroethene	ND (0.00032)	ND (0.00035)	ND (0.00029)	ND (0.00030)	ND (0.00035)	ND (0.00031)	ND (0.00030)	ND (0.021)	ND (0.00036)	ND (0.00034)
Trichlorofluoromethane	ND (0.00021)	ND (0.00023)	ND (0.00019)	ND (0.00019)	ND (0.00023)	ND (0.00020)	ND (0.00019)	ND (0.013)	ND (0.00023)	ND (0.00022)
Vinyl chloride	ND (0.00031)	ND (0.00035)	ND (0.00029)	ND (0.00029)	ND (0.00035)	ND (0.00030)	ND (0.00030)	ND (0.020)	ND (0.00035)	ND (0.00034)
m,p-Xylene	ND (0.00044)	0.00092 J	ND (0.00040)	ND (0.00042)	ND (0.00049)	ND (0.00043)	ND (0.00042)	**0.744**	ND (0.00050)	0.00052 J
o-Xylene	ND (0.00016)	ND (0.00018)	ND (0.00015)	ND (0.00015)	ND (0.00018)	ND (0.00016)	ND (0.00015)	**0.274**	ND (0.00018)	ND (0.00017)
Xylene (total)	ND (0.00016)	0.00092 J	ND (0.00015)	ND (0.00015)	ND (0.00018)	ND (0.00016)	ND (0.00015)	**1.02**	0.00032 J	0.00052 J
GC/MS Volatile TIC										
Total TIC, Volatile	0	0	0	6 J	0	0	0.3711 J	2.33 J	0.0804 J	0.782 J
General Chemistry										
Solids, Percent	88.4	84	89.4	88	90.1	92.1	90.4	87.1	88.1	82.2

Legend:
Hit
Exceedance of UUSCO
Exceedance of Commercial Use SCO
Exceedance of Protection of Groundwater SCO and UUSCO
J - Estimated Value

Table 6 - Semi-Volatile Organic Compounds in Soil Samples
511 West 21st Street, New York, NY

Client Sample ID:		NY SCO - Unrestricted Use (6 NYCRR 375-6 12/06)	NY SCO - Commercial w/ CP-51 (10/10) (6 NYCRR 375-6 12/06)	NY SCO - Protection of Groundwater w/ CP-51 (10/10) (6 NYCRR 375-6 12/06)	SB-1(0-2')	SB-1(7-9')	SB-2(0-2')	SB-2(8-10')	SB-3(0-2')	SB-3(8-10')	SB-4(0-2')	SB-4(8-10')	SB-5(3-5')	SB-5(6-8')	SB-6(3-5')	SB-6(6-8')	SB-7(3-5')	SB-7(6-8')
Lab Sample ID:					JB55187-7	JB55187-8	JB55187-3	JB55187-4	JB55187-5	JB55187-6	JB55187-1	JB55187-2	JB55187-25	JB55187-26	JB55187-27	JB55187-28	JB55187-29	JB55187-30
Date Sampled:					12/10/2013	12/10/2013	12/9/2013	12/9/2013	12/9/2013	12/9/2013	12/9/2013	12/9/2013	12/12/2013	12/12/2013	12/12/2013	12/12/2013	12/12/2013	12/12/2013
Matrix:					Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
GC/MS Semi-volatiles (SW846 8270D)																		
2-Chlorophenol	mg/kg	-	-	-	ND (0.035)	ND (0.036)	ND (0.035)	ND (0.035)	ND (0.032)	ND (0.038)	ND (0.032)	ND (0.036)	ND (0.035)	ND (0.042)	ND (0.035)	ND (0.037)	ND (0.036)	ND (0.041)
4-Chloro-3-methyl phenol	mg/kg	-	-	-	ND (0.035)	ND (0.036)	ND (0.035)	ND (0.035)	ND (0.032)	ND (0.038)	ND (0.032)	ND (0.036)	ND (0.035)	ND (0.042)	ND (0.035)	ND (0.037)	ND (0.036)	ND (0.041)
2,4-Dichlorophenol	mg/kg	-	-	0.4	ND (0.057)	ND (0.057)	ND (0.056)	ND (0.057)	ND (0.052)	ND (0.062)	ND (0.051)	ND (0.059)	ND (0.057)	ND (0.068)	ND (0.056)	ND (0.059)	ND (0.057)	ND (0.066)
2,4-Dimethylphenol	mg/kg	-	-	-	ND (0.059)	ND (0.060)	ND (0.059)	ND (0.059)	ND (0.054)	ND (0.064)	ND (0.053)	ND (0.061)	ND (0.059)	ND (0.071)	ND (0.058)	ND (0.062)	ND (0.060)	ND (0.069)
2,4-Dinitrophenol	mg/kg	-	-	0.2	ND (0.043)	ND (0.043)	ND (0.043)	ND (0.043)	ND (0.040)	ND (0.047)	ND (0.039)	ND (0.044)	ND (0.043)	ND (0.052)	ND (0.042)	ND (0.045)	ND (0.043)	ND (0.050)
4,6-Dinitro-o-cresol	mg/kg	-	-	-	ND (0.043)	ND (0.043)	ND (0.043)	ND (0.043)	ND (0.040)	ND (0.047)	ND (0.039)	ND (0.044)	ND (0.043)	ND (0.052)	ND (0.042)	ND (0.045)	ND (0.043)	ND (0.050)
2-Methylphenol	mg/kg	0.33	500	0.33	ND (0.040)	ND (0.041)	ND (0.040)	ND (0.040)	ND (0.037)	ND (0.044)	ND (0.036)	ND (0.041)	ND (0.040)	ND (0.048)	ND (0.039)	ND (0.042)	ND (0.040)	ND (0.047)
3&4-Methylphenol	mg/kg	-	-	-	ND (0.045)	ND (0.045)	ND (0.045)	ND (0.045)	ND (0.041)	ND (0.049)	ND (0.040)	ND (0.046)	ND (0.045)	ND (0.054)	ND (0.044)	ND (0.047)	ND (0.045)	ND (0.052)
2-Nitrophenol	mg/kg	-	-	0.3	ND (0.037)	ND (0.038)	ND (0.037)	ND (0.037)	ND (0.034)	ND (0.041)	ND (0.034)	ND (0.039)	ND (0.037)	ND (0.045)	ND (0.037)	ND (0.039)	ND (0.038)	ND (0.044)
4-Nitrophenol	mg/kg	-	-	0.1	ND (0.059)	ND (0.060)	ND (0.059)	ND (0.059)	ND (0.055)	ND (0.065)	ND (0.053)	ND (0.061)	ND (0.060)	ND (0.071)	ND (0.058)	ND (0.062)	ND (0.060)	ND (0.070)
Pentachlorophenol	mg/kg	0.8	6.7	0.8	ND (0.060)	ND (0.061)	ND (0.060)	ND (0.060)	ND (0.055)	ND (0.065)	ND (0.054)	ND (0.062)	ND (0.060)	ND (0.072)	ND (0.059)	ND (0.063)	ND (0.061)	ND (0.071)
Phenol	mg/kg	0.33	500	0.33	ND (0.037)	ND (0.037)	ND (0.037)	ND (0.037)	ND (0.034)	ND (0.040)	ND (0.033)	ND (0.038)	ND (0.037)	ND (0.044)	ND (0.036)	ND (0.039)	ND (0.037)	ND (0.043)
2,3,4,6-Tetrachlorophenol	mg/kg	-	-	-	ND (0.036)	ND (0.037)	ND (0.036)	ND (0.036)	ND (0.033)	ND (0.039)	ND (0.033)	ND (0.037)	ND (0.036)	ND (0.044)	ND (0.036)	ND (0.038)	ND (0.037)	ND (0.043)
2,4,5-Trichlorophenol	mg/kg	-	-	0.1	ND (0.041)	ND (0.041)	ND (0.041)	ND (0.041)	ND (0.038)	ND (0.044)	ND (0.037)	ND (0.042)	ND (0.041)	ND (0.049)	ND (0.040)	ND (0.043)	ND (0.041)	ND (0.048)
2,4,6-Trichlorophenol	mg/kg	-	-	-	ND (0.033)	ND (0.033)	ND (0.033)	ND (0.033)	ND (0.030)	ND (0.036)	ND (0.030)	ND (0.034)	ND (0.033)	ND (0.040)	ND (0.032)	ND (0.035)	ND (0.033)	ND (0.039)
Acenaphthene	mg/kg	20	500	98	0.0573	0.907	ND (0.010)	0.168	0.283	ND (0.011)	0.0343	ND (0.011)	0.0449	1.14	0.325	0.55	0.0194 J	ND (0.012)
Acenaphthylene	mg/kg	100	500	107	0.048	ND (0.011)	0.0165 J	ND (0.011)	0.0724	ND (0.012)	0.0413	ND (0.012)	0.0537	ND (0.014)	0.0204 J	ND (0.012)	0.0326 J	ND (0.013)
Acetophenone	mg/kg	-	-	-	ND (0.0062)	ND (0.0063)	ND (0.0062)	ND (0.0062)	ND (0.0057)	ND (0.0067)	ND (0.0056)	ND (0.0064)	ND (0.0062)	ND (0.0074)	ND (0.0061)	ND (0.0065)	ND (0.0062)	ND (0.0073)
Anthracene	mg/kg	100	500	1000	0.18	ND (0.012)	0.044	ND (0.012)	0.794	ND (0.013)	0.134	ND (0.013)	0.178	ND (0.015)	0.821	ND (0.013)	0.0647	ND (0.014)
Atrazine	mg/kg	-	-	-	ND (0.0069)	ND (0.0070)	ND (0.0069)	ND (0.0069)	ND (0.0064)	ND (0.0075)	ND (0.0062)	ND (0.0072)	ND (0.0069)	ND (0.0083)	ND (0.0068)	ND (0.0073)	ND (0.0070)	ND (0.0081)
Benzo(a)anthracene	mg/kg	1	5.6	1	0.604	0.0254 J	0.149	0.0212 J	**1.77**	ND (0.012)	0.467	ND (0.012)	0.548	0.0982	**1.35**	0.0304 J	0.346	ND (0.013)
Benzo(a)pyrene	mg/kg	1	1	22	0.574	ND (0.011)	0.161	0.0159 J	**1.4**	ND (0.012)	0.467	ND (0.011)	0.515	0.0744	0.936	0.0162 J	0.292	ND (0.013)
Benzo(b)fluoranthene	mg/kg	1	5.6	1.7	0.691	ND (0.012)	0.179	0.0181 J	**1.56**	ND (0.013)	0.549	ND (0.012)	0.565	0.0705	**1.04**	ND (0.012)	0.34	ND (0.014)
Benzo(g,h,i)perylene	mg/kg	100	500	1000	0.429	ND (0.013)	0.114	ND (0.013)	0.743	ND (0.014)	0.293	ND (0.014)	0.397	0.0558	0.468	ND (0.014)	0.224	ND (0.015)
Benzo(k)fluoranthene	mg/kg	0.8	56	1.7	0.234	ND (0.013)	0.0724	ND (0.013)	0.567	ND (0.014)	0.195	ND (0.014)	0.204	0.0295 J	0.329	ND (0.014)	0.112	ND (0.016)
4-Bromophenyl phenyl ether	mg/kg	-	-	-	ND (0.013)	ND (0.013)	ND (0.013)	ND (0.013)	ND (0.012)	ND (0.014)	ND (0.011)	ND (0.013)	ND (0.013)	ND (0.015)	ND (0.013)	ND (0.013)	ND (0.013)	ND (0.015)
Butyl benzyl phthalate	mg/kg	-	-	122	ND (0.020)	ND (0.021)	ND (0.020)	ND (0.020)	0.174	ND (0.022)	ND (0.018)	ND (0.021)	ND (0.020)	0.758	ND (0.020)	ND (0.021)	ND (0.021)	ND (0.024)
1,1'-Biphenyl	mg/kg	-	-	-	ND (0.0041)	ND (0.0041)	ND (0.0041)	ND (0.0041)	0.0291 J	ND (0.0044)	ND (0.0037)	ND (0.0042)	ND (0.0041)	ND (0.0049)	0.0236 J	ND (0.0043)	ND (0.0041)	ND (0.0048)
Benzaldehyde	mg/kg	-	-	-	ND (0.0081)	ND (0.0082)	ND (0.0081)	ND (0.0081)	ND (0.0075)	ND (0.0088)	ND (0.0073)	ND (0.0084)	ND (0.0081)	ND (0.0097)	ND (0.0079)	ND (0.0085)	ND (0.0082)	ND (0.0095)
2-Chloronaphthalene	mg/kg	-	-	-	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.010)	ND (0.012)	ND (0.0098)	ND (0.011)	ND (0.011)	ND (0.013)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.013)
4-Chloroaniline	mg/kg	-	-	0.22	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.010)	ND (0.012)	ND (0.010)	ND (0.012)	ND (0.011)	ND (0.014)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.013)
Carbazole	mg/kg	-	-	-	0.0620 J	ND (0.016)	ND (0.016)	ND (0.016)	0.158	ND (0.018)	0.0446 J	ND (0.017)	0.0444 J	ND (0.020)	0.171	ND (0.017)	0.0216 J	ND (0.019)
Caprolactam	mg/kg	-	-	-	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.010)	ND (0.012)	ND (0.010)	ND (0.011)	ND (0.011)	ND (0.013)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.013)
Chrysene	mg/kg	1	56	1	0.651	0.0332 J	0.155	0.0284 J	**1.95**	ND (0.013)	0.518	ND (0.012)	0.618	0.118	**1.43**	0.0282 J	0.396	ND (0.014)
bis(2-Chloroethoxy)methane	mg/kg	-	-	-	ND (0.014)	ND (0.014)	ND (0.014)	ND (0.014)	ND (0.013)	ND (0.015)	ND (0.013)	ND (0.015)	ND (0.014)	ND (0.017)	ND (0.014)	ND (0.015)	ND (0.014)	ND (0.017)
bis(2-Chloroethyl)ether	mg/kg	-	-	-	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.0098)	ND (0.012)	ND (0.0095)	ND (0.011)	ND (0.011)	ND (0.013)	ND (0.010)	ND (0.011)	ND (0.011)	ND (0.012)
bis(2-Chloroisopropyl)ether	mg/kg	-	-	-	ND (0.010)	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.0096)	ND (0.011)	ND (0.0094)	ND (0.011)	ND (0.010)	ND (0.013)	ND (0.010)	ND (0.011)	ND (0.011)	ND (0.012)
4-Chlorophenyl phenyl ether	mg/kg	-	-	-	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.0098)	ND (0.012)	ND (0.0095)	ND (0.011)	ND (0.011)	ND (0.013)	ND (0.010)	ND (0.011)	ND (0.011)	ND (0.012)
2,4-Dinitrotoluene	mg/kg	-	-	-	ND (0.015)	ND (0.016)	ND (0.015)	ND (0.015)	ND (0.014)	ND (0.017)	ND (0.014)	ND (0.016)	ND (0.015)	ND (0.018)	ND (0.015)	ND (0.016)	ND (0.016)	ND (0.018)
2,6-Dinitrotoluene	mg/kg	-	-	1	ND (0.013)	ND (0.014)	ND (0.013)	ND (0.013)	ND (0.012)	ND (0.015)	ND (0.012)	ND (0.014)	ND (0.013)	ND (0.016)	ND (0.013)	ND (0.014)	ND (0.014)	ND (0.016)
3,3'-Dichlorobenzidine	mg/kg	-	-	-	ND (0.0089)	ND (0.0090)	ND (0.0089)	ND (0.0089)	ND (0.0082)	ND (0.0097)	ND (0.0080)	ND (0.0092)	ND (0.0089)	ND (0.011)	ND (0.0088)	ND (0.0094)	ND (0.0090)	ND (0.010)
1,4-Dioxane	mg/kg	0.1	130	0.1	ND (0.023)	ND (0.023)	ND (0.023)	ND (0.023)	ND (0.021)	ND (0.025)	ND (0.021)	ND (0.024)	ND (0.023)	ND (0.027)	ND (0.022)	ND (0.024)	ND (0.023)	ND (0.027)
Dibenzo(a,h)anthracene	mg/kg	0.33	0.56	1000	0.0999	ND (0.012)	0.0250 J	ND (0.012)	0.227	ND (0.013)	0.0689	ND (0.012)	0.104	ND (0.014)	0.138	ND (0.013)	0.0555	ND (0.014)
Dibenzofuran	mg/kg	7	350	6.2	0.0526 J	1.4	ND (0.010)	ND (0.010)	0.117	ND (0.011)	0.0282 J	ND (0.011)	0.0292 J	1.18	0.154	0.539	ND (0.011)	ND (0.012)
Di-n-butyl phthalate	mg/kg	-	-	8.1	ND (0.0078)	ND (0.0079)	ND (0.0078)	ND (0.0078)	ND (0.0072)	ND (0.0085)	ND (0.0070)	ND (0.0081)	ND (0.0078)	ND (0.0094)	ND (0.0077)	ND (0.0082)	ND (0.0079)	ND (0.0092)
Di-n-octyl phthalate	mg/kg	-	-	120	ND (0.017)	ND (0.017)	ND (0.017)	ND (0.017)	ND (0.016)	ND (0.019)	ND (0.015)	ND (0.018)	ND (0.017)	ND (0.021)	ND (0.017)	ND (0.018)	ND (0.017)	ND (0.020)
Diethyl phthalate	mg/kg	-	-	7.1	ND (0.012)	ND (0.012)	ND (0.012)	ND (0.012)	ND (0.011)	ND (0.013)	ND (0.011)	ND (0.012)	ND (0.012)	ND (0.014)	ND (0.012)	ND (0.012)	ND (0.012)	ND (0.014)
Dimethyl phthalate	mg/kg	-	-	27	ND (0.012)	ND (0.013)	ND (0.012)	ND (0.012)	ND (0.011)	ND (0.013)	ND (0.011)	ND (0.013)	ND (0.012)	ND (0.015)	ND (0.012)	ND (0.013)	ND (0.012)	ND (0.015)
bis(2-Ethylhexyl)phthalate	mg/kg	-	-	435	0.219	0.12	0.101	0.0707	0.141	0.0617 J	0.171	0.0787	0.466	2.4	0.174	0.0791	0.126	0.0475 J
Fluoranthene	mg/kg	100	500	1000	1.45	0.0546	0.292	0.0528	3.19	ND (0.017)	1.02	0.0233 J	0.803	0.0347 J	2.53	0.0616	0.688	ND (0.018)
Fluorene	mg/kg	30	500	386	0.0447	2.71	ND (0.012)	0.219	0.291	ND (0.013)	0.0378	ND (0.012)	0.0386	2.25	0.36	1.03	ND (0.012)	ND (0.014)
Hexachlorobenzene	mg/kg	0.33	6	1.4	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.012)	ND (0.010)	ND (0.012)	ND (0.011)	ND (0.014)	ND (0.011)	ND (0.012)	ND (0.012)	ND (0.013)
Hexachlorobutadiene	mg/kg	-	-	-	ND (0.0098)	ND (0.0099)	ND (0.0097)	ND (0.0098)	ND (0.0090)	ND (0.011)	ND (0.0088)	ND (0.010)	ND (0.0098)	ND (0.012)	ND (0.0096)	ND (0.010)	ND (0.0099)	ND (0.011)
Hexachlorocyclopentadiene	mg/kg	-	-	-	ND (0.036)	ND (0.036)	ND (0.036)	ND (0.036)	ND (0.033)	ND (0.039)	ND (0.032)	ND (0.037)	ND (0.036)	ND (0.043)	ND (0.035)	ND (0.038)	ND (0.036)	ND (0.042)
Hexachloroethane	mg/kg	-	-	-	ND (0.0098)	ND (0.0099)	ND (0.0097)	ND (0.0098)	ND (0.0090)	ND (0.011)	ND (0.0088)	ND (0.010)	ND (0.0098)	ND (0.012)	ND (0.0096)	ND (0.010)	ND (0.0099)	ND (0.011)
Indeno(1,2,3-cd)pyrene	mg/kg	0.5	5.6	8.2	0.401	ND (0.012)	0.11	ND (0.012)	**0.848**	ND (0.013)	0.302	ND (0.013)	0.365	0.0462	0.456	ND (0.013)	0.212	ND (0.014)
Isophorone	mg/kg	-	-	4.4	ND (0.0095)	ND (0.0096)	ND (0.0094)	ND (0.0094)	ND (0.0087)	ND (0.010)	ND (0.0085)	ND (0.0098)	ND (0.0095)	ND (0.011)	ND (0.0093)	ND (0.0099)	ND (0.0096)	ND (0.011)
2-Methylnaphthalene	mg/kg	-	-	36.4	0.0527 J	39.4	ND (0.020)	ND (0.020)	0.0838	ND (0.021)	0.0213 J	ND (0.020)	0.0435 J	31.8	0.0876	5.55	0.0216 J	ND (0.023)
2-Nitroaniline	mg/kg	-	-	0.4	ND (0.015)	ND (0.016)	ND (0.015)	ND (0.015)	ND (0.014)	ND (0.017)	ND (0.014)	ND (0.016)	ND (0.015)	ND (0.019)	ND (0.015)	ND (0.016)	ND (0.016)	ND (0.018)
3-Nitroaniline	mg/kg	-	-	0.5	ND (0.014)	ND (0.014)	ND (0.014)	ND (0.014)	ND (0.013)	ND (0.015)	ND (0.013)	ND (0.015)	ND (0.014)	ND (0.017)	ND (0.014)	ND (0.015)	ND (0.014)	ND (0.017)
4-Nitroaniline	mg/kg	-	-	-	ND (0.014)	ND (0.014)	ND (0.014)	ND (0.014)	ND (0.013)	ND (0.015)	ND (0.012)	ND (0.014)	ND (0.014)	ND (0.016)	ND (0.013)	ND (0.014)	ND (0.014)	ND (0.016)
Naphthalene	mg/kg	12	500	12	0.0405	2.85	0.0309 J	ND (0.0096)	0.0485	ND (0.010)	0.0256 J	ND (0.0099)	0.0457	7.13	0.0473	1.18	0.0196 J	ND (0.011)
Nitrobenzene	mg/kg	-	69	0.17	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.0094)	ND (0.011)	ND (0.0091)	ND (0.011)	ND (0.010)	ND (0.012)	ND (0.010)	ND (0.011)	ND (0.010)	ND (0.012)
N-Nitroso-di-n-propylamine	mg/kg	-	-	-	ND (0.0086)	ND (0.0087)	ND (0.0086)	ND (0.0086)	ND (0.0079)	ND (0.0093)	ND (0.0077)	ND (0.0089)	ND (0.0086)	ND (0.010)	ND (0.0084)	ND (0.0090)	ND (0.0087)	ND (0.010)
N-Nitrosodiphenylamine	mg/kg	-	-	-	ND (0.021)	ND (0.021)	ND (0.021)	ND (0.021)	ND (0.019)	ND (0.023)	ND (0.019)	ND (0.022)	ND (0.021)	ND (0.025)	ND (0.021)	ND (0.022)	ND (0.021)	ND (0.025)
Phenanthrene	mg/kg	100	500	1000	0.945	7.37	0.154	0.511	3.7	ND (0.017)	0.557	ND (0.017)	0.658	5.63	3.49	1.81	0.223	ND (0.019)
Pyrene	mg/kg	100	500	1000	1.3	0.296	0.246	0.0761	3.34	ND (0.015)	0.913	0.0169 J	1.08	0.562	2.93	0.173	0.777	ND (0.016)
1,2,4,5-Tetrachlorobenzene	mg/kg	-	-	-	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.0099)	ND (0.012)	ND (0.0097)	ND (0.011)	ND (0.011)	ND (0.013)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.013)
GC/MS Semi-volatile TIC																		
Total TIC, Semi-Volatile	mg/kg	-	-	-	8.43 J	83.2 J	0.37 J	37.52 J	12.54 J	0.43 J	4.67 J	0	2.44 J	58.3 J	11.53 J	72.6 J	5.72 J	0.32 J

Legend:
Hit
Exceedance of UUSCO
Exceedance of Commercial Use SCO
Exceedance of Protection of Groundwater SCO and UUSCOs
J - Estimated Value

Table 6 - Semi-Volatile Organic Compounds in Soil Samples
511 West 21st Street, New York, NY

Client Sample ID:		NY SCO - Unrestricted Use (6 NYCRR 375-6 12/06)	NY SCO - Commercial w/ CP-51 (10/10) (6 NYCRR 375-6 12/06)	NY SCO - Protection of Groundwater w/ CP-51 (10/10) (6 NYCRR 375-6 12/06)	SB-8(0-2')	SB-8(6-8')	SB-9(3-5')	SB-9(6-8')	SB-10(0-2')	SB-10(6-8')	SB-11(0-2')	SB-11(8-10')	SB-12(0-2')	SB-12(6-8')	SB-13(0-2')	SB-13(8-10')	SB-14(0-2')	SB-14(8-10')
Lab Sample ID:					JB55187-13	JB55187-14	JB55187-23	JB55187-24	JB55187-19	JB55187-20	JB55187-17	JB55187-18	JB55187-15	JB55187-16	JB55187-9	JB55187-10	JB55187-11	JB55187-12
Date Sampled:					12/11/2013	12/11/2013	12/12/2013	12/12/2013	12/12/2013	12/12/2013	12/12/2013	12/12/2013	12/12/2013	12/12/2013	12/11/2013	12/11/2013	12/11/2013	12/11/2013
Matrix:					Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
GC/MS Semi-volatiles (SW846 8270D)																		
2-Chlorophenol	mg/kg	-	-	-	ND (0.035)	ND (0.039)	ND (0.036)	ND (0.040)	ND (0.038)	ND (0.033)	ND (0.037)	ND (0.039)	ND (0.037)	ND (0.036)	ND (0.031)	ND (0.031)	ND (0.037)	ND (0.037)
4-Chloro-3-methyl phenol	mg/kg	-	-	-	ND (0.035)	ND (0.039)	ND (0.036)	ND (0.040)	ND (0.038)	ND (0.033)	ND (0.037)	ND (0.039)	ND (0.037)	ND (0.036)	ND (0.031)	ND (0.031)	ND (0.037)	ND (0.037)
2,4-Dichlorophenol	mg/kg	-	-	0.4	ND (0.056)	ND (0.063)	ND (0.059)	ND (0.065)	ND (0.061)	ND (0.054)	ND (0.059)	ND (0.063)	ND (0.060)	ND (0.058)	ND (0.051)	ND (0.051)	ND (0.059)	ND (0.059)
2,4-Dimethylphenol	mg/kg	-	-	-	ND (0.058)	ND (0.066)	ND (0.061)	ND (0.068)	ND (0.064)	ND (0.056)	ND (0.062)	ND (0.066)	ND (0.062)	ND (0.061)	ND (0.053)	ND (0.053)	ND (0.061)	ND (0.061)
2,4-Dinitrophenol	mg/kg	-	-	0.2	ND (0.042)	ND (0.048)	ND (0.044)	ND (0.049)	ND (0.046)	ND (0.041)	ND (0.045)	ND (0.048)	ND (0.045)	ND (0.044)	ND (0.038)	ND (0.038)	ND (0.045)	ND (0.045)
4,6-Dinitro-o-cresol	mg/kg	-	-	-	ND (0.042)	ND (0.048)	ND (0.044)	ND (0.049)	ND (0.046)	ND (0.041)	ND (0.045)	ND (0.048)	ND (0.045)	ND (0.044)	ND (0.038)	ND (0.038)	ND (0.045)	ND (0.045)
2-Methylphenol	mg/kg	0.33	500	0.33	ND (0.040)	ND (0.045)	ND (0.042)	ND (0.046)	ND (0.043)	ND (0.038)	ND (0.042)	ND (0.044)	ND (0.042)	ND (0.041)	ND (0.036)	ND (0.036)	ND (0.042)	ND (0.042)
3&4-Methylphenol	mg/kg	-	-	-	ND (0.044)	ND (0.050)	ND (0.046)	ND (0.051)	ND (0.048)	ND (0.042)	ND (0.047)	ND (0.050)	ND (0.047)	ND (0.046)	ND (0.040)	ND (0.040)	ND (0.046)	ND (0.046)
2-Nitrophenol	mg/kg	-	-	0.3	ND (0.037)	ND (0.042)	ND (0.039)	ND (0.043)	ND (0.040)	ND (0.035)	ND (0.039)	ND (0.041)	ND (0.039)	ND (0.038)	ND (0.033)	ND (0.033)	ND (0.039)	ND (0.039)
4-Nitrophenol	mg/kg	-	-	0.1	ND (0.059)	ND (0.066)	ND (0.062)	ND (0.068)	ND (0.064)	ND (0.056)	ND (0.062)	ND (0.066)	ND (0.063)	ND (0.061)	ND (0.053)	ND (0.053)	ND (0.062)	ND (0.062)
Pentachlorophenol	mg/kg	0.8	6.7	0.8	ND (0.060)	ND (0.067)	ND (0.062)	ND (0.069)	ND (0.065)	ND (0.057)	ND (0.063)	ND (0.067)	ND (0.063)	ND (0.062)	ND (0.054)	ND (0.054)	ND (0.062)	ND (0.063)
Phenol	mg/kg	0.33	500	0.33	ND (0.037)	ND (0.041)	ND (0.038)	ND (0.042)	ND (0.040)	ND (0.035)	ND (0.039)	ND (0.041)	ND (0.039)	ND (0.038)	ND (0.033)	ND (0.033)	ND (0.038)	ND (0.038)
2,3,4,6-Tetrachlorophenol	mg/kg	-	-	-	ND (0.036)	ND (0.040)	ND (0.038)	ND (0.042)	ND (0.039)	ND (0.034)	ND (0.038)	ND (0.040)	ND (0.038)	ND (0.037)	ND (0.032)	ND (0.032)	ND (0.038)	ND (0.038)
2,4,5-Trichlorophenol	mg/kg	-	-	0.1	ND (0.040)	ND (0.046)	ND (0.042)	ND (0.047)	ND (0.044)	ND (0.039)	ND (0.043)	ND (0.045)	ND (0.043)	ND (0.042)	ND (0.036)	ND (0.037)	ND (0.042)	ND (0.042)
2,4,6-Trichlorophenol	mg/kg	-	-	-	ND (0.033)	ND (0.037)	ND (0.034)	ND (0.038)	ND (0.036)	ND (0.031)	ND (0.035)	ND (0.037)	ND (0.035)	ND (0.034)	ND (0.030)	ND (0.030)	ND (0.034)	ND (0.034)
Acenaphthene	mg/kg	20	500	98	0.0364	ND (0.011)	0.242	0.0192 J	0.061	ND (0.0097)	0.114	0.0201 J	0.14	ND (0.011)	0.0817	ND (0.0091)	0.0170 J	0.145
Acenaphthylene	mg/kg	100	500	107	0.0257 J	ND (0.013)	0.793	ND (0.013)	0.0915	ND (0.011)	0.1	0.0232 J	0.103	ND (0.012)	0.12	ND (0.010)	0.0254 J	0.039
Acetophenone	mg/kg	-	-	-	ND (0.0061)	ND (0.0069)	ND (0.0064)	ND (0.0071)	ND (0.0067)	ND (0.0059)	ND (0.0065)	ND (0.0069)	ND (0.0065)	ND (0.0064)	ND (0.0055)	ND (0.0055)	ND (0.0064)	ND (0.0064)
Anthracene	mg/kg	100	500	1000	0.0823	ND (0.014)	1.27	ND (0.014)	0.324	ND (0.012)	0.341	0.0539	0.385	ND (0.013)	0.27	ND (0.011)	0.0501	0.199
Atrazine	mg/kg	-	-	-	ND (0.0069)	ND (0.0077)	ND (0.0072)	ND (0.0080)	ND (0.0075)	ND (0.0066)	ND (0.0072)	ND (0.0077)	ND (0.0073)	ND (0.0072)	ND (0.0062)	ND (0.0062)	ND (0.0072)	ND (0.0072)
Benzo(a)anthracene	mg/kg	1	5.6	1	0.228	ND (0.013)	**5.2**	0.0375 J	0.822	0.0489	0.955	0.276	**1.08**	0.0157 J	0.622	ND (0.010)	0.449	0.372
Benzo(a)pyrene	mg/kg	1	1	22	0.215	ND (0.012)	**4.84**	0.0308 J	0.658	0.0463	**1.01**	0.356	**1.14**	ND (0.011)	0.616	ND (0.0096)	0.863	0.357
Benzo(b)fluoranthene	mg/kg	1	5.6	1.7	0.252	ND (0.013)	**5.4**	0.0320 J	0.75	0.0567	**1.08**	0.347	**1.23**	ND (0.012)	0.711	ND (0.011)	0.789	0.36
Benzo(g,h,i)perylene	mg/kg	100	500	1000	0.105	ND (0.015)	2.69	0.0204 J	0.417	0.0344	0.729	0.243	0.811	ND (0.014)	0.499	ND (0.012)	0.548	0.224
Benzo(k)fluoranthene	mg/kg	0.8	56	1.7	0.0817	ND (0.015)	**1.94**	ND (0.015)	0.255	0.0236 J	0.353	0.156	0.375	ND (0.014)	0.242	ND (0.012)	0.283	0.116
4-Bromophenyl phenyl ether	mg/kg	-	-	-	ND (0.013)	ND (0.014)	ND (0.013)	ND (0.015)	ND (0.014)	ND (0.012)	ND (0.013)	ND (0.014)	ND (0.013)	ND (0.013)	ND (0.011)	ND (0.011)	ND (0.013)	ND (0.013)
Butyl benzyl phthalate	mg/kg	-	-	122	ND (0.020)	ND (0.023)	ND (0.021)	ND (0.023)	ND (0.022)	ND (0.019)	ND (0.021)	ND (0.023)	ND (0.021)	ND (0.021)	ND (0.018)	ND (0.018)	ND (0.021)	ND (0.021)
1,1'-Biphenyl	mg/kg	-	-	-	ND (0.0040)	ND (0.0046)	0.0566 J	ND (0.0047)	ND (0.0044)	ND (0.0039)	ND (0.0043)	ND (0.0045)	0.0176 J	ND (0.0042)	0.0272 J	ND (0.0037)	ND (0.0042)	0.0653 J
Benzaldehyde	mg/kg	-	-	-	ND (0.0080)	ND (0.0090)	ND (0.0084)	ND (0.0093)	ND (0.0087)	ND (0.0077)	ND (0.0084)	ND (0.0090)	ND (0.0085)	ND (0.0084)	ND (0.0072)	ND (0.0072)	ND (0.0084)	ND (0.0084)
2-Chloronaphthalene	mg/kg	-	-	-	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.013)	ND (0.012)	ND (0.010)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.011)	ND (0.0097)	ND (0.0098)	ND (0.011)	ND (0.011)
4-Chloroaniline	mg/kg	-	-	0.22	ND (0.011)	ND (0.013)	ND (0.012)	ND (0.013)	ND (0.012)	ND (0.011)	ND (0.012)	ND (0.012)	ND (0.012)	ND (0.012)	ND (0.010)	ND (0.010)	ND (0.012)	ND (0.012)
Carbazole	mg/kg	-	-	-	0.0317 J	ND (0.018)	0.32	ND (0.019)	0.0853	ND (0.015)	0.135	0.0271 J	0.151	ND (0.017)	0.0887	ND (0.015)	0.0185 J	0.0852
Caprolactam	mg/kg	-	-	-	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.013)	ND (0.012)	ND (0.011)	ND (0.012)	ND (0.012)	ND (0.012)	ND (0.011)	ND (0.0099)	ND (0.0099)	ND (0.012)	ND (0.012)
Chrysene	mg/kg	1	56	1	0.221	ND (0.013)	**5.33**	0.0335 J	0.844	0.0618	**1.08**	0.29	**1.19**	ND (0.012)	0.708	ND (0.011)	0.44	0.413
bis(2-Chloroethoxy)methane	mg/kg	-	-	-	ND (0.014)	ND (0.016)	ND (0.015)	ND (0.016)	ND (0.015)	ND (0.014)	ND (0.015)	ND (0.016)	ND (0.015)	ND (0.015)	ND (0.013)	ND (0.013)	ND (0.015)	ND (0.015)
bis(2-Chloroethyl)ether	mg/kg	-	-	-	ND (0.010)	ND (0.012)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.010)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.011)	ND (0.0095)	ND (0.0095)	ND (0.011)	ND (0.011)
bis(2-Chloroisopropyl)ether	mg/kg	-	-	-	ND (0.010)	ND (0.012)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.0099)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.011)	ND (0.0093)	ND (0.0093)	ND (0.011)	ND (0.011)
4-Chlorophenyl phenyl ether	mg/kg	-	-	-	ND (0.010)	ND (0.012)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.010)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.011)	ND (0.0095)	ND (0.0095)	ND (0.011)	ND (0.011)
2,4-Dinitrotoluene	mg/kg	-	-	-	ND (0.015)	ND (0.017)	ND (0.016)	ND (0.018)	ND (0.017)	ND (0.015)	ND (0.016)	ND (0.017)	ND (0.016)	ND (0.016)	ND (0.014)	ND (0.014)	ND (0.016)	ND (0.016)
2,6-Dinitrotoluene	mg/kg	-	-	1	ND (0.013)	ND (0.015)	ND (0.014)	ND (0.015)	ND (0.014)	ND (0.013)	ND (0.014)	ND (0.015)	ND (0.014)	ND (0.014)	ND (0.012)	ND (0.012)	ND (0.014)	ND (0.014)
3,3'-Dichlorobenzidine	mg/kg	-	-	-	ND (0.0088)	ND (0.010)	ND (0.0093)	ND (0.010)	ND (0.0096)	ND (0.0085)	ND (0.0093)	ND (0.0099)	ND (0.0094)	ND (0.0092)	ND (0.0080)	ND (0.0080)	ND (0.0093)	ND (0.0093)
1,4-Dioxane	mg/kg	0.1	130	0.1	ND (0.023)	ND (0.025)	ND (0.024)	ND (0.026)	ND (0.025)	ND (0.022)	ND (0.024)	ND (0.025)	ND (0.024)	ND (0.024)	ND (0.020)	ND (0.020)	ND (0.024)	ND (0.024)
Dibenzo(a,h)anthracene	mg/kg	0.33	0.56	1000	0.0234 J	ND (0.013)	**0.805**	ND (0.014)	0.121	ND (0.011)	0.177	0.0705	0.19	ND (0.012)	0.11	ND (0.011)	0.139	0.0595
Dibenzofuran	mg/kg	7	350	6.2	0.0300 J	ND (0.012)	0.252	ND (0.012)	0.0512 J	ND (0.0099)	0.0684 J	ND (0.012)	0.0886	ND (0.011)	0.0757	ND (0.0093)	ND (0.011)	0.106
Di-n-butyl phthalate	mg/kg	-	-	8.1	ND (0.0077)	ND (0.0087)	ND (0.0081)	ND (0.0090)	ND (0.0084)	ND (0.0074)	ND (0.0082)	ND (0.0087)	ND (0.0082)	ND (0.0081)	ND (0.0070)	ND (0.0070)	ND (0.0081)	ND (0.0081)
Di-n-octyl phthalate	mg/kg	-	-	120	ND (0.017)	ND (0.019)	ND (0.018)	ND (0.020)	ND (0.018)	ND (0.016)	ND (0.018)	ND (0.019)	ND (0.018)	ND (0.018)	ND (0.015)	ND (0.015)	ND (0.018)	ND (0.018)
Diethyl phthalate	mg/kg	-	-	7.1	ND (0.012)	ND (0.013)	ND (0.012)	ND (0.014)	ND (0.013)	ND (0.011)	ND (0.013)	ND (0.013)	ND (0.013)	ND (0.012)	ND (0.011)	ND (0.011)	ND (0.012)	ND (0.012)
Dimethyl phthalate	mg/kg	-	-	27	ND (0.012)	ND (0.014)	ND (0.013)	ND (0.014)	ND (0.013)	ND (0.012)	ND (0.013)	ND (0.014)	ND (0.013)	ND (0.013)	ND (0.011)	ND (0.011)	ND (0.013)	ND (0.013)
bis(2-Ethylhexyl)phthalate	mg/kg	-	-	435	0.103	0.078	0.461	0.0998	0.221	0.352	0.0875	0.587	0.318	0.14	0.342	0.083	0.207	0.223
Fluoranthene	mg/kg	100	500	1000	0.469	ND (0.017)	8.96	0.0618	1.41	0.129	1.61	0.347	2.03	0.0279 J	1.51	ND (0.014)	0.518	0.795
Fluorene	mg/kg	30	500	386	0.045	ND (0.013)	0.366	0.0164 J	0.0704	ND (0.011)	0.109	ND (0.013)	0.121	ND (0.012)	0.0951	ND (0.010)	0.0168 J	0.188
Hexachlorobenzene	mg/kg	0.33	6	1.4	ND (0.011)	ND (0.013)	ND (0.012)	ND (0.013)	ND (0.012)	ND (0.011)	ND (0.012)	ND (0.013)	ND (0.012)	ND (0.012)	ND (0.010)	ND (0.010)	ND (0.012)	ND (0.012)
Hexachlorobutadiene	mg/kg	-	-	-	ND (0.0097)	ND (0.011)	ND (0.010)	ND (0.011)	ND (0.011)	ND (0.0093)	ND (0.010)	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.0087)	ND (0.0087)	ND (0.010)	ND (0.010)
Hexachlorocyclopentadiene	mg/kg	-	-	-	ND (0.036)	ND (0.040)	ND (0.037)	ND (0.041)	ND (0.039)	ND (0.034)	ND (0.037)	ND (0.040)	ND (0.038)	ND (0.037)	ND (0.032)	ND (0.032)	ND (0.037)	ND (0.037)
Hexachloroethane	mg/kg	-	-	-	ND (0.0097)	ND (0.011)	ND (0.010)	ND (0.011)	ND (0.011)	ND (0.0093)	ND (0.010)	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.0087)	ND (0.0087)	ND (0.010)	ND (0.010)
Indeno(1,2,3-cd)pyrene	mg/kg	0.5	5.6	8.2	0.118	ND (0.014)	**2.82**	0.0207 J	0.431	0.0332	**0.711**	0.271	**0.755**	ND (0.013)	0.428	ND (0.011)	**0.642**	0.23
Isophorone	mg/kg	-	-	4.4	ND (0.0094)	ND (0.011)	ND (0.0098)	ND (0.011)	ND (0.010)	ND (0.0090)	ND (0.0099)	ND (0.010)	ND (0.010)	ND (0.0098)	ND (0.0085)	ND (0.0085)	ND (0.0098)	ND (0.0098)
2-Methylnaphthalene	mg/kg	-	-	36.4	0.0904	ND (0.022)	0.19	0.113	ND (0.021)	ND (0.019)	0.0374 J	ND (0.022)	0.0560 J	ND (0.020)	0.125	ND (0.018)	0.0505 J	1.85
2-Nitroaniline	mg/kg	-	-	0.4	ND (0.015)	ND (0.017)	ND (0.016)	ND (0.018)	ND (0.017)	ND (0.015)	ND (0.016)	ND (0.017)	ND (0.016)	ND (0.016)	ND (0.014)	ND (0.014)	ND (0.016)	ND (0.016)
3-Nitroaniline	mg/kg	-	-	0.5	ND (0.014)	ND (0.016)	ND (0.015)	ND (0.016)	ND (0.015)	ND (0.013)	ND (0.015)	ND (0.016)	ND (0.015)	ND (0.015)	ND (0.013)	ND (0.013)	ND (0.015)	ND (0.015)
4-Nitroaniline	mg/kg	-	-	-	ND (0.014)	ND (0.015)	ND (0.014)	ND (0.016)	ND (0.015)	ND (0.013)	ND (0.014)	ND (0.015)	ND (0.014)	ND (0.014)	ND (0.012)	ND (0.012)	ND (0.014)	ND (0.014)
Naphthalene	mg/kg	12	500	12	0.366	ND (0.011)	0.108	0.104	0.0275 J	ND (0.0091)	0.0493	ND (0.011)	0.105	ND (0.0099)	0.142	ND (0.0086)	0.0575	2.02
Nitrobenzene	mg/kg	-	69	0.17	ND (0.010)	ND (0.011)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.0097)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.010)	ND (0.0091)	ND (0.0091)	ND (0.011)	ND (0.011)
N-Nitroso-di-n-propylamine	mg/kg	-	-	-	ND (0.0085)	ND (0.0096)	ND (0.0089)	ND (0.0099)	ND (0.0092)	ND (0.0082)	ND (0.0090)	ND (0.0095)	ND (0.0090)	ND (0.0089)	ND (0.0077)	ND (0.0077)	ND (0.0089)	ND (0.0089)
N-Nitrosodiphenylamine	mg/kg	-	-	-	ND (0.021)	ND (0.023)	ND (0.022)	ND (0.024)	ND (0.023)	ND (0.020)	ND (0.022)	ND (0.023)	ND (0.022)	ND (0.022)	ND (0.019)	ND (0.019)	ND (0.022)	ND (0.022)
Phenanthrene	mg/kg	100	500	1000	0.392	ND (0.018)	4.86	0.0564	1.26	0.141	1.5	0.179	1.69	0.0244 J	1.21	ND (0.014)	0.176	0.947
Pyrene	mg/kg	100	500	1000	0.433	ND (0.015)	10.7	0.07	1.81	0.124	1.99	0.494	2.35	0.0383	1.3	ND (0.012)	0.658	0.751
1,2,4,5-Tetrachlorobenzene	mg/kg	-	-	-	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.012)	ND (0.012)	ND (0.010)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.011)	ND (0.0097)	ND (0.0097)	ND (0.011)	ND (0.011)
GC/MS Semi-volatile TIC																		
Total TIC, Semi-Volatile	mg/kg	-	-	-	0.91 J	0.29 J	19.1 J	31.29 J	3.18 J	0.17 J	5.73 J	1.21 J	14.63 J	4.54 J	9.19 J	0.49 J	3.65 J	34.64 J

Legend:
Hit
Exceedance of UUSCO
Exceedance of Commercial Use SCO
Exceedance of Protection of Groundwater SCO and UUSCOs
J - Estimated Value

Table 7 - Metals in Soil Samples
511 West 21st Street, New York, NY

Client Sample ID:		NY SCO - Unrestricted Use (6 NYCRR 375-6 12/06)	NY SCO - Commercial w/ CP-51 (10/10) (6 NYCRR 375-6 12/06)	NY SCO - Protection of Groundwater w/ CP-51 (10/10) (6 NYCRR 375-6 12/06)	SB-1(0-2')	SB-1(7-9')	SB-2(0-2')	SB-2(8-10')	SB-3(0-2')	SB-3(8-10')	SB-4(0-2')	SB-4(8-10')
Lab Sample ID:					JB55187-7	JB55187-8	JB55187-3	JB55187-4	JB55187-5	JB55187-6	JB55187-1	JB55187-2
Date Sampled:					12/10/2013	12/10/2013	12/9/2013	12/9/2013	12/9/2013	12/9/2013	12/9/2013	12/9/2013
Matrix:					Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Metals Analysis												
Aluminum	mg/kg	-	-	-	10000	9330	7790	6360	7610	10100	9680	11700
Antimony	mg/kg	-	-	-	3.1	ND (2.3)	2.4	ND (2.2)	ND (2.2)	ND (2.4)	7.2	ND (2.4)
Arsenic	mg/kg	13	16	16	4.6	ND (2.3)	5.5	ND (2.2)	6.7	ND (2.4)	6.1	2.8
Barium	mg/kg	350	400	820	87.5	49.9	85.3	49.6	77.7	45.5	87.8	70.4
Beryllium	mg/kg	7.2	590	47	0.4	0.48	0.86	0.58	0.53	0.63	0.75	0.92
Cadmium	mg/kg	2.5	9.3	7.5	0.64	ND (0.57)	ND (0.56)	ND (0.55)	ND (0.56)	ND (0.61)	ND (0.52)	ND (0.59)
Calcium	mg/kg	-	-	-	42100	1080	46800	1390	26300	1210	40300	1190
Chromium	mg/kg	-	-	-	21.3	19.1	27	14.9	17.2	14	19.6	23.4
Cobalt	mg/kg	-	-	-	5.6	6.3	ND (5.6)	ND (5.5)	ND (5.6)	ND (6.1)	6	7.8
Copper	mg/kg	50	270	1720	**592**	13.5	**74.7**	11.7	**80.8**	9	**73.4**	14.8
Iron	mg/kg	-	-	-	15300	13700	13100	12100	14000	13900	14700	17800
Lead	mg/kg	63	1000	450	**268**	18.8	**126**	6.4	**209**	8.2	**141**	10.2
Magnesium	mg/kg	-	-	-	10100	3040	9960	2690	5630	3080	6390	3390
Manganese	mg/kg	1600	10000	2000	**292**	243	413	214	311	277	411	405
Mercury	mg/kg	0.18	2.8	0.73	0.17	ND (0.035)	0.099	ND (0.034)	**0.22**	ND (0.038)	0.11	ND (0.038)
Nickel	mg/kg	30	310	130	18.8	17	16.3	13.8	14.4	14.3	17.5	20.1
Potassium	mg/kg	-	-	-	1710	1860	1990	1320	1530	ND (1200)	1940	1880
Selenium	mg/kg	3.9	1500	4	ND (2.2)	ND (2.3)	ND (2.2)	ND (2.2)	ND (2.2)	ND (2.4)	ND (2.1)	ND (2.4)
Silver	mg/kg	2	1500	8.3	0.99	ND (0.57)	0.94	ND (0.55)	0.71	ND (0.61)	0.81	ND (0.59)
Sodium	mg/kg	-	-	-	ND (1100)	ND (1100)	ND (1100)	ND (1100)	ND (1100)	ND (1200)	1240	ND (1200)
Thallium	mg/kg	-	-	-	ND (1.1)	ND (1.1)	ND (1.1)	ND (1.1)	ND (1.1)	ND (1.2)	ND (1.0)	ND (1.2)
Vanadium	mg/kg	-	-	-	21.8	20.7	26.3	27.6	20.5	16.5	24.8	25.3
Zinc	mg/kg	109	10000	2480	**241**	39.5	109	29.5	**191**	37.1	**144**	33.2

Legend:
Hit
Exceedance of UUSCO
Exceedance of Commercial Use SCO
Exceedance of Protection of Groundwater SCO and
J - Estimated Value

Table 7 - Metals in Soil Samples
511 West 21st Street, New York, NY

Client Sample ID:		NY SCO - Unrestricted Use (6 NYCRR 375-6 12/06)	NY SCO - Commercial w/ CP-51 (10/10) (6 NYCRR 375-6 12/06)	NY SCO - Protection of Groundwater w/ CP-51 (10/10) (6 NYCRR 375-6 12/06)	SB-5(3-5')	SB-5(6-8')	SB-6(3-5')	SB-6(6-8')	SB-7(3-5')	SB-7(6-8')	SB-8(0-2')	SB-8(6-8')
Lab Sample ID:					JB55187-25	JB55187-26	JB55187-27	JB55187-28	JB55187-29	JB55187-30	JB55187-13	JB55187-14
Date Sampled:					12/12/2013	12/12/2013	12/12/2013	12/12/2013	12/12/2013	12/12/2013	12/11/2013	12/11/2013
Matrix:					Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Metals Analysis												
Aluminum	mg/kg	-	-	-	8150	9170	6830	8050	9440	15100	7830	8790
Antimony	mg/kg	-	-	-	3.2	ND (2.8)	ND (2.3)	ND (2.5)	3.3	ND (2.5)	ND (2.1)	ND (2.5)
Arsenic	mg/kg	13	16	16	10.5	3.8	6	3	5.6	3.5	3.4	3
Barium	mg/kg	350	400	820	69.2	42.4	55.8	43.2	78.9	57.9	86.3	37.8
Beryllium	mg/kg	7.2	590	47	0.61	0.57	0.57	0.56	0.76	0.9	0.35	0.4
Cadmium	mg/kg	2.5	9.3	7.5	ND (0.56)	ND (0.71)	ND (0.57)	ND (0.61)	ND (0.55)	ND (0.63)	ND (0.52)	ND (0.62)
Calcium	mg/kg	-	-	-	64400	15100	87100	1070	51600	1670	11100	2100
Chromium	mg/kg	-	-	-	17.5	14.6	13.8	14.1	18.3	26.3	17.4	14.8
Cobalt	mg/kg	-	-	-	6.3	ND (7.1)	ND (5.7)	6.8	ND (5.5)	8.1	5.8	6.8
Copper	mg/kg	50	270	1720	**124**	27.9	**51.5**	14.3	**70.1**	22.3	32.5	12.6
Iron	mg/kg	-	-	-	21100	14700	10700	15900	15700	21700	12500	16500
Lead	mg/kg	63	1000	450	**155**	45.3	**88.2**	7.7	**126**	18.5	**114**	7.2
Magnesium	mg/kg	-	-	-	16200	6340	36200	3230	8520	4490	4150	3650
Manganese	mg/kg	1600	10000	2000	251	205	201	241	291	489	298	501
Mercury	mg/kg	0.18	2.8	0.73	**0.24**	0.076	0.15	ND (0.036)	**0.25**	ND (0.042)	0.16	ND (0.036)
Nickel	mg/kg	30	310	130	19.9	13.7	13	14	15.4	23.3	16.4	15.3
Potassium	mg/kg	-	-	-	1620	ND (1400)	1500	1420	1730	2700	1550	1680
Selenium	mg/kg	3.9	1500	4	ND (2.2)	ND (2.8)	ND (2.3)	ND (2.5)	ND (2.2)	ND (2.5)	ND (2.1)	ND (2.5)
Silver	mg/kg	2	1500	8.3	**4**	ND (0.71)	1.2	ND (0.61)	0.9	1.2	0.73	0.67
Sodium	mg/kg	-	-	-	ND (1100)	ND (1400)	ND (1100)	ND (1200)	ND (1100)	ND (1300)	ND (1000)	ND (1200)
Thallium	mg/kg	-	-	-	ND (1.1)	ND (1.4)	ND (1.1)	ND (1.2)	ND (1.1)	ND (1.3)	ND (1.0)	ND (1.2)
Vanadium	mg/kg	-	-	-	20.7	18.1	32.9	17.1	26	30.1	20.3	18
Zinc	mg/kg	109	10000	2480	**139**	59.3	81	33.8	**140**	43.3	62.5	41.2

Legend:
Hit
Exceedance of UUSCO
Exceedance of Commercial Use SCO
Exceedance of Protection of Groundwater SCO
J - Estimated Value

Table 7 - Metals in Soil Samples
511 West 21st Street, New York, NY

Client Sample ID:		NY SCO - Unrestricted Use (6 NYCRR 375-6 12/06)	NY SCO - Commercial w/ CP-51 (10/10) (6 NYCRR 375-6 12/06)	NY SCO - Protection of Groundwater w/ CP-51 (10/10) (6 NYCRR 375-6 12/06)	SB-9(3-5')	SB-9(6-8')	SB-10(0-2')	SB-10(6-8')	SB-11(0-2')	SB-11(8-10')	SB-12(0-2')	SB-12(6-8')	SB-13(0-2')
Lab Sample ID:					JB55187-23	JB55187-24	JB55187-19	JB55187-20	JB55187-17	JB55187-18	JB55187-15	JB55187-16	JB55187-9
Date Sampled:					12/12/2013	12/12/2013	12/12/2013	12/12/2013	12/12/2013	12/12/2013	12/12/2013	12/12/2013	12/11/2013
Matrix:					Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Metals Analysis													
Aluminum	mg/kg	-	-	-	8450	9330	9000	9030	10600	10700	8010	9280	8630
Antimony	mg/kg	-	-	-	ND (2.2)	ND (2.5)	ND (2.6)	ND (2.2)	5.3	ND (2.5)	ND (2.2)	ND (2.3)	ND (2.3)
Arsenic	mg/kg	13	16	16	3.9	3.4	4.2	4.9	5.7	3.3	4.9	2.6	10.2
Barium	mg/kg	350	400	820	70.4	60	109	52	147	112	85.3	43.5	71.8
Beryllium	mg/kg	7.2	590	47	0.7	0.74	0.72	0.75	0.79	0.77	0.61	0.75	0.37
Cadmium	mg/kg	2.5	9.3	7.5	ND (0.56)	ND (0.63)	**2.7**	ND (0.56)	ND (0.55)	ND (0.62)	ND (0.54)	ND (0.56)	ND (0.58)
Calcium	mg/kg	-	-	-	23700	25300	26000	27900	28400	47400	50600	22500	37900
Chromium	mg/kg	-	-	-	17.3	18.8	16.6	18.3	24	14.7	15.8	22.9	20.1
Cobalt	mg/kg	-	-	-	ND (5.6)	ND (6.3)	ND (6.4)	5.6	6	7	ND (5.4)	6.3	ND (5.8)
Copper	mg/kg	50	270	1720	32.9	20.1	**63.7**	18.9	**95.3**	16.6	**65.9**	14.3	27.3
Iron	mg/kg	-	-	-	13300	14600	15900	13900	20800	17000	14500	14500	12700
Lead	mg/kg	63	1000	450	**191**	**123**	**189**	29.1	**358**	**122**	**202**	9.1	**75.5**
Magnesium	mg/kg	-	-	-	6360	8050	9770	10200	6250	18400	11900	13400	6630
Manganese	mg/kg	1600	10000	2000	320	260	461	390	312	785	230	356	252
Mercury	mg/kg	0.18	2.8	0.73	**0.74**	**0.21**	**0.42**	ND (0.036)	**0.93**	0.16	**2.7**	ND (0.036)	0.16
Nickel	mg/kg	30	310	130	15.7	17.1	16.8	17.2	19	27.9	14.9	28	15.3
Potassium	mg/kg	-	-	-	1700	1710	2070	1760	1890	1720	1330	1710	1510
Selenium	mg/kg	3.9	1500	4	ND (2.2)	ND (2.5)	ND (2.6)	ND (2.2)	ND (2.2)	ND (2.5)	ND (2.2)	ND (2.3)	ND (2.3)
Silver	mg/kg	2	1500	8.3	1.2	0.74	0.86	0.73	1	0.92	0.87	ND (0.56)	0.81
Sodium	mg/kg	-	-	-	ND (1100)	ND (1300)	ND (1300)	ND (1100)	ND (1100)	ND (1200)	ND (1100)	ND (1100)	ND (1200)
Thallium	mg/kg	-	-	-	ND (1.1)	ND (1.3)	ND (1.3)	ND (1.1)	ND (1.1)	ND (1.2)	ND (1.1)	ND (1.1)	ND (1.2)
Vanadium	mg/kg	-	-	-	21.1	21.4	20.9	22.2	24.9	19.3	28.3	22.5	24.1
Zinc	mg/kg	109	10000	2480	67.5	41	**136**	42.1	**188**	40.1	**128**	26.5	71.9

Legend:
Hit
Exceedance of UUSCO
Exceedance of Commercial Use SCO
Exceedance of Protection of Groundwater SCO
J - Estimated Value

Table 7 - Metals in Soil Samples
511 West 21st Street, New York, NY

Client Sample ID:		NY SCO - Unrestricted Use (6 NYCRR 375-6 12/06)	NY SCO - Commercial w/ CP-51 (10/10) (6 NYCRR 375-6 12/06)	NY SCO - Protection of Groundwater w/ CP-51 (10/10) (6 NYCRR 375-6 12/06)	SB-13(8-10')	SB-14(0-2')	SB-14(8-10')	SB-20(0-2')	SB-20(6-8')
Lab Sample ID:					JB55187-10	JB55187-11	JB55187-12	JB55187-21	JB55187-22
Date Sampled:					12/11/2013	12/11/2013	12/11/2013	12/12/2013	12/12/2013
Matrix:					Soil	Soil	Soil	Soil	Soil
Metals Analysis									
Aluminum	mg/kg	-	-	-	9250	10200	7760	11300	7560
Antimony	mg/kg	-	-	-	ND (2.2)	ND (2.2)	ND (2.3)	2.7	ND (2.5)
Arsenic	mg/kg	13	16	16	2.4	3.5	3.9	4.8	2.7
Barium	mg/kg	350	400	820	47.4	95.6	49.1	125	47.4
Beryllium	mg/kg	7.2	590	47	0.42	0.44	0.3	0.89	0.7
Cadmium	mg/kg	2.5	9.3	7.5	ND (0.55)	ND (0.56)	ND (0.57)	ND (0.59)	ND (0.61)
Calcium	mg/kg	-	-	-	2720	14400	69600	27500	11500
Chromium	mg/kg	-	-	-	23.3	21.7	16.6	19.4	15.3
Cobalt	mg/kg	-	-	-	6.1	6.7	ND (5.7)	6.9	ND (6.1)
Copper	mg/kg	50	270	1720	16	32.4	20	**73.6**	12
Iron	mg/kg	-	-	-	13800	16100	10500	17100	12400
Lead	mg/kg	63	1000	450	7.3	**112**	45.8	**202**	15.8
Magnesium	mg/kg	-	-	-	3400	4640	14300	10700	5260
Manganese	mg/kg	1600	10000	2000	361	659	173	492	340
Mercury	mg/kg	0.18	2.8	0.73	ND (0.031)	0.16	0.048	**0.39**	ND (0.037)
Nickel	mg/kg	30	310	130	16.8	20.2	9.3	20.6	13.7
Potassium	mg/kg	-	-	-	1570	1630	ND (1100)	2410	1670
Selenium	mg/kg	3.9	1500	4	ND (2.2)	ND (2.2)	ND (2.3)	ND (2.4)	ND (2.5)
Silver	mg/kg	2	1500	8.3	0.56	0.8	0.95	0.89	ND (0.61)
Sodium	mg/kg	-	-	-	ND (1100)	ND (1100)	ND (1100)	ND (1200)	ND (1200)
Thallium	mg/kg	-	-	-	ND (1.1)	ND (1.1)	ND (1.1)	ND (1.2)	ND (1.2)
Vanadium	mg/kg	-	-	-	24.3	24.1	20.3	23.9	19.3
Zinc	mg/kg	109	10000	2480	26.4	63.2	43.7	**128**	34.3

Legend:
Hit
Exceedance of UUSCO
Exceedance of Commercial Use SCO
Exceedance of Protection of Groundwater SCO
J - Estimated Value

Table 8 - PCBs and Pesticides in Soil Samples
511 West 21st Street, New York, NY

Client Sample ID:		NY SCO - Unrestricted Use (6 NYCRR 375-6 12/06)	NY SCO - Commercial w/CP-51 (10/10) (6 NYCRR 375-6 12/06)	NY SCO - Protection of Groundwater w/CP-51 (10/10) (6 NYCRR 375-6 12/06)	SB-1(0-2')	SB-1(7-9')	SB-2(0-2')	SB-2(8-10')	SB-3(0-2')	SB-3(8-10')	SB-4(0-2')	SB-4(8-10')	SB-5(3-5')	SB-5(6-8')	SB-6(3-5')	SB-6(6-8')	SB-7(3-5')	SB-7(6-8')
Lab Sample ID:					JB55187-7	JB55187-8	JB55187-3	JB55187-4	JB55187-5	JB55187-6	JB55187-1	JB55187-2	JB55187-25	JB55187-26	JB55187-27	JB55187-28	JB55187-29	JB55187-30
Date Sampled:					12/10/2013	12/10/2013	12/9/2013	12/9/2013	12/9/2013	12/9/2013	12/9/2013	12/9/2013	12/12/2013	12/12/2013	12/12/2013	12/12/2013	12/12/2013	12/12/2013
Matrix:					Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
GC Semi-volatiles (SW846 8081B)																		
Aldrin	mg/kg	0.005	0.68	0.19	ND (0.00032)	ND (0.00035)	ND (0.00032)	ND (0.00032)	ND (0.00031)	ND (0.00037)	ND (0.00034)	ND (0.00035)	ND (0.00034)	ND (0.00042)	ND (0.00034)	ND (0.00036)	ND (0.00033)	ND (0.00039)
alpha-BHC	mg/kg	0.02	3.4	0.02	ND (0.00021)	ND (0.00023)	ND (0.00021)	ND (0.00021)	ND (0.00020)	ND (0.00024)	ND (0.00022)	ND (0.00023)	ND (0.00022)	ND (0.00027)	ND (0.00022)	ND (0.00023)	ND (0.00022)	ND (0.00025)
beta-BHC	mg/kg	0.036	3	0.09	ND (0.00044)	ND (0.00047)	ND (0.00044)	ND (0.00043)	ND (0.00042)	ND (0.00051)	ND (0.00045)	ND (0.00048)	ND (0.00046)	ND (0.00056)	ND (0.00046)	ND (0.00049)	ND (0.00045)	ND (0.00053)
delta-BHC	mg/kg	0.04	500	0.25	ND (0.00035)	ND (0.00037)	ND (0.00035)	ND (0.00034)	ND (0.00033)	ND (0.00040)	ND (0.00036)	ND (0.00038)	ND (0.00036)	ND (0.00045)	ND (0.00037)	ND (0.00039)	ND (0.00036)	ND (0.00042)
gamma-BHC (Lindane)	mg/kg	0.1	9.2	0.1	ND (0.00035)	ND (0.00037)	ND (0.00035)	ND (0.00034)	ND (0.00033)	ND (0.00040)	ND (0.00036)	ND (0.00038)	ND (0.00036)	ND (0.00044)	ND (0.00037)	ND (0.00038)	ND (0.00035)	ND (0.00042)
alpha-Chlordane	mg/kg	0.094	24	2.9	ND (0.00026)	ND (0.00028)	ND (0.00026)	ND (0.00026)	0.0033	ND (0.00030)	ND (0.00027)	ND (0.00028)	ND (0.00027)	ND (0.00034)	ND (0.00028)	ND (0.00029)	ND (0.00027)	ND (0.00032)
gamma-Chlordane	mg/kg	-	-	14	ND (0.00049)	ND (0.00052)	ND (0.00049)	ND (0.00048)	0.0038	ND (0.00056)	ND (0.00050)	ND (0.00053)	ND (0.00051)	ND (0.00063)	ND (0.00051)	ND (0.00054)	ND (0.00050)	ND (0.00059)
Dieldrin	mg/kg	0.005	1.4	0.1	ND (0.00028)	ND (0.00030)	ND (0.00028)	ND (0.00027)	ND (0.00027)	ND (0.00032)	ND (0.00029)	ND (0.00030)	ND (0.00029)	ND (0.00035)	ND (0.00029)	ND (0.00031)	ND (0.00028)	ND (0.00033)
4,4'-DDD	mg/kg	0.0033	92	14	ND (0.00039)	ND (0.00041)	ND (0.00039)	ND (0.00038)	ND (0.00037)	ND (0.00044)	ND (0.00040)	ND (0.00042)	ND (0.00040)	ND (0.00049)	ND (0.00041)	ND (0.00043)	ND (0.00039)	ND (0.00047)
4,4'-DDE	mg/kg	0.0033	62	17	ND (0.00028)	ND (0.00031)	ND (0.00028)	ND (0.00028)	ND (0.00027)	ND (0.00033)	ND (0.00029)	ND (0.00031)	ND (0.00030)	ND (0.00037)	ND (0.00030)	ND (0.00032)	ND (0.00029)	ND (0.00034)
4,4'-DDT	mg/kg	0.0033	47	136	0.0010 [a]	ND (0.00037)	ND (0.00035)	ND (0.00034)	**0.0062**	ND (0.00040)	ND (0.00036)	ND (0.00038)	0.0028 [a]	ND (0.00045)	**0.0043 [a]**	ND (0.00039)	0.0025	ND (0.00042)
Endrin	mg/kg	0.014	89	0.06	ND (0.00023)	ND (0.00025)	ND (0.00023)	ND (0.00022)	ND (0.00022)	ND (0.00026)	ND (0.00024)	ND (0.00025)	ND (0.00024)	ND (0.00029)	ND (0.00024)	ND (0.00025)	ND (0.00023)	ND (0.00028)
Endosulfan sulfate	mg/kg	2.4	200	1000	ND (0.00030)	ND (0.00033)	ND (0.00030)	ND (0.00030)	ND (0.00029)	ND (0.00035)	ND (0.00031)	ND (0.00033)	ND (0.00032)	ND (0.00039)	ND (0.00032)	ND (0.00034)	ND (0.00031)	ND (0.00037)
Endrin aldehyde	mg/kg	-	-	-	ND (0.00037)	ND (0.00040)	ND (0.00037)	ND (0.00036)	ND (0.00035)	ND (0.00042)	ND (0.00038)	ND (0.00040)	ND (0.00038)	ND (0.00047)	ND (0.00039)	ND (0.00041)	ND (0.00038)	ND (0.00045)
Endosulfan-I	mg/kg	2.4	200	102	ND (0.00027)	ND (0.00029)	ND (0.00027)	ND (0.00026)	ND (0.00026)	ND (0.00031)	ND (0.00028)	ND (0.00029)	ND (0.00028)	ND (0.00034)	ND (0.00028)	ND (0.00030)	ND (0.00027)	ND (0.00032)
Endosulfan-II	mg/kg	2.4	200	102	ND (0.00042)	ND (0.00045)	ND (0.00042)	ND (0.00041)	ND (0.00041)	ND (0.00049)	ND (0.00044)	ND (0.00046)	ND (0.00044)	ND (0.00054)	ND (0.00045)	ND (0.00047)	ND (0.00043)	ND (0.00051)
Heptachlor	mg/kg	0.042	15	0.38	ND (0.00034)	ND (0.00037)	ND (0.00034)	ND (0.00034)	ND (0.00033)	ND (0.00039)	ND (0.00036)	ND (0.00037)	ND (0.00036)	ND (0.00044)	ND (0.00036)	ND (0.00038)	ND (0.00035)	ND (0.00042)
Heptachlor epoxide	mg/kg	-	-	0.02	ND (0.00026)	ND (0.00028)	ND (0.00026)	ND (0.00026)	ND (0.00025)	ND (0.00030)	ND (0.00027)	ND (0.00029)	ND (0.00027)	ND (0.00034)	ND (0.00028)	ND (0.00029)	ND (0.00027)	ND (0.00032)
Methoxychlor	mg/kg	-	-	900	ND (0.00069)	ND (0.00074)	ND (0.00069)	ND (0.00068)	ND (0.00066)	ND (0.00079)	ND (0.00071)	ND (0.00075)	ND (0.00072)	ND (0.00089)	ND (0.00073)	ND (0.00077)	ND (0.00071)	ND (0.00083)
Endrin ketone	mg/kg	-	-	-	ND (0.00029)	ND (0.00031)	ND (0.00029)	ND (0.00028)	ND (0.00028)	ND (0.00033)	ND (0.00030)	ND (0.00031)	ND (0.00030)	ND (0.00037)	ND (0.00030)	ND (0.00032)	ND (0.00029)	ND (0.00035)
Toxaphene	mg/kg	-	-	-	ND (0.0089)	ND (0.0096)	ND (0.0089)	ND (0.0087)	ND (0.0085)	ND (0.010)	ND (0.0092)	ND (0.0097)	ND (0.0092)	ND (0.011)	ND (0.0094)	ND (0.0099)	ND (0.0091)	ND (0.011)
GC Semi-volatiles (SW846 8082A)																		
Aroclor 1016	mg/kg	0.1	1	3.2	ND (0.0092)	ND (0.0099)	ND (0.0092)	ND (0.0090)	ND (0.0088)	ND (0.011)	ND (0.0095)	ND (0.010)	ND (0.0089)	ND (0.011)	ND (0.0097)	ND (0.010)	ND (0.0088)	ND (0.011)
Aroclor 1221	mg/kg	0.1	1	3.2	ND (0.021)	ND (0.023)	ND (0.021)	ND (0.021)	ND (0.020)	ND (0.024)	ND (0.022)	ND (0.023)	ND (0.021)	ND (0.026)	ND (0.022)	ND (0.024)	ND (0.020)	ND (0.026)
Aroclor 1232	mg/kg	0.1	1	3.2	ND (0.018)	ND (0.019)	ND (0.018)	ND (0.017)	ND (0.017)	ND (0.021)	ND (0.018)	ND (0.019)	ND (0.017)	ND (0.022)	ND (0.019)	ND (0.020)	ND (0.017)	ND (0.022)
Aroclor 1242	mg/kg	0.1	1	3.2	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.013)	ND (0.012)	ND (0.012)	ND (0.011)	ND (0.014)	ND (0.012)	ND (0.012)	ND (0.011)	ND (0.014)
Aroclor 1248	mg/kg	0.1	1	3.2	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.011)	ND (0.010)	ND (0.012)	ND (0.011)	ND (0.012)	ND (0.010)	ND (0.013)	ND (0.011)	ND (0.012)	ND (0.010)	ND (0.013)
Aroclor 1254	mg/kg	0.1	1	3.2	ND (0.017)	ND (0.018)	ND (0.017)	ND (0.016)	ND (0.016)	ND (0.019)	ND (0.017)	ND (0.018)	ND (0.016)	ND (0.020)	ND (0.017)	ND (0.018)	ND (0.016)	ND (0.020)
Aroclor 1260	mg/kg	0.1	1	3.2	ND (0.012)	ND (0.012)	ND (0.012)	ND (0.011)	ND (0.011)	ND (0.013)	ND (0.012)	ND (0.013)	ND (0.011)	ND (0.014)	ND (0.012)	ND (0.013)	ND (0.011)	ND (0.014)
Aroclor 1268	mg/kg	0.1	1	3.2	ND (0.010)	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.012)	ND (0.011)	ND (0.011)	ND (0.010)	ND (0.012)	ND (0.011)	ND (0.012)	ND (0.010)	ND (0.013)
Aroclor 1262	mg/kg	0.1	1	3.2	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.013)	ND (0.012)	ND (0.012)	ND (0.011)	ND (0.014)	ND (0.012)	ND (0.012)	ND (0.011)	ND (0.014)

Legend:
Hit
Exceedance of UUSCO
Exceedance of Commercial Use SCO
Exceedance of Protection of Groundwater SCO and UUSCOs
J - Estimated Value

Table 8 - PCBs and Pesticides in Soil Samples
511 West 21st Street, New York, NY

Client Sample ID:		NY SCO - Unrestricted Use (6 NYCRR 375-6 12/06)	NY SCO - Commercial w/CP-51 (10/10) (6 NYCRR 375-6 12/06)	NY SCO - Protection of Groundwater w/CP-51 (10/10) (6 NYCRR 375-6 12/06)	SB-8(0-2')	SB-8(6-8')	SB-9(3-5')	SB-9(6-8')	SB-10(0-2')	SB-10(6-8')	SB-11(0-2')	SB-11(8-10')	SB-12(0-2')	SB-12(6-8')	SB-13(0-2')	SB-13(8-10')	SB-14(0-2')	SB-14(8-10')
Lab Sample ID:					JB55187-13	JB55187-14	JB55187-23	JB55187-24	JB55187-19	JB55187-20	JB55187-17	JB55187-18	JB55187-15	JB55187-16	JB55187-9	JB55187-10	JB55187-11	JB55187-12
Date Sampled:					12/11/2013	12/11/2013	12/12/2013	12/12/2013	12/12/2013	12/12/2013	12/12/2013	12/12/2013	12/12/2013	12/12/2013	12/11/2013	12/11/2013	12/11/2013	12/11/2013
Matrix:					Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
GC Semi-volatiles (SW846 8081B)																		
Aldrin	mg/kg	0.005	0.68	0.19	ND (0.00032)	ND (0.00037)	ND (0.00032)	ND (0.00034)	ND (0.00038)	ND (0.00036)	ND (0.00035)	ND (0.00036)	ND (0.00033)	ND (0.00033)	ND (0.00030)	ND (0.00033)	ND (0.00033)	ND (0.00035)
alpha-BHC	mg/kg	0.02	3.4	0.02	ND (0.00021)	ND (0.00024)	ND (0.00021)	ND (0.00022)	ND (0.00025)	ND (0.00023)	ND (0.00023)	ND (0.00023)	ND (0.00022)	ND (0.00022)	ND (0.00020)	ND (0.00021)	ND (0.00021)	ND (0.00023)
beta-BHC	mg/kg	0.036	3	0.09	ND (0.00043)	ND (0.00050)	ND (0.00044)	ND (0.00047)	ND (0.00051)	ND (0.00049)	ND (0.00047)	ND (0.00049)	ND (0.00045)	ND (0.00045)	ND (0.00041)	ND (0.00045)	ND (0.00045)	ND (0.00048)
delta-BHC	mg/kg	0.04	500	0.25	ND (0.00034)	ND (0.00039)	ND (0.00035)	ND (0.00037)	ND (0.00041)	ND (0.00038)	ND (0.00037)	ND (0.00039)	ND (0.00036)	ND (0.00036)	ND (0.00033)	ND (0.00035)	ND (0.00035)	ND (0.00038)
gamma-BHC (Lindane)	mg/kg	0.1	9.2	0.1	ND (0.00034)	ND (0.00039)	ND (0.00035)	ND (0.00037)	ND (0.00040)	ND (0.00038)	ND (0.00037)	ND (0.00038)	ND (0.00036)	ND (0.00035)	ND (0.00032)	ND (0.00035)	ND (0.00035)	ND (0.00038)
alpha-Chlordane	mg/kg	0.094	24	2.9	ND (0.00026)	ND (0.00029)	ND (0.00026)	ND (0.00028)	ND (0.00030)	ND (0.00029)	ND (0.00028)	ND (0.00029)	0.0022	ND (0.00027)	ND (0.00024)	ND (0.00026)	ND (0.00027)	ND (0.00028)
gamma-Chlordane	mg/kg	-	-	14	ND (0.00048)	ND (0.00055)	ND (0.00049)	ND (0.00052)	ND (0.00057)	ND (0.00054)	ND (0.00052)	ND (0.00054)	0.0033 [a]	ND (0.00050)	ND (0.00046)	ND (0.00049)	ND (0.00050)	ND (0.00053)
Dieldrin	mg/kg	0.005	1.4	0.1	ND (0.00027)	ND (0.00031)	ND (0.00028)	ND (0.00029)	ND (0.00032)	ND (0.00030)	ND (0.00029)	ND (0.00031)	ND (0.00028)	ND (0.00028)	ND (0.00026)	ND (0.00028)	ND (0.00028)	ND (0.00030)
4,4'-DDD	mg/kg	0.0033	92	14	ND (0.00038)	ND (0.00043)	ND (0.00039)	ND (0.00041)	ND (0.00045)	ND (0.00043)	ND (0.00041)	ND (0.00043)	ND (0.00040)	ND (0.00040)	ND (0.00036)	ND (0.00039)	ND (0.00039)	ND (0.00042)
4,4'-DDE	mg/kg	0.0033	62	17	ND (0.00028)	ND (0.00032)	ND (0.00028)	ND (0.00030)	ND (0.00033)	ND (0.00031)	ND (0.00030)	ND (0.00032)	ND (0.00029)	ND (0.00029)	ND (0.00027)	ND (0.00029)	ND (0.00029)	ND (0.00031)
4,4'-DDT	mg/kg	0.0033	47	136	ND (0.00034)	ND (0.00039)	**0.0107 [a]**	ND (0.00037)	**0.0055**	ND (0.00038)	**0.007**	ND (0.00039)	**0.0038**	ND (0.00036)	ND (0.00033)	ND (0.00035)	ND (0.00035)	ND (0.00038)
Endrin	mg/kg	0.014	89	0.06	ND (0.00023)	ND (0.00026)	ND (0.00023)	ND (0.00024)	ND (0.00027)	ND (0.00025)	ND (0.00024)	ND (0.00025)	ND (0.00024)	ND (0.00023)	ND (0.00021)	ND (0.00023)	ND (0.00023)	ND (0.00025)
Endosulfan sulfate	mg/kg	2.4	200	1000	ND (0.00030)	ND (0.00034)	ND (0.00030)	ND (0.00032)	ND (0.00035)	ND (0.00034)	ND (0.00032)	ND (0.00034)	ND (0.00031)	ND (0.00031)	ND (0.00028)	ND (0.00031)	ND (0.00031)	ND (0.00033)
Endrin aldehyde	mg/kg	-	-	-	ND (0.00036)	ND (0.00042)	ND (0.00037)	ND (0.00039)	ND (0.00043)	ND (0.00041)	ND (0.00039)	ND (0.00041)	ND (0.00038)	ND (0.00038)	ND (0.00035)	ND (0.00037)	ND (0.00038)	ND (0.00040)
Endosulfan-I	mg/kg	2.4	200	102	ND (0.00026)	ND (0.00030)	ND (0.00027)	ND (0.00028)	ND (0.00031)	ND (0.00030)	ND (0.00029)	ND (0.00030)	ND (0.00028)	ND (0.00027)	ND (0.00025)	ND (0.00027)	ND (0.00027)	ND (0.00029)
Endosulfan-II	mg/kg	2.4	200	102	ND (0.00042)	ND (0.00048)	ND (0.00042)	ND (0.00045)	ND (0.00049)	ND (0.00047)	ND (0.00045)	ND (0.00047)	ND (0.00044)	ND (0.00043)	ND (0.00040)	ND (0.00043)	ND (0.00043)	ND (0.00046)
Heptachlor	mg/kg	0.042	15	0.38	ND (0.00034)	ND (0.00039)	ND (0.00034)	ND (0.00036)	ND (0.00040)	ND (0.00038)	ND (0.00037)	ND (0.00038)	ND (0.00035)	ND (0.00035)	ND (0.00032)	ND (0.00035)	ND (0.00035)	ND (0.00037)
Heptachlor epoxide	mg/kg	-	-	0.02	ND (0.00026)	ND (0.00030)	ND (0.00026)	ND (0.00028)	ND (0.00031)	ND (0.00029)	ND (0.00028)	ND (0.00029)	ND (0.00027)	ND (0.00027)	ND (0.00025)	ND (0.00027)	ND (0.00027)	ND (0.00029)
Methoxychlor	mg/kg	-	-	900	ND (0.00068)	ND (0.00078)	ND (0.00069)	ND (0.00073)	ND (0.00081)	ND (0.00076)	ND (0.00074)	ND (0.00077)	ND (0.00071)	ND (0.00071)	ND (0.00065)	ND (0.00070)	ND (0.00070)	ND (0.00075)
Endrin ketone	mg/kg	-	-	-	ND (0.00028)	ND (0.00032)	ND (0.00029)	ND (0.00030)	ND (0.00034)	ND (0.00032)	ND (0.00031)	ND (0.00032)	ND (0.00030)	ND (0.00029)	ND (0.00027)	ND (0.00029)	ND (0.00029)	ND (0.00031)
Toxaphene	mg/kg	-	-	-	ND (0.0088)	ND (0.010)	ND (0.0089)	ND (0.0094)	ND (0.010)	ND (0.0098)	ND (0.0095)	ND (0.0099)	ND (0.0092)	ND (0.0091)	ND (0.0083)	ND (0.0090)	ND (0.0091)	ND (0.0096)
GC Semi-volatiles (SW846 8082A)																		
Aroclor 1016	mg/kg	0.1	1	3.2	ND (0.0091)	ND (0.010)	ND (0.0092)	ND (0.0097)	ND (0.011)	ND (0.010)	ND (0.0098)	ND (0.010)	ND (0.0094)	ND (0.0094)	ND (0.0086)	ND (0.0093)	ND (0.0093)	ND (0.010)
Aroclor 1221	mg/kg	0.1	1	3.2	ND (0.021)	ND (0.024)	ND (0.021)	ND (0.022)	ND (0.025)	ND (0.023)	ND (0.023)	ND (0.024)	ND (0.022)	ND (0.022)	ND (0.020)	ND (0.022)	ND (0.022)	ND (0.023)
Aroclor 1232	mg/kg	0.1	1	3.2	ND (0.018)	ND (0.020)	ND (0.018)	ND (0.019)	ND (0.021)	ND (0.020)	ND (0.019)	ND (0.020)	ND (0.018)	ND (0.018)	ND (0.017)	ND (0.018)	ND (0.018)	ND (0.019)
Aroclor 1242	mg/kg	0.1	1	3.2	ND (0.011)	ND (0.013)	ND (0.011)	ND (0.012)	ND (0.013)	ND (0.012)	ND (0.012)	ND (0.012)	ND (0.012)	ND (0.012)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.012)
Aroclor 1248	mg/kg	0.1	1	3.2	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.011)	ND (0.013)	ND (0.012)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.011)	ND (0.010)	ND (0.011)	ND (0.011)	ND (0.012)
Aroclor 1254	mg/kg	0.1	1	3.2	ND (0.016)	ND (0.019)	ND (0.017)	ND (0.017)	ND (0.019)	ND (0.018)	ND (0.018)	ND (0.018)	ND (0.017)	ND (0.017)	ND (0.015)	ND (0.017)	ND (0.017)	ND (0.018)
Aroclor 1260	mg/kg	0.1	1	3.2	ND (0.011)	ND (0.013)	ND (0.012)	ND (0.012)	ND (0.013)	ND (0.013)	ND (0.012)	ND (0.013)	ND (0.012)	ND (0.012)	ND (0.011)	ND (0.012)	ND (0.012)	ND (0.013)
Aroclor 1268	mg/kg	0.1	1	3.2	ND (0.010)	ND (0.012)	ND (0.010)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.011)	ND (0.012)	ND (0.011)	ND (0.011)	ND (0.0097)	ND (0.011)	ND (0.011)	ND (0.011)
Aroclor 1262	mg/kg	0.1	1	3.2	ND (0.011)	ND (0.013)	ND (0.011)	ND (0.012)	ND (0.013)	ND (0.012)	ND (0.012)	ND (0.012)	ND (0.012)	ND (0.012)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.012)

Legend:
Hit
Exceedance of UUSCO
Exceedance of Commercial Use SCO
Exceedance of Protection of Groundwater SCO and UUSCOs
J - Estimated Value

Table 9 - Summary of Groundwater Analytical Results
511 West 21st Street New York, New York

Compound	TOGS (ug/L)	Number of Samples	Max Conc. (ug/L)	Samples Above TOGS
Volatile Organic Compounds				
Benzene	1	6	2,360	FLS-1, FLS-2, MW-6, MW-7, MW-8, MW-10, GFMW-1, GFMW-3
Chloroform	7	2	23.8	FLS-4, MW-24
Ethylbenzene	5	6	720	FLS-2, FLS-4, MW-7, MW-8, MW-10, FLS-24, GFMW-1
Isopropylbenzene	5	6	14.90	FLS-1, FLS-2, FLS-4, MW-8, MW-10, FLS-24
Methyl Tert Butyl Ether	10	4	271	MW-6, MW-7, MW-8, MW-10, GFMW-1
Toluene	5	7	2,340	FLS-2, FLS-4, MW-6, MW-7, MW-8, MW-10, FLS-24, GFMW-1
o-Xylene	5	6	667	FLS-2, FLS-4, MW-7, MW-8, MW-10, FLS-24, GFMW-1
Xylene (total)	5	6	2,270	FLS-2, FLS-4, MW-7, MW-8, MW-10, FLS-24, GFMW-1
Semi-Volatile Organic Compounds				
2,4-Dimethylphenol	1	3	6.40	MW-7, MW-8, MW-10
Metals				
Antimony	0.003	1	8.3	MW-7
Arsenic	0.025	1	62.5	MW-7
Iron	0.3	10	17,500	FLS-1, FLS-2, FLS-3 , FLS-4 , MW-5, MW-6, MW-8, MW-9, MW-10, MW-24
Manganese	0.3	9	8,980	FLS-1, FLS-2, FLS-3 , FLS-4 , MW-5, MW-6, MW-9, MW-10, MW-24
Selenium	0.01	2	17.8	FLS-1, MW-9
Sodium	20	11	1,260,000	FLS-1, FLS-2, FLS-3 , FLS-4 , MW-5, MW-6, MW-7, MW-8, MW-9, MW-10, MW-24

Concentrations in parts per billion (ppb)

TOGS - Technical Operations and Guidance Series Class GA Groundwater Standards

Table 10 - Volatile Organic Compounds in Groundwater Samples
511 West 21st Street, New York, NY

Client Sample ID:		NY TOGS Class	FLS-1	FLS-1	FLS-1	FLS-2	FLS-2	FLS-2	FLS-3	FLS-3	FLS-3	FLS-4	FLS-4	FLS-4
Lab Sample ID:		GA GW Standards	JB56029-1	JB57431-1	JB70310-4	JB56029-2	JB57431-1	JB70310-5	JB56029-3	JB57431-1	JB70310-6	JB56029-4	JB57431-1	JB70310-7
Date Sampled:		(NYSDEC 6/2004)	12/17/2013	1/10/2014	6/25/2014	12/17/2013	1/10/2014	6/25/2014	12/17/2013	1/10/2014	6/25/2014	12/17/2013	1/10/2014	6/25/2014
Matrix:			Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
GC/MS Volatiles (SW846														
Acetone	ug/l	-	24.5	14.1	7.4 J	4.0 J	ND (3.3)	ND (3.3)	10	6.4 J	ND (3.3)	ND (67)	252	ND (3.3)
Benzene	ug/l	1	**5.3**	**1.9**	0.53 J	**3.7**	**4.4**	**9.7**	ND (0.28)	ND (0.28)	ND (0.28)	ND (5.6)	ND (0.28)	ND (0.28)
Bromochloromethane	ug/l	5	ND (0.42)	ND (0.42)	ND (0.42)	ND (0.42)	ND (0.42)	ND (0.42)	ND (0.42)	ND (0.42)	ND (0.42)	ND (8.3)	ND (0.42)	ND (0.42)
Bromodichloromethane	ug/l	-	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (4.2)	ND (0.21)	ND (0.21)
Bromoform	ug/l	-	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (6.0)	ND (0.30)	ND (0.30)
Bromomethane	ug/l	5	ND (0.56)	ND (0.56)	ND (0.56)	ND (0.56)	ND (0.56)	ND (0.56)	ND (0.56)	ND (0.56)	ND (0.56)	ND (11)	ND (0.56)	ND (0.56)
2-Butanone (MEK)	ug/l	-	15.3	17.9	4.1 J	ND (3.2)	4.0 J	ND (3.2)	ND (3.2)	ND (3.2)	ND (3.2)	ND (64)	5.2 J	ND (3.2)
Carbon disulfide	ug/l	60	ND (0.18)	ND (0.18)	ND (0.18)	ND (0.18)	ND (0.18)	ND (0.18)	ND (0.18)	ND (0.18)	ND (0.18)	ND (3.6)	ND (0.18)	ND (0.18)
Carbon tetrachloride	ug/l	5	ND (0.23)	ND (0.23)	ND (0.23)	ND (0.23)	ND (0.23)	ND (0.23)	ND (0.23)	ND (0.23)	ND (0.23)	ND (4.5)	ND (0.23)	ND (0.23)
Chlorobenzene	ug/l	5	ND (0.35)	ND (0.35)	ND (0.35)	ND (0.35)	ND (0.35)	ND (0.35)	ND (0.35)	ND (0.35)	ND (0.35)	ND (6.9)	ND (0.35)	ND (0.35)
Chloroethane	ug/l	5	ND (0.39)	ND (0.39)	ND (0.39)	ND (0.39)	ND (0.39)	ND (0.39)	ND (0.39)	ND (0.39)	ND (0.39)	ND (7.8)	ND (0.39)	ND (0.39)
Chloroform	ug/l	7	ND (0.25)	ND (0.25)	ND (0.25)	ND (0.25)	ND (0.25)	ND (0.25)	ND (0.25)	ND (0.25)	ND (0.25)	**23.7**	1.5	2.2
Chloromethane	ug/l	5	ND (0.36)	ND (0.36)	ND (0.36)	ND (0.36)	0.62 J	ND (0.36)	ND (0.36)	0.55 J	ND (0.36)	ND (7.3)	ND (0.36)	ND (0.36)
Cyclohexane	ug/l	-	71.3	40.3	5.5	1.2 J	1.9 J	7.9	ND (0.18)	ND (0.18)	ND (0.18)	ND (3.6)	0.49 J	ND (0.18)
1,2-Dibromo-3-chloropropane	ug/l	0.04	ND (1.3)	ND (1.3)	ND (1.3)	ND (1.3)	ND (1.3)	ND (1.3)	ND (1.3)	ND (1.3)	ND (1.3)	ND (25)	ND (1.3)	ND (1.3)
Dibromochloromethane	ug/l	-	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.19)	ND (3.8)	ND (0.19)	ND (0.19)
1,2-Dibromoethane	ug/l	0.0006	ND (0.16)	ND (0.16)	ND (0.16)	ND (0.16)	ND (0.16)	ND (0.16)	ND (0.16)	ND (0.16)	ND (0.16)	ND (3.2)	ND (0.16)	ND (0.16)
1,2-Dichlorobenzene	ug/l	3	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (4.1)	ND (0.20)	ND (0.20)
1,3-Dichlorobenzene	ug/l	3	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (6.3)	ND (0.31)	ND (0.31)
1,4-Dichlorobenzene	ug/l	3	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (6.0)	ND (0.30)	ND (0.30)
Dichlorodifluoromethane	ug/l	5	ND (0.63)	ND (0.63)	ND (0.63)	ND (0.63)	ND (0.63)	ND (0.63)	ND (0.63)	ND (0.63)	ND (0.63)	ND (13)	ND (0.63)	ND (0.63)
1,1-Dichloroethane	ug/l	5	ND (0.26)	ND (0.26)	ND (0.26)	ND (0.26)	ND (0.26)	ND (0.26)	ND (0.26)	ND (0.26)	ND (0.26)	ND (5.2)	ND (0.26)	ND (0.26)
1,2-Dichloroethane	ug/l	0.6	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)	ND (4.4)	ND (0.22)	ND (0.22)
1,1-Dichloroethene	ug/l	5	ND (0.34)	ND (0.34)	ND (0.34)	ND (0.34)	ND (0.34)	ND (0.34)	ND (0.34)	ND (0.34)	ND (0.34)	ND (6.9)	ND (0.34)	ND (0.34)
cis-1,2-Dichloroethene	ug/l	5	ND (0.24)	ND (0.24)	ND (0.24)	ND (0.24)	ND (0.24)	ND (0.24)	ND (0.24)	ND (0.24)	ND (0.24)	ND (4.8)	ND (0.24)	ND (0.24)
trans-1,2-Dichloroethene	ug/l	5	ND (0.38)	ND (0.38)	ND (0.38)	ND (0.38)	ND (0.38)	ND (0.38)	ND (0.38)	ND (0.38)	ND (0.38)	ND (7.6)	ND (0.38)	ND (0.38)
1,2-Dichloropropane	ug/l	1	ND (0.28)	ND (0.28)	ND (0.28)	ND (0.28)	ND (0.28)	ND (0.28)	ND (0.28)	ND (0.28)	ND (0.28)	ND (5.6)	ND (0.28)	ND (0.28)
cis-1,3-Dichloropropene	ug/l	-	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	ND (3.0)	ND (0.15)	ND (0.15)
trans-1,3-Dichloropropene	ug/l	-	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (4.1)	ND (0.21)	ND (0.21)
Ethylbenzene	ug/l	5	0.87 J	0.37 J	ND (0.21)	**17.3**	1.9	0.51 J	ND (0.21)	ND (0.21)	ND (0.21)	**69.6**	**13.8**	ND (0.21)
Freon 113	ug/l	5	ND (0.77)	ND (0.77)	ND (0.77)	ND (0.77)	ND (0.77)	ND (0.77)	ND (0.77)	ND (0.77)	ND (0.77)	ND (15)	ND (0.77)	ND (0.77)
2-Hexanone	ug/l	-	ND (1.7)	ND (1.7)	ND (1.7)	ND (1.7)	ND (1.7)	ND (1.7)	ND (1.7)	ND (1.7)	ND (1.7)	ND (34)	ND (1.7)	ND (1.7)
Isopropylbenzene	ug/l	5	**14.9**	**7.6**	2.4	**12.9**	**11**	**16.8**	ND (0.22)	ND (0.22)	ND (0.22)	**9.5 J**	2.6	ND (0.22)
Methyl Acetate	ug/l	-	ND (1.5)	ND (1.5)	ND (1.5)	ND (1.5)	ND (1.5)	ND (1.5)	ND (1.5)	ND (1.5)	ND (1.5)	ND (30)	ND (1.5)	ND (1.5)
Methylcyclohexane	ug/l	-	56.2	43.4	3.4 J	3.7 J	2.9 J	2.0 J	ND (0.15)	ND (0.15)	ND (0.15)	ND (3.1)	2.1 J	ND (0.15)
Methyl Tert Butyl Ether	ug/l	10	5.6	6.1	3.4	0.87 J	0.90 J	0.57 J	ND (0.29)	ND (0.29)	ND (0.29)	ND (5.7)	ND (0.29)	5
4-Methyl-2-pentanone(MIBK)	ug/l	-	ND (1.5)	ND (1.5)	ND (1.5)	ND (1.5)	ND (1.5)	ND (1.5)	ND (1.5)	ND (1.5)	ND (1.5)	ND (30)	ND (1.5)	ND (1.5)
Methylene chloride	ug/l	5	ND (0.86)	ND (0.86)	ND (0.86)	ND (0.86)	ND (0.86)	ND (0.86)	ND (0.86)	ND (0.86)	ND (0.86)	ND (17)	ND (0.86)	ND (0.86)
Styrene	ug/l	5	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (6.0)	ND (0.30)	ND (0.30)
1,1,2,2-Tetrachloroethane	ug/l	5	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (3.9)	ND (0.20)	ND (0.20)
Tetrachloroethene	ug/l	5	0.41 J	0.64 J	0.37 J	ND (0.25)	ND (0.25)	ND (0.25)	0.32 J	ND (0.25)	ND (0.25)	ND (5.0)	ND (0.25)	ND (0.25)
Toluene	ug/l	5	1	ND (0.44)	ND (0.44)	**7.7**	ND (0.44)	0.55 J	ND (0.44)	ND (0.44)	ND (0.44)	**39.8**	4.1	0.53 J
1,2,3-Trichlorobenzene	ug/l	5	ND (0.24)	ND (0.24)	ND (0.24)	ND (0.24)	ND (0.24)	ND (0.24)	ND (0.24)	ND (0.24)	ND (0.24)	ND (4.9)	ND (0.24)	ND (0.24)
1,2,4-Trichlorobenzene	ug/l	5	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)	ND (4.3)	ND (0.22)	ND (0.22)
1,1,1-Trichloroethane	ug/l	5	ND (0.25)	ND (0.25)	ND (0.25)	ND (0.25)	ND (0.25)	ND (0.25)	ND (0.25)	ND (0.25)	ND (0.25)	ND (5.0)	ND (0.25)	ND (0.25)
1,1,2-Trichloroethane	ug/l	1	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (4.2)	ND (0.21)	ND (0.21)
Trichloroethene	ug/l	5	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (10)	ND (0.50)	ND (0.50)
Trichlorofluoromethane	ug/l	5	ND (0.33)	ND (0.33)	ND (0.33)	ND (0.33)	ND (0.33)	ND (0.33)	ND (0.33)	ND (0.33)	ND (0.33)	ND (6.7)	ND (0.33)	ND (0.33)
Vinyl chloride	ug/l	2	ND (0.41)	ND (0.41)	ND (0.41)	ND (0.41)	ND (0.41)	ND (0.41)	ND (0.41)	ND (0.41)	ND (0.41)	ND (8.3)	ND (0.41)	ND (0.41)
m,p-Xylene	ug/l	-	0.45 J	ND (0.40)	ND (0.40)	90.6	8.6	0.54 J	ND (0.40)	ND (0.40)	ND (0.40)	200	42.2	ND (0.40)
o-Xylene	ug/l	5	0.40 J	ND (0.19)	ND (0.19)	**46.4**	4.3	0.21 J	ND (0.19)	ND (0.19)	ND (0.19)	**158**	**32.5**	ND (0.19)
Xylene (total)	ug/l	5	0.84 J	ND (0.19)	ND (0.19)	**137**	**12.9**	0.75 J	ND (0.19)	ND (0.19)	ND (0.19)	**358**	**74.7**	0.30 J
GC/MS Volatile TIC														
Total TIC, Volatile	ug/l	-	1316 J	831 J	189.8 J	544 J	611 J	574 J	0	0	0	590 J	80.1 J	0

Legend:
Hit
Exceedance
J - Estimated Value

Table 10 - Volatile Organic Compounds in Groundwater Samples
511 West 21st Street, New York, NY

Client Sample ID:		NY TOGS Class	MW-5	MW-5	MW-6	MW-6	MW-7	MW-7	MW-8	MW-8	MW-9	MW-9	MW-10	MW-10
Lab Sample ID:		GA GW Standards	JB56029-5	JB70310-16	JB56029-6	JB70310-8	JB56029-7	JB70310-9	JB56029-8	JB70310-10	JB56029-9	JB70310-11	JB56029-10	JB70310-12
Date Sampled:		(NYSDEC 6/2004)	12/17/2013	6/25/2014	12/17/2013	6/25/2014	12/17/2013	6/25/2014	12/17/2013	6/25/2014	12/17/2013	6/25/2014	12/17/2013	6/25/2014
Matrix:			Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
GC/MS Volatiles (SW846														
Acetone	ug/l	-	ND (3.3)	ND (3.3)	ND (3.3)	ND (3.3)	ND (33)	ND (3.3)	28.5	12.6	ND (3.3)	ND (3.3)	ND (67)	ND (8.4)
Benzene	ug/l	1	ND (0.28)	ND (0.28)	**13.5**	**13.9**	**87.3**	**158**	**19.9**	**2.7**	0.75 J	ND (0.28)	**2360**	**3870**
Bromochloromethane	ug/l	5	ND (0.42)	ND (0.42)	ND (0.42)	ND (0.42)	ND (4.2)	ND (0.42)	ND (0.42)	ND (0.42)	ND (0.42)	ND (0.42)	ND (8.3)	ND (1.0)
Bromodichloromethane	ug/l	-	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (2.1)	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (4.2)	ND (0.53)
Bromoform	ug/l	-	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (3.0)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (6.0)	ND (0.75)
Bromomethane	ug/l	5	ND (0.56)	ND (0.56)	ND (0.56)	ND (0.56)	ND (5.6)	ND (0.56)	ND (0.56)	ND (0.56)	ND (0.56)	ND (0.56)	ND (11)	ND (1.4)
2-Butanone (MEK)	ug/l	-	ND (3.2)	ND (3.2)	ND (3.2)	ND (3.2)	ND (32)	ND (3.2)	24.7	ND (3.2)	ND (3.2)	ND (3.2)	ND (64)	ND (8.0)
Carbon disulfide	ug/l	60	ND (0.18)	ND (0.18)	ND (0.18)	ND (0.18)	ND (1.8)	ND (0.18)	ND (0.18)	ND (0.18)	ND (0.18)	ND (0.18)	ND (3.6)	ND (0.46)
Carbon tetrachloride	ug/l	5	ND (0.23)	ND (0.23)	ND (0.23)	ND (0.23)	ND (2.3)	ND (0.23)	ND (0.23)	ND (0.23)	ND (0.23)	ND (0.23)	ND (4.5)	ND (0.57)
Chlorobenzene	ug/l	5	ND (0.35)	ND (0.35)	ND (0.35)	ND (0.35)	ND (3.5)	ND (0.35)	ND (0.35)	ND (0.35)	ND (0.35)	ND (0.35)	ND (6.9)	ND (0.87)
Chloroethane	ug/l	5	ND (0.39)	ND (0.39)	ND (0.39)	ND (0.39)	ND (3.9)	ND (0.39)	ND (0.39)	ND (0.39)	ND (0.39)	ND (0.39)	ND (7.8)	ND (0.97)
Chloroform	ug/l	7	ND (0.25)	ND (0.25)	ND (0.25)	ND (0.25)	ND (2.5)	ND (0.25)	0.49 J	0.49 J	ND (0.25)	ND (0.25)	ND (4.9)	ND (0.61)
Chloromethane	ug/l	5	ND (0.36)	ND (0.36)	ND (0.36)	ND (0.36)	ND (3.6)	ND (0.36)	ND (0.36)	ND (0.36)	ND (0.36)	ND (0.36)	ND (7.3)	ND (0.91)
Cyclohexane	ug/l	-	ND (0.18)	ND (0.18)	ND (0.18)	0.26 J	17.5 J	13.1	45.3	0.85 J	ND (0.18)	ND (0.18)	98.1 J	96.1
1,2-Dibromo-3-chloropropane	ug/l	0.04	ND (1.3)	ND (1.3)	ND (1.3)	ND (1.3)	ND (13)	ND (1.3)	ND (1.3)	ND (1.3)	ND (1.3)	ND (1.3)	ND (25)	ND (3.2)
Dibromochloromethane	ug/l	-	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.19)	ND (1.9)	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.19)	ND (3.8)	ND (0.48)
1,2-Dibromoethane	ug/l	0.0006	ND (0.16)	ND (0.16)	ND (0.16)	ND (0.16)	ND (1.6)	ND (0.16)	ND (0.16)	ND (0.16)	ND (0.16)	ND (0.16)	ND (3.2)	ND (0.40)
1,2-Dichlorobenzene	ug/l	3	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (2.0)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (4.1)	ND (0.51)
1,3-Dichlorobenzene	ug/l	3	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (3.1)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (6.3)	ND (0.79)
1,4-Dichlorobenzene	ug/l	3	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (3.0)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (6.0)	ND (0.75)
Dichlorodifluoromethane	ug/l	5	ND (0.63)	ND (0.63)	ND (0.63)	ND (0.63)	ND (6.3)	2.9 J	ND (0.63)	ND (0.63)	ND (0.63)	ND (0.63)	ND (13)	ND (1.6)
1,1-Dichloroethane	ug/l	5	ND (0.26)	ND (0.26)	ND (0.26)	ND (0.26)	ND (2.6)	ND (0.26)	ND (0.26)	ND (0.26)	ND (0.26)	ND (0.26)	ND (5.2)	ND (0.65)
1,2-Dichloroethane	ug/l	0.6	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)	ND (2.2)	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)	ND (4.4)	ND (0.55)
1,1-Dichloroethene	ug/l	5	ND (0.34)	ND (0.34)	ND (0.34)	ND (0.34)	ND (3.4)	ND (0.34)	ND (0.34)	ND (0.34)	ND (0.34)	ND (0.34)	ND (6.9)	ND (0.86)
cis-1,2-Dichloroethene	ug/l	5	ND (0.24)	ND (0.24)	ND (0.24)	ND (0.24)	ND (2.4)	ND (0.24)	ND (0.24)	ND (0.24)	ND (0.24)	ND (0.24)	ND (4.8)	ND (0.60)
trans-1,2-Dichloroethene	ug/l	5	ND (0.38)	ND (0.38)	ND (0.38)	ND (0.38)	ND (3.8)	ND (0.38)	ND (0.38)	ND (0.38)	ND (0.38)	ND (0.38)	ND (7.6)	ND (0.95)
1,2-Dichloropropane	ug/l	1	ND (0.28)	ND (0.28)	ND (0.28)	ND (0.28)	ND (2.8)	ND (0.28)	ND (0.28)	ND (0.28)	ND (0.28)	ND (0.28)	ND (5.6)	ND (0.70)
cis-1,3-Dichloropropene	ug/l	-	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	ND (1.5)	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	ND (3.0)	ND (0.38)
trans-1,3-Dichloropropene	ug/l	-	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (2.1)	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (4.1)	ND (0.52)
Ethylbenzene	ug/l	5	ND (0.21)	ND (0.21)	1.4	0.90 J	**52**	**77.3**	**34.4**	3.8	0.39 J	ND (0.21)	**720**	**703**
Freon 113	ug/l	5	ND (0.77)	ND (0.77)	ND (0.77)	ND (0.77)	ND (7.7)	ND (0.77)	ND (0.77)	ND (0.77)	ND (0.77)	ND (0.77)	ND (15)	ND (1.9)
2-Hexanone	ug/l	-	ND (1.7)	ND (1.7)	ND (1.7)	ND (1.7)	ND (17)	ND (1.7)	1.8 J	ND (1.7)	ND (1.7)	ND (1.7)	ND (34)	9.3 J
Isopropylbenzene	ug/l	5	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)	ND (2.2)	4.6	**10.9**	0.36 J	ND (0.22)	ND (0.22)	**35.6 J**	**35.7**
Methyl Acetate	ug/l	-	ND (1.5)	ND (1.5)	ND (1.5)	ND (1.5)	ND (15)	ND (1.5)	ND (1.5)	ND (1.5)	ND (1.5)	ND (1.5)	ND (30)	ND (3.8)
Methylcyclohexane	ug/l	-	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	5.8 J	6.3	21.3	ND (0.15)	ND (0.15)	ND (0.15)	36.4 J	42.4
Methyl Tert Butyl Ether	ug/l	10	ND (0.29)	5.5	**120**	**110**	**1840**	**2500**	**96.8**	**26**	ND (0.29)	ND (0.29)	**2710**	**6190**
4-Methyl-2-pentanone(MIBK)	ug/l	-	ND (1.5)	ND (1.5)	ND (1.5)	ND (1.5)	ND (15)	ND (1.5)	ND (1.5)	ND (1.5)	ND (1.5)	ND (1.5)	ND (30)	ND (3.7)
Methylene chloride	ug/l	5	ND (0.86)	ND (0.86)	ND (0.86)	ND (0.86)	ND (8.6)	ND (0.86)	ND (0.86)	ND (0.86)	ND (0.86)	ND (0.86)	ND (17)	ND (2.2)
Styrene	ug/l	5	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (3.0)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (6.0)	ND (0.76)
1,1,2,2-Tetrachloroethane	ug/l	5	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (2.0)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (3.9)	ND (0.49)
Tetrachloroethene	ug/l	5	ND (0.25)	ND (0.25)	ND (0.25)	ND (0.25)	ND (2.5)	ND (0.25)	ND (0.25)	ND (0.25)	ND (0.25)	ND (0.25)	ND (5.0)	ND (0.63)
Toluene	ug/l	5	ND (0.44)	ND (0.44)	**5.9**	3.7	**372**	**246**	**32**	**6.7**	0.95 J	ND (0.44)	**2340**	**3990**
1,2,3-Trichlorobenzene	ug/l	5	ND (0.24)	ND (0.24)	ND (0.24)	ND (0.24)	ND (2.4)	ND (0.24)	ND (0.24)	ND (0.24)	ND (0.24)	ND (0.24)	ND (4.9)	ND (0.61)
1,2,4-Trichlorobenzene	ug/l	5	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)	ND (2.2)	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)	ND (4.3)	ND (0.54)
1,1,1-Trichloroethane	ug/l	5	ND (0.25)	ND (0.25)	ND (0.25)	ND (0.25)	ND (2.5)	ND (0.25)	ND (0.25)	ND (0.25)	ND (0.25)	ND (0.25)	ND (5.0)	ND (0.62)
1,1,2-Trichloroethane	ug/l	1	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (2.1)	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (4.2)	ND (0.53)
Trichloroethene	ug/l	5	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (5.0)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (10)	ND (1.3)
Trichlorofluoromethane	ug/l	5	ND (0.33)	ND (0.33)	ND (0.33)	ND (0.33)	ND (3.3)	ND (0.33)	ND (0.33)	ND (0.33)	ND (0.33)	ND (0.33)	ND (6.7)	ND (0.84)
Vinyl chloride	ug/l	2	ND (0.41)	ND (0.41)	ND (0.41)	ND (0.41)	ND (4.1)	ND (0.41)	ND (0.41)	ND (0.41)	ND (0.41)	ND (0.41)	ND (8.3)	ND (1.0)
m,p-Xylene	ug/l	-	ND (0.40)	ND (0.40)	2	1.3	264	219	133	10.4	0.85 J	ND (0.40)	1600	1190
o-Xylene	ug/l	5	ND (0.19)	ND (0.19)	2.3	1.3	**156**	**115**	**57.7**	**7.3**	0.25 J	ND (0.19)	**667**	**388**
Xylene (total)	ug/l	5	ND (0.19)	ND (0.19)	4.3	2.6	**421**	**334**	**190**	**17.6**	1.1	ND (0.19)	**2270**	**1570**
GC/MS Volatile TIC														
Total TIC, Volatile	ug/l	-	13 J	120 J	1016.4 J	289.3 J	420 J	1597 J	704 J	14.1 J	0	0	5930 J	8930 J

Legend:
Hit
Exceedance
J - Estimated Value

Table 10 - Volatile Organic Compounds in Groundwater Samples
511 West 21st Street, New York, NY

Client Sample ID:		NY TOGS Class	GFMW-1	GFMW-2	GFMW-3	FLS-24	FLS-24	FIELD BLANK	FIELD BLANK	FB06252014	TRIP BLANK 1	TRIP BLANK 2	TRIP BLANK 3	TRIP BLANK	TRIP BLANK
Lab Sample ID:		GA GW Standards	JB70310-1	JB70310-2	JB70310-3	JB70310-13	JB56029-11	JB56029-12	JB57431-5	JB70310-15	JB56029-13	JB56029-14	JB56029-15	JB57431-6	JB70310-14
Date Sampled:		(NYSDEC 6/2004)	6/25/2014	6/25/2014	6/25/2014	6/25/2014	12/17/2013	12/17/2013	1/10/2014	6/25/2014	12/17/2013	12/17/2013	12/17/2013	1/10/2014	6/25/2014
Matrix:			Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Field Blank	Field Blank	Field Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank
GC/MS Volatiles (SW846															
Acetone	ug/l	-	ND (8.4)	ND (3.3)	ND (3.3)	ND (3.3)	45.1 J	ND (3.3)	ND (3.3)	ND (3.3)	ND (3.3)	ND (3.3)	ND (3.3)	ND (3.3)	ND (3.3)
Benzene	ug/l	1	**346**	ND (0.28)	**23.7**	ND (0.28)	ND (2.8)	ND (0.28)	ND (0.28)	ND (0.28)	ND (0.28)	ND (0.28)	ND (0.28)	ND (0.28)	ND (0.28)
Bromochloromethane	ug/l	5	ND (1.0)	ND (0.42)	ND (0.42)	ND (0.42)	ND (4.2)	ND (0.42)	ND (0.42)	ND (0.42)	ND (0.42)	ND (0.42)	ND (0.42)	ND (0.42)	ND (0.42)
Bromodichloromethane	ug/l	-	ND (0.53)	ND (0.21)	ND (0.21)	0.28 J	ND (2.1)	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)
Bromoform	ug/l	-	ND (0.75)	ND (0.30)	ND (0.30)	ND (0.30)	ND (3.0)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)
Bromomethane	ug/l	5	ND (1.4)	ND (0.56)	ND (0.56)	ND (0.56)	ND (5.6)	ND (0.56)	ND (0.56)	ND (0.56)	ND (0.56)	ND (0.56)	ND (0.56)	ND (0.56)	ND (0.56)
2-Butanone (MEK)	ug/l	-	ND (8.0)	ND (3.2)	ND (3.2)	ND (3.2)	ND (32)	ND (3.2)	ND (3.2)	ND (3.2)	ND (3.2)	ND (3.2)	ND (3.2)	ND (3.2)	ND (3.2)
Carbon disulfide	ug/l	60	ND (0.46)	ND (0.18)	ND (0.18)	ND (0.18)	ND (1.8)	ND (0.18)	ND (0.18)	ND (0.18)	ND (0.18)	ND (0.18)	ND (0.18)	ND (0.18)	ND (0.18)
Carbon tetrachloride	ug/l	5	ND (0.57)	ND (0.23)	ND (0.23)	ND (0.23)	ND (2.3)	ND (0.23)	ND (0.23)	ND (0.23)	ND (0.23)	ND (0.23)	ND (0.23)	ND (0.23)	ND (0.23)
Chlorobenzene	ug/l	5	ND (0.87)	ND (0.35)	ND (0.35)	ND (0.35)	ND (3.5)	ND (0.35)	ND (0.35)	ND (0.35)	ND (0.35)	ND (0.35)	ND (0.35)	ND (0.35)	ND (0.35)
Chloroethane	ug/l	5	ND (0.97)	ND (0.39)	ND (0.39)	ND (0.39)	ND (3.9)	ND (0.39)	ND (0.39)	ND (0.39)	ND (0.39)	ND (0.39)	ND (0.39)	ND (0.39)	ND (0.39)
Chloroform	ug/l	7	ND (0.61)	ND (0.25)	ND (0.25)	2.4	**23.8**	ND (0.25)	ND (0.25)	ND (0.25)	ND (0.25)	ND (0.25)	ND (0.25)	ND (0.25)	ND (0.25)
Chloromethane	ug/l	5	ND (0.91)	ND (0.36)	ND (0.36)	ND (0.36)	ND (3.6)	ND (0.36)	ND (0.36)	ND (0.36)	ND (0.36)	ND (0.36)	ND (0.36)	ND (0.36)	ND (0.36)
Cyclohexane	ug/l	-	4.4 J	ND (0.18)	3.3 J	ND (0.18)	ND (1.8)	ND (0.18)	ND (0.18)	ND (0.18)	ND (0.18)	ND (0.18)	ND (0.18)	ND (0.18)	ND (0.18)
1,2-Dibromo-3-chloropropane	ug/l	0.04	ND (3.2)	ND (1.3)	ND (1.3)	ND (1.3)	ND (13)	ND (1.3)	ND (1.3)	ND (1.3)	ND (1.3)	ND (1.3)	ND (1.3)	ND (1.3)	ND (1.3)
Dibromochloromethane	ug/l	-	ND (0.48)	ND (0.19)	ND (0.19)	ND (0.19)	ND (1.9)	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.19)
1,2-Dibromoethane	ug/l	0.0006	ND (0.40)	ND (0.16)	ND (0.16)	ND (0.16)	ND (1.6)	ND (0.16)	ND (0.16)	ND (0.16)	ND (0.16)	ND (0.16)	ND (0.16)	ND (0.16)	ND (0.16)
1,2-Dichlorobenzene	ug/l	3	ND (0.51)	ND (0.20)	ND (0.20)	ND (0.20)	ND (2.0)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)
1,3-Dichlorobenzene	ug/l	3	ND (0.79)	ND (0.31)	ND (0.31)	ND (0.31)	ND (3.1)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)
1,4-Dichlorobenzene	ug/l	3	ND (0.75)	ND (0.30)	ND (0.30)	ND (0.30)	ND (3.0)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)
Dichlorodifluoromethane	ug/l	5	ND (1.6)	ND (0.63)	ND (0.63)	ND (0.63)	ND (6.3)	ND (0.63)	ND (0.63)	ND (0.63)	ND (0.63)	ND (0.63)	ND (0.63)	ND (0.63)	ND (0.63)
1,1-Dichloroethane	ug/l	5	ND (0.65)	ND (0.26)	ND (0.26)	ND (0.26)	ND (2.6)	ND (0.26)	ND (0.26)	ND (0.26)	ND (0.26)	ND (0.26)	ND (0.26)	ND (0.26)	ND (0.26)
1,2-Dichloroethane	ug/l	0.6	ND (0.55)	ND (0.22)	ND (0.22)	ND (0.22)	ND (2.2)	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)
1,1-Dichloroethene	ug/l	5	ND (0.86)	ND (0.34)	ND (0.34)	ND (0.34)	ND (3.4)	ND (0.34)	ND (0.34)	ND (0.34)	ND (0.34)	ND (0.34)	ND (0.34)	ND (0.34)	ND (0.34)
cis-1,2-Dichloroethene	ug/l	5	ND (0.60)	ND (0.24)	ND (0.24)	ND (0.24)	ND (2.4)	ND (0.24)	ND (0.24)	ND (0.24)	ND (0.24)	ND (0.24)	ND (0.24)	ND (0.24)	ND (0.24)
trans-1,2-Dichloroethene	ug/l	5	ND (0.95)	ND (0.38)	ND (0.38)	ND (0.38)	ND (3.8)	ND (0.38)	ND (0.38)	ND (0.38)	ND (0.38)	ND (0.38)	ND (0.38)	ND (0.38)	ND (0.38)
1,2-Dichloropropane	ug/l	1	ND (0.70)	ND (0.28)	ND (0.28)	ND (0.28)	ND (2.8)	ND (0.28)	ND (0.28)	ND (0.28)	ND (0.28)	ND (0.28)	ND (0.28)	ND (0.28)	ND (0.28)
cis-1,3-Dichloropropene	ug/l	-	ND (0.38)	ND (0.15)	ND (0.15)	ND (0.15)	ND (1.5)	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)
trans-1,3-Dichloropropene	ug/l	-	ND (0.52)	ND (0.21)	ND (0.21)	ND (0.21)	ND (2.1)	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)
Ethylbenzene	ug/l	5	**54.6**	ND (0.21)	0.22 J	ND (0.21)	**49.9**	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)
Freon 113	ug/l	5	ND (1.9)	ND (0.77)	ND (0.77)	ND (0.77)	ND (7.7)	ND (0.77)	ND (0.77)	ND (0.77)	ND (0.77)	ND (0.77)	ND (0.77)	ND (0.77)	ND (0.77)
2-Hexanone	ug/l	-	ND (4.3)	ND (1.7)	ND (1.7)	ND (1.7)	ND (17)	ND (1.7)	ND (1.7)	ND (1.7)	ND (1.7)	ND (1.7)	ND (1.7)	ND (1.7)	ND (1.7)
Isopropylbenzene	ug/l	5	1.0 J	ND (0.22)	1.7 J	ND (0.22)	**6.9 J**	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)
Methyl Acetate	ug/l	-	ND (3.8)	ND (1.5)	ND (1.5)	ND (1.5)	ND (15)	ND (1.5)	ND (1.5)	ND (1.5)	ND (1.5)	ND (1.5)	ND (1.5)	ND (1.5)	ND (1.5)
Methylcyclohexane	ug/l	-	0.73 J	ND (0.15)	ND (0.15)	ND (0.15)	3.1 J	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)
Methyl Tert Butyl Ether	ug/l	10	**470**	1.9	2.9	5.3	ND (2.9)	ND (0.29)	ND (0.29)	ND (0.29)	ND (0.29)	ND (0.29)	ND (0.29)	ND (0.29)	ND (0.29)
4-Methyl-2-pentanone(MIBK)	ug/l	-	ND (3.7)	ND (1.5)	ND (1.5)	ND (1.5)	ND (15)	ND (1.5)	ND (1.5)	ND (1.5)	ND (1.5)	ND (1.5)	ND (1.5)	ND (1.5)	ND (1.5)
Methylene chloride	ug/l	5	ND (2.2)	ND (0.86)	ND (0.86)	ND (0.86)	ND (8.6)	ND (0.86)	ND (0.86)	ND (0.86)	ND (0.86)	ND (0.86)	ND (0.86)	ND (0.86)	ND (0.86)
Styrene	ug/l	5	ND (0.76)	ND (0.30)	ND (0.30)	ND (0.30)	ND (3.0)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)
1,1,2,2-Tetrachloroethane	ug/l	5	ND (0.49)	ND (0.20)	ND (0.20)	ND (0.20)	ND (2.0)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)
Tetrachloroethene	ug/l	5	ND (0.63)	ND (0.25)	ND (0.25)	ND (0.25)	ND (2.5)	ND (0.25)	ND (0.25)	ND (0.25)	ND (0.25)	ND (0.25)	ND (0.25)	ND (0.25)	ND (0.25)
Toluene	ug/l	5	**1430**	ND (0.44)	ND (0.44)	0.69 J	**30.2**	ND (0.44)	ND (0.44)	ND (0.44)	ND (0.44)	ND (0.44)	ND (0.44)	ND (0.44)	ND (0.44)
1,2,3-Trichlorobenzene	ug/l	5	ND (0.61)	ND (0.24)	ND (0.24)	ND (0.24)	ND (2.4)	ND (0.24)	ND (0.24)	ND (0.24)	ND (0.24)	ND (0.24)	ND (0.24)	ND (0.24)	ND (0.24)
1,2,4-Trichlorobenzene	ug/l	5	ND (0.54)	ND (0.22)	ND (0.22)	ND (0.22)	ND (2.2)	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)
1,1,1-Trichloroethane	ug/l	5	ND (0.62)	ND (0.25)	ND (0.25)	ND (0.25)	ND (2.5)	ND (0.25)	ND (0.25)	ND (0.25)	ND (0.25)	ND (0.25)	ND (0.25)	ND (0.25)	ND (0.25)
1,1,2-Trichloroethane	ug/l	1	ND (0.53)	ND (0.21)	ND (0.21)	ND (0.21)	ND (2.1)	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)
Trichloroethene	ug/l	5	ND (1.3)	ND (0.50)	ND (0.50)	ND (0.50)	ND (5.0)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
Trichlorofluoromethane	ug/l	5	ND (0.84)	ND (0.33)	ND (0.33)	ND (0.33)	ND (3.3)	ND (0.33)	ND (0.33)	ND (0.33)	ND (0.33)	ND (0.33)	ND (0.33)	ND (0.33)	ND (0.33)
Vinyl chloride	ug/l	2	ND (1.0)	ND (0.41)	ND (0.41)	ND (0.41)	ND (4.1)	ND (0.41)	ND (0.41)	ND (0.41)	ND (0.41)	ND (0.41)	ND (0.41)	ND (0.41)	ND (0.41)
m,p-Xylene	ug/l	-	193	ND (0.40)	ND (0.40)	0.40 J	143	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)
o-Xylene	ug/l	5	**144**	ND (0.19)	ND (0.19)	0.20 J	**114**	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.19)
Xylene (total)	ug/l	5	**338**	ND (0.19)	ND (0.19)	0.61 J	**257**	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.19)
GC/MS Volatile TIC															
Total TIC, Volatile	ug/l	-	454 J	56 J	77.4 J	0	1350 J	0	0	0	0	0	0	0	0

Legend:
Hit
Exceedance
J - Estimated Value

Table 11 - Semi-Volatile Organic Compounds in Groundwater Samples
511 West 21st Street, New York, NY

Client Sample ID:		NY TOGS Class GA GW Standards (NYSDEC 6/2004)	FLS-1	FLS-2	FLS-3	FLS-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10
Lab Sample ID:			JB56029-1	JB56029-2	JB56029-3	JB56029-4	JB56029-5	JB56029-6	JB56029-7	JB56029-8	JB56029-9	JB56029-10
Date Sampled:			12/17/2013	12/17/2013	12/17/2013	12/17/2013	12/17/2013	12/17/2013	12/17/2013	12/17/2013	12/17/2013	12/17/2013
Matrix:			Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
GC/MS Semi-volatiles (SW846 8270D)												
2-Chlorophenol	ug/l	-	ND (0.97)	ND (0.97)	ND (0.97)	ND (0.97)	ND (0.97)	ND (0.97)	ND (0.97)	ND (0.97)	ND (0.97)	ND (0.97)
4-Chloro-3-methyl phenol	ug/l	-	ND (1.8)	ND (1.8)	ND (1.8)	ND (1.8)	ND (1.8)	ND (1.8)	ND (1.8)	ND (1.8)	ND (1.8)	ND (1.8)
2,4-Dichlorophenol	ug/l	1	ND (1.2)	ND (1.2)	ND (1.2)	ND (1.2)	ND (1.2)	ND (1.2)	ND (1.2)	ND (1.2)	ND (1.2)	ND (1.2)
2,4-Dimethylphenol	ug/l	1	ND (1.5)	ND (1.5)	ND (1.5)	ND (1.5)	ND (1.5)	ND (1.5)	**2.9 J**	**2.8 J**	ND (1.5)	**6.4**
2,4-Dinitrophenol	ug/l	1	ND (17)	ND (17)	ND (17)	ND (17)	ND (17)	ND (17)	ND (17)	ND (17)	ND (17)	ND (17)
4,6-Dinitro-o-cresol	ug/l	-	ND (0.99)	ND (0.99)	ND (0.99)	ND (0.99)	ND (0.99)	ND (0.99)	ND (0.99)	ND (0.99)	ND (0.99)	ND (0.99)
2-Methylphenol	ug/l	-	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	5.8	ND (1.0)	ND (1.0)	5.4
3&4-Methylphenol	ug/l	-	ND (0.93)	ND (0.93)	ND (0.93)	ND (0.93)	ND (0.93)	ND (0.93)	ND (0.93)	ND (0.93)	ND (0.93)	7.2
2-Nitrophenol	ug/l	-	ND (1.5)	ND (1.5)	ND (1.5)	ND (1.5)	ND (1.5)	ND (1.5)	ND (1.5)	ND (1.5)	ND (1.5)	ND (1.5)
4-Nitrophenol	ug/l	-	ND (5.2)	ND (5.2)	ND (5.2)	ND (5.2)	ND (5.2)	ND (5.2)	ND (5.2)	ND (5.2)	ND (5.2)	ND (5.2)
Pentachlorophenol	ug/l	1	ND (1.4)	ND (1.4)	ND (1.4)	ND (1.4)	ND (1.4)	ND (1.4)	ND (1.4)	ND (1.4)	ND (1.4)	ND (1.4)
Phenol	ug/l	1	ND (1.3)	ND (1.3)	ND (1.3)	ND (1.3)	ND (1.3)	ND (1.3)	ND (1.3)	ND (1.3)	ND (1.3)	ND (1.3)
2,3,4,6-Tetrachlorophenol	ug/l	-	ND (0.94)	ND (0.94)	ND (0.94)	ND (0.94)	ND (0.94)	ND (0.94)	ND (0.94)	ND (0.94)	ND (0.94)	ND (0.94)
2,4,5-Trichlorophenol	ug/l	-	ND (1.6)	ND (1.6)	ND (1.6)	ND (1.6)	ND (1.6)	ND (1.6)	ND (1.6)	ND (1.6)	ND (1.6)	ND (1.6)
2,4,6-Trichlorophenol	ug/l	-	ND (1.3)	ND (1.3)	ND (1.3)	ND (1.3)	ND (1.3)	ND (1.3)	ND (1.3)	ND (1.3)	ND (1.3)	ND (1.3)
Acenaphthene	ug/l	-	4.3	1.6	ND (0.26)	ND (0.26)	ND (0.26)	ND (0.26)	ND (0.26)	ND (0.26)	ND (0.26)	ND (0.26)
Acenaphthylene	ug/l	-	ND (0.23)	ND (0.23)	ND (0.23)	ND (0.23)	ND (0.23)	ND (0.23)	ND (0.23)	ND (0.23)	ND (0.23)	ND (0.23)
Acetophenone	ug/l	-	ND (0.29)	ND (0.29)	ND (0.29)	ND (0.29)	ND (0.29)	ND (0.29)	ND (0.29)	ND (0.29)	ND (0.29)	ND (0.29)
Anthracene	ug/l	-	1.1	ND (0.29)	ND (0.29)	ND (0.29)	ND (0.29)	ND (0.29)	ND (0.29)	ND (0.29)	ND (0.29)	ND (0.29)
Atrazine	ug/l	7.5	ND (0.49)	ND (0.49)	ND (0.49)	ND (0.49)	ND (0.49)	ND (0.49)	ND (0.49)	ND (0.49)	ND (0.49)	ND (0.49)
Benzaldehyde	ug/l	-	ND (3.3)	ND (3.3)	ND (3.3)	ND (3.3)	ND (3.3)	ND (3.3)	ND (3.3)	ND (3.3)	ND (3.3)	ND (3.3)
Benzo(a)anthracene	ug/l	-	0.62 J	ND (0.23)	ND (0.23)	ND (0.23)	ND (0.23)	ND (0.23)	ND (0.23)	ND (0.23)	ND (0.23)	ND (0.23)
Benzo(a)pyrene	ug/l	ND	ND (0.23)	ND (0.23)	ND (0.23)	ND (0.23)	ND (0.23)	ND (0.23)	ND (0.23)	ND (0.23)	ND (0.23)	ND (0.23)
Benzo(b)fluoranthene	ug/l	-	ND (0.46)	ND (0.46)	ND (0.46)	ND (0.46)	ND (0.46)	ND (0.46)	ND (0.46)	ND (0.46)	ND (0.46)	ND (0.46)
Benzo(g,h,i)perylene	ug/l	-	ND (0.32)	ND (0.32)	ND (0.32)	ND (0.32)	ND (0.32)	ND (0.32)	ND (0.32)	ND (0.32)	ND (0.32)	ND (0.32)
Benzo(k)fluoranthene	ug/l	-	ND (0.51)	ND (0.51)	ND (0.51)	ND (0.51)	ND (0.51)	ND (0.51)	ND (0.51)	ND (0.51)	ND (0.51)	ND (0.51)
ether	ug/l	-	ND (0.36)	ND (0.36)	ND (0.36)	ND (0.36)	ND (0.36)	ND (0.36)	ND (0.36)	ND (0.36)	ND (0.36)	ND (0.36)
Butyl benzyl phthalate	ug/l	-	ND (0.29)	ND (0.29)	ND (0.29)	2.3	ND (0.29)	ND (0.29)	ND (0.29)	ND (0.29)	ND (0.29)	ND (0.29)
1,1'-Biphenyl	ug/l	5	ND (0.30)	ND (0.30)	ND (0.30)	2.7	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)
2-Chloronaphthalene	ug/l	-	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)
4-Chloroaniline	ug/l	5	ND (0.53)	ND (0.53)	ND (0.53)	ND (0.53)	ND (0.53)	ND (0.53)	ND (0.53)	ND (0.53)	ND (0.53)	ND (0.53)
Carbazole	ug/l	-	1.1	ND (0.36)	ND (0.36)	ND (0.36)	ND (0.36)	ND (0.36)	ND (0.36)	ND (0.36)	ND (0.36)	0.71 J
Caprolactam	ug/l	-	ND (0.69)	ND (0.69)	ND (0.69)	ND (0.69)	ND (0.69)	ND (0.69)	ND (0.69)	ND (0.69)	ND (0.69)	ND (0.69)
Chrysene	ug/l	-	0.60 J	ND (0.29)	ND (0.29)	ND (0.29)	ND (0.29)	ND (0.29)	ND (0.29)	ND (0.29)	ND (0.29)	ND (0.29)
Chloroethoxy)methane	ug/l	5	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)
bis(2-Chloroethyl)ether	ug/l	1	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)
Chloroisopropyl)ether	ug/l	5	ND (0.45)	ND (0.45)	ND (0.45)	ND (0.45)	ND (0.45)	ND (0.45)	ND (0.45)	ND (0.45)	ND (0.45)	ND (0.45)
ether	ug/l	-	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)
2,4-Dinitrotoluene	ug/l	5	ND (0.43)	ND (0.43)	ND (0.43)	ND (0.43)	ND (0.43)	ND (0.43)	ND (0.43)	ND (0.43)	ND (0.43)	ND (0.43)
2,6-Dinitrotoluene	ug/l	5	ND (0.46)	ND (0.46)	ND (0.46)	ND (0.46)	ND (0.46)	ND (0.46)	ND (0.46)	ND (0.46)	ND (0.46)	ND (0.46)
3,3'-Dichlorobenzidine	ug/l	5	ND (0.36)	ND (0.36)	ND (0.36)	ND (0.36)	ND (0.36)	ND (0.36)	ND (0.36)	ND (0.36)	ND (0.36)	ND (0.36)
1,4-Dioxane	ug/l	-	ND (0.27)	ND (0.27)	ND (0.27)	1.6	ND (0.27)	ND (0.27)	ND (0.27)	ND (0.27)	ND (0.27)	ND (0.27)
Dibenzo(a,h)anthracene	ug/l	-	ND (0.38)	ND (0.38)	ND (0.38)	ND (0.38)	ND (0.38)	ND (0.38)	ND (0.38)	ND (0.38)	ND (0.38)	ND (0.38)
Dibenzofuran	ug/l	-	4.5 J	1.2 J	ND (0.27)	ND (0.27)	ND (0.27)	ND (0.27)	ND (0.27)	ND (0.27)	ND (0.27)	ND (0.27)
Di-n-butyl phthalate	ug/l	50	ND (0.56)	ND (0.56)	ND (0.56)	ND (0.56)	ND (0.56)	ND (0.56)	ND (0.56)	ND (0.56)	ND (0.56)	ND (0.56)
Di-n-octyl phthalate	ug/l	-	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)
Diethyl phthalate	ug/l	-	ND (0.33)	ND (0.33)	ND (0.33)	ND (0.33)	ND (0.33)	ND (0.33)	ND (0.33)	ND (0.33)	ND (0.33)	ND (0.33)
Dimethyl phthalate	ug/l	-	ND (0.28)	ND (0.28)	ND (0.28)	ND (0.28)	ND (0.28)	ND (0.28)	ND (0.28)	ND (0.28)	ND (0.28)	ND (0.28)
bis(2-Ethylhexyl)phthalate	ug/l	5	ND (0.59)	ND (0.59)	ND (0.59)	1.4 J	ND (0.59)	ND (0.59)	ND (0.59)	ND (0.59)	ND (0.59)	ND (0.59)
Fluoranthene	ug/l	-	1	ND (0.32)	ND (0.32)	ND (0.32)	ND (0.32)	ND (0.32)	ND (0.32)	ND (0.32)	ND (0.32)	ND (0.32)
Fluorene	ug/l	-	7.1	1.6	ND (0.28)	0.81 J	ND (0.28)	ND (0.28)	ND (0.28)	ND (0.28)	ND (0.28)	ND (0.28)
Hexachlorobenzene	ug/l	0.04	ND (0.34)	ND (0.34)	ND (0.34)	ND (0.34)	ND (0.34)	ND (0.34)	ND (0.34)	ND (0.34)	ND (0.34)	ND (0.34)
Hexachlorobutadiene	ug/l	0.5	ND (0.51)	ND (0.51)	ND (0.51)	ND (0.51)	ND (0.51)	ND (0.51)	ND (0.51)	ND (0.51)	ND (0.51)	ND (0.51)
e	ug/l	5	ND (7.1)	ND (7.1)	ND (7.1)	ND (7.1)	ND (7.1)	ND (7.1)	ND (7.1)	ND (7.1)	ND (7.1)	ND (7.1)
Hexachloroethane	ug/l	5	ND (0.55)	ND (0.55)	ND (0.55)	ND (0.55)	ND (0.55)	ND (0.55)	ND (0.55)	ND (0.55)	ND (0.55)	ND (0.55)
Indeno(1,2,3-cd)pyrene	ug/l	-	ND (0.37)	ND (0.37)	ND (0.37)	ND (0.37)	ND (0.37)	ND (0.37)	ND (0.37)	ND (0.37)	ND (0.37)	ND (0.37)
Isophorone	ug/l	-	ND (0.27)	ND (0.27)	ND (0.27)	ND (0.27)	ND (0.27)	ND (0.27)	ND (0.27)	ND (0.27)	ND (0.27)	ND (0.27)
2-Methylnaphthalene	ug/l	-	186	2.6	ND (0.38)	21.4	ND (0.38)	ND (0.38)	0.86 J	8.4	ND (0.38)	10.9
2-Nitroaniline	ug/l	5	ND (1.1)	ND (1.1)	ND (1.1)	ND (1.1)	ND (1.1)	ND (1.1)	ND (1.1)	ND (1.1)	ND (1.1)	ND (1.1)
3-Nitroaniline	ug/l	5	ND (1.3)	ND (1.3)	ND (1.3)	ND (1.3)	ND (1.3)	ND (1.3)	ND (1.3)	ND (1.3)	ND (1.3)	ND (1.3)
4-Nitroaniline	ug/l	5	ND (1.7)	ND (1.7)	ND (1.7)	ND (1.7)	ND (1.7)	ND (1.7)	ND (1.7)	ND (1.7)	ND (1.7)	ND (1.7)
Naphthalene	ug/l	-	84.5	5.6	ND (0.26)	17.8	ND (0.26)	ND (0.26)	6.8	7.1	ND (0.26)	52.4
Nitrobenzene	ug/l	0.4	ND (0.42)	ND (0.42)	ND (0.42)	ND (0.42)	ND (0.42)	ND (0.42)	ND (0.42)	ND (0.42)	ND (0.42)	ND (0.42)
propylamine	ug/l	-	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)
N-Nitrosodiphenylamine	ug/l	-	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)
Phenanthrene	ug/l	-	9.3	ND (0.29)	ND (0.29)	0.71 J	ND (0.29)	ND (0.29)	ND (0.29)	ND (0.29)	ND (0.29)	0.42 J
Pyrene	ug/l	-	1.7	ND (0.27)	ND (0.27)	ND (0.27)	ND (0.27)	ND (0.27)	ND (0.27)	ND (0.27)	ND (0.27)	ND (0.27)
Tetrachlorobenzene	ug/l	5	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)
GC/MS Semi-volatile TIC												
Total TIC, Semi-Volatile	ug/l	-	659.6 J	656 J	0	6345 J	521 J	107 J	90.6 J	1705.5 J	0	1017.9 J

Legend:
Hit
Exceedance
J - Estimated Value

Table 12 - Metals in Groundwater Samples
511 West 21st Street, New York, NY

Client Sample ID:		NY TOGS Class	FLS-1	FLS-1	FLS-2	FLS-2	FLS-3	FLS-3	FLS-4	FLS-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10	FLS-24	FIELD BLANK	FIELD BLANK
Lab Sample ID:		GA GW Standards	JB56029-1	JB57431-1	JB56029-2	JB57431-2	JB56029-3	JB57431-3	JB56029-4	JB57431-4	JB56029-5	JB56029-6	JB56029-7	JB56029-8	JB56029-9	JB56029-10	JB56029-11	JB56029-12	JB57431-5
Date Sampled:		(NYSDEC 6/2004)	12/17/2013	1/10/2014	12/17/2013	1/10/2014	12/17/2013	1/10/2014	12/17/2013	1/10/2014	12/17/2013	12/17/2013	12/17/2013	12/17/2013	12/17/2013	12/17/2013	12/17/2013	12/17/2013	1/10/2014
Matrix:			Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Field Blank	Field Blank
GC/MS Semi-volatiles (SW846 8270D)																			
Aluminum	ug/l	-	215	420	507	721	421	460	402	362	1140	213	251	532	577	253	264	ND (200)	ND (200)
Antimony	ug/l	3	ND (6.0)	**7.2**	ND (6.0)	ND (6.0)	ND (6.0)	**6.9**	ND (6.0)	ND (6.0)	ND (6.0)	ND (6.0)	**8.3**	ND (6.0)	ND (6.0)	ND (6.0)	ND (6.0)	ND (6.0)	ND (6.0)
Arsenic	ug/l	25	ND (3.0)	ND (3.0)	15.3	13.2	ND (3.0)	ND (3.0)	4.3	11.4	7	7.5	**62.5**	9.8	ND (3.0)	14.5	4.2	ND (3.0)	ND (3.0)
Barium	ug/l	1000	275	244	838	745	488	444	ND (200)	ND (200)	ND (200)	334	ND (200)	ND (200)	238	ND (200)	ND (200)	ND (200)	ND (200)
Beryllium	ug/l	-	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Cadmium	ug/l	5	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)
Calcium	ug/l	-	232000	255000	200000	165000	384000	334000	60000	169000	194000	137000	16000	18500	494000	60200	56900	ND (5000)	ND (5000)
Chromium	ug/l	50	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
Cobalt	ug/l	-	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)
Copper	ug/l	200	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	10.9	ND (10)	ND (10)	ND (10)	ND (10)	28.8	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
Iron	ug/l	300	**402**	**496**	**11900**	**15500**	**718**	**1340**	**490**	**10200**	**17500**	**411**	206	**438**	**559**	**563**	**376**	ND (100)	ND (100)
Lead	ug/l	25	5.4	3.9	11.2	9.7	5.6	5.6	3.9	ND (3.0)	4.1	3.9	ND (30) [a]	21.6	ND (15) [a]	4.8	4.4	ND (3.0)	ND (3.0)
Magnesium	ug/l	-	82800	87000	117000	84300	90700	76500	9020	37100	53600	22200	6490	ND (5000)	119000	23200	8540	ND (5000)	ND (5000)
Manganese	ug/l	300	**8980**	**9840**	**6670**	**5840**	**10500**	**9730**	**490**	**7900**	**6470**	**3060**	26.6	15.3	**5530**	**1240**	**508**	ND (15)	ND (15)
Mercury	ug/l	0.7	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)
Nickel	ug/l	100	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	12.5	ND (10)	ND (10)	ND (10)
Potassium	ug/l	-	29300	27500	81100	61400	28300	25400	16500	26800	28700	44400	63300	21200	52000	58900	16100	ND (10000)	ND (10000)
Selenium	ug/l	10	**17.8**	**14.8**	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	**15.2**	ND (10)	ND (10)	ND (10)	ND (10)
Silver	ug/l	50	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
Sodium	ug/l	20000	**320000**	**320000**	**1050000**	**819000**	**418000**	**396000**	**63300**	**181000**	**235000**	**587000**	**1870000**	**158000**	**634000**	**1260000**	**61600**	ND (10000)	ND (10000)
Thallium	ug/l	-	ND (2.0)	ND (4.0) [a]	ND (2.0)	ND (10) [b]	ND (4.0) [a]	ND (4.0) [a]	ND (2.0)	ND (2.0)	ND (2.0)	ND (10) [b]	ND (10) [a]	ND (2.0)	ND (10) [a]	ND (10) [b]	ND (2.0)	ND (2.0)	ND (2.0)
Vanadium	ug/l	-	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)
Zinc	ug/l	-	ND (20)	ND (20)	ND (20)	ND (20)	ND (20)	ND (20)	ND (20)	ND (20)	ND (20)	ND (20)	ND (20)	ND (20)	ND (20)	ND (20)	ND (20)	ND (20)	ND (20)
General Chemistry																			
Cyanide	ug/l	200	ND (10)	-	ND (10)	-	ND (10)	-	ND (10)	-	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	-

Legend:
Hit
Exceedance
J - Estimated Value

Table 13 - PCBs and Pesticides in Groundwater Samples
511 West 21st Street, New York, NY

Client Sample ID:		NY TOGS Class GA GW Standards (NYSDEC 6/2004)	FLS-1	FLS-2	FLS-3	FLS-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10
Lab Sample ID:			JB56029-1	JB56029-2	JB56029-3	JB56029-4	JB56029-5	JB56029-6	JB56029-7	JB56029-8	JB56029-9	JB56029-10
Date Sampled:			12/17/2013	12/17/2013	12/17/2013	12/17/2013	12/17/2013	12/17/2013	12/17/2013	12/17/2013	12/17/2013	12/17/2013
Matrix:			Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
GC Semi-volatiles (EPA												
Aldrin	ug/l	ND	ND (0.0017)	ND (0.0017)	ND (0.0017)	ND (0.0017)	ND (0.0017)	ND (0.0017)	ND (0.0017)	ND (0.0017)	ND (0.0017)	ND (0.0017)
alpha-BHC	ug/l	0.01	ND (0.0013)	ND (0.0013)	ND (0.0013)	ND (0.0013)	ND (0.0013)	ND (0.0013)	ND (0.0013)	ND (0.0013)	ND (0.0013)	ND (0.0013)
beta-BHC	ug/l	0.04	ND (0.0031)	ND (0.0031)	ND (0.0031)	ND (0.0031)	ND (0.0031)	ND (0.0031)	ND (0.0031)	ND (0.0031)	ND (0.0031)	ND (0.0031)
delta-BHC	ug/l	0.04	ND (0.0016)	ND (0.0016)	ND (0.0016)	ND (0.0016)	ND (0.0016)	ND (0.0016)	ND (0.0016)	ND (0.0016)	ND (0.0016)	ND (0.0016)
gamma-BHC (Lindane)	ug/l	0.05	ND (0.00086)	ND (0.00086)	ND (0.00086)	ND (0.00086)	ND (0.00086)	ND (0.00086)	ND (0.00086)	ND (0.00086)	ND (0.00086)	ND (0.00086)
alpha-Chlordane	ug/l	-	ND (0.0022)	ND (0.0022)	ND (0.0022)	ND (0.0022)	ND (0.0022)	ND (0.0022)	ND (0.0022)	ND (0.0022)	ND (0.0022)	ND (0.0022)
gamma-Chlordane	ug/l	-	ND (0.00086)	ND (0.00086)	ND (0.00086)	ND (0.00086)	ND (0.00086)	ND (0.00086)	ND (0.00086)	ND (0.00086)	ND (0.00086)	ND (0.00086)
Dieldrin	ug/l	0.004	ND (0.00086)	ND (0.00086)	ND (0.00086)	ND (0.00086)	ND (0.00086)	ND (0.00086)	ND (0.00086)	ND (0.00086)	ND (0.00086)	ND (0.00086)
4,4'-DDD	ug/l	0.3	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)	ND (0.0012)
4,4'-DDE	ug/l	0.2	ND (0.00084)	ND (0.00084)	ND (0.00084)	ND (0.00084)	ND (0.00084)	ND (0.00084)	ND (0.00084)	ND (0.00084)	ND (0.00084)	ND (0.00084)
4,4'-DDT	ug/l	0.2	ND (0.0025)	ND (0.0025)	ND (0.0025)	ND (0.0025)	ND (0.0025)	ND (0.0025)	ND (0.0025)	ND (0.0025)	ND (0.0025)	ND (0.0025)
Endrin	ug/l	ND	ND (0.0015)	ND (0.0015)	ND (0.0015)	ND (0.0015)	ND (0.0015)	ND (0.0015)	ND (0.0015)	ND (0.0015)	ND (0.0015)	ND (0.0015)
Endosulfan sulfate	ug/l	-	ND (0.0023)	ND (0.0023)	ND (0.0023)	ND (0.0023)	ND (0.0023)	ND (0.0023)	ND (0.0023)	ND (0.0023)	ND (0.0023)	ND (0.0023)
Endrin aldehyde	ug/l	5	ND (0.0032)	ND (0.0032)	ND (0.0032)	ND (0.0032)	ND (0.0032)	ND (0.0032)	ND (0.0032)	ND (0.0032)	ND (0.0032)	ND (0.0032)
Endrin ketone	ug/l	5	ND (0.0017)	ND (0.0017)	ND (0.0017)	ND (0.0017)	ND (0.0017)	ND (0.0017)	ND (0.0017)	ND (0.0017)	ND (0.0017)	ND (0.0017)
Endosulfan-I	ug/l	-	ND (0.0011)	ND (0.0011)	ND (0.0011)	ND (0.0011)	ND (0.0011)	ND (0.0011)	ND (0.0011)	ND (0.0011)	ND (0.0011)	ND (0.0011)
Endosulfan-II	ug/l	-	ND (0.0016)	ND (0.0016)	ND (0.0016)	ND (0.0016)	ND (0.0016)	ND (0.0016)	ND (0.0016)	ND (0.0016)	ND (0.0016)	ND (0.0016)
Heptachlor	ug/l	0.04	ND (0.0013)	ND (0.0013)	ND (0.0013)	ND (0.0013)	ND (0.0013)	ND (0.0013)	ND (0.0013)	ND (0.0013)	ND (0.0013)	ND (0.0013)
Heptachlor epoxide	ug/l	0.03	0.016	ND (0.00074)	ND (0.00074)	ND (0.00074)	ND (0.00074)	ND (0.00074)	ND (0.00074)	ND (0.00074)	ND (0.00074)	ND (0.00074)
Methoxychlor	ug/l	35	ND (0.0034)	ND (0.0034)	ND (0.0034)	ND (0.0034)	ND (0.0034)	ND (0.0034)	ND (0.0034)	ND (0.0034)	ND (0.0034)	ND (0.0034)
Toxaphene	ug/l	0.06	ND (0.047)	ND (0.047)	ND (0.047)	ND (0.047)	ND (0.047)	ND (0.047)	ND (0.047)	ND (0.047)	ND (0.047)	ND (0.047)
Aroclor 1016	ug/l	0.09	ND (0.0094)	ND (0.0094)	ND (0.0094)	ND (0.0094)	ND (0.0094)	ND (0.0094)	ND (0.0094)	ND (0.0094)	ND (0.0094)	ND (0.0094)
Aroclor 1221	ug/l	0.09	ND (0.047)	ND (0.047)	ND (0.047)	ND (0.047)	ND (0.047)	ND (0.047)	ND (0.047)	ND (0.047)	ND (0.047)	ND (0.047)
Aroclor 1232	ug/l	0.09	ND (0.039)	ND (0.039)	ND (0.039)	ND (0.039)	ND (0.039)	ND (0.039)	ND (0.039)	ND (0.039)	ND (0.039)	ND (0.039)
Aroclor 1242	ug/l	0.09	ND (0.016)	ND (0.016)	ND (0.016)	ND (0.016)	ND (0.016)	ND (0.016)	ND (0.016)	ND (0.016)	ND (0.016)	ND (0.016)
Aroclor 1248	ug/l	0.09	ND (0.015)	ND (0.015)	ND (0.015)	ND (0.015)	ND (0.015)	ND (0.015)	ND (0.015)	ND (0.015)	ND (0.015)	ND (0.015)
Aroclor 1254	ug/l	0.09	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)
Aroclor 1260	ug/l	0.09	ND (0.012)	ND (0.012)	ND (0.012)	ND (0.012)	ND (0.012)	ND (0.012)	ND (0.012)	ND (0.012)	ND (0.012)	ND (0.012)

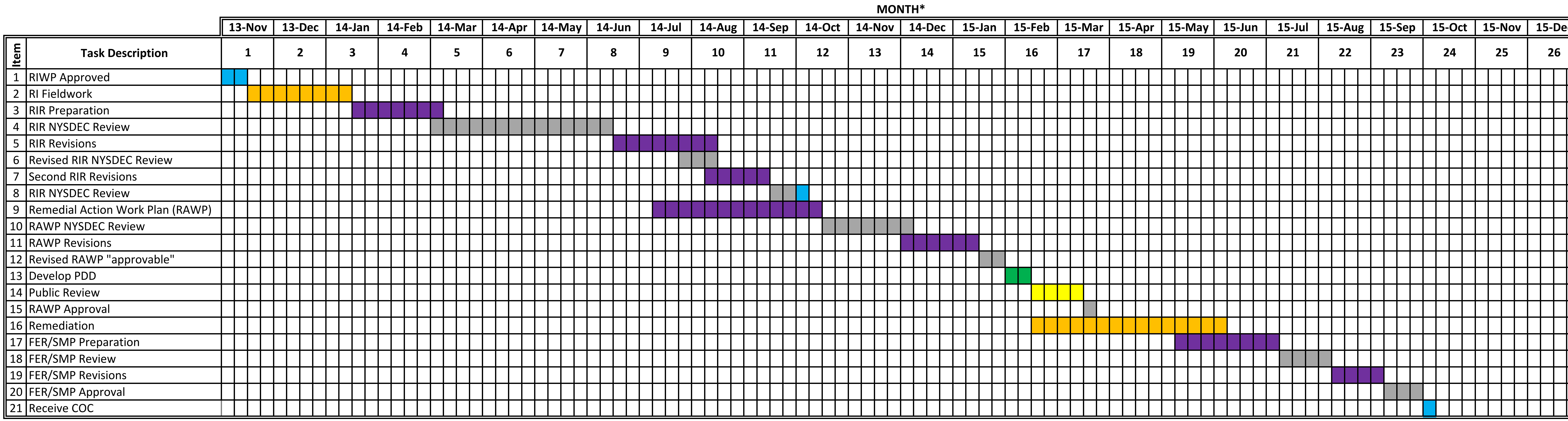
Legend:
Hit
Exceedance
J - Estimated Value

Table 14 - Volatile Organic Compounds in Indoor Air and Sub-Slab Soil Vapor
511 West 21st Street, New York, NY

Client Sample ID:		NYSDOH Final Guidance for Evaluating Soil Vapor Intrusion (Ambient Air)	IA-1	SV-1	SV-2	SV-3	SV-4
Lab Sample ID:			JB55641-5	JB55641-1	JB55641-2	JB55641-3	JB55641-4
Date Sampled:			12/12/2013	12/12/2013	12/12/2013	12/12/2013	12/12/2013
Matrix:			Ambient Indoor Air	Soil Vapor	Soil Vapor	Soil Vapor	Soil Vapor
GC/MS Volatiles (TO-15) - ug/m3							
Acetone	ug/m3	-	7.8	134	75.5	141	6130
1,3-Butadiene	ug/m3	-	ND (0.044)	ND (0.058)	ND (0.058)	ND (0.10)	ND (44)
Benzene	ug/m3	-	1.5	15	13	22	ND (70)
Bromodichloromethane	ug/m3	-	ND (0.17)	ND (0.22)	ND (0.22)	ND (0.39)	ND (170)
Bromoform	ug/m3	-	ND (0.23)	ND (0.30)	ND (0.30)	ND (0.52)	ND (230)
Bromomethane	ug/m3	-	ND (0.066)	ND (0.089)	ND (0.089)	ND (0.16)	ND (70)
Bromoethene	ug/m3	-	ND (0.061)	ND (0.083)	ND (0.083)	ND (0.14)	ND (66)
Benzyl Chloride	ug/m3	-	ND (0.13)	ND (0.17)	ND (0.17)	ND (0.30)	ND (130)
Carbon disulfide	ug/m3	-	ND (0.053)	78.2	36.4	117	ND (56)
Chlorobenzene	ug/m3	-	ND (0.12)	ND (0.16)	ND (0.16)	ND (0.27)	ND (120)
Chloroethane	ug/m3	-	ND (0.053)	ND (0.071)	ND (0.071)	ND (0.13)	ND (55)
Chloroform	ug/m3	-	ND (0.093)	35	14	3.9	ND (93)
Chloromethane	ug/m3	-	1.3	0.95	ND (0.093)	ND (0.16)	ND (70)
3-Chloropropene	ug/m3	-	ND (0.088)	ND (0.12)	ND (0.12)	ND (0.20)	ND (88)
2-Chlorotoluene	ug/m3	-	ND (0.10)	ND (0.14)	ND (0.14)	ND (0.24)	ND (100)
Carbon tetrachloride	ug/m3	-	ND (0.069)	ND (0.094)	ND (0.094)	ND (0.16)	ND (75)
Cyclohexane	ug/m3	-	0.55 J	34	20	28	ND (210)
1,1-Dichloroethane	ug/m3	-	ND (0.065)	ND (0.089)	ND (0.089)	ND (0.15)	ND (69)
1,1-Dichloroethylene	ug/m3	-	ND (0.083)	ND (0.11)	ND (0.11)	ND (0.19)	ND (87)
1,2-Dibromoethane	ug/m3	-	ND (0.21)	ND (0.28)	ND (0.28)	ND (0.48)	ND (220)
1,2-Dichloroethane	ug/m3	-	ND (0.065)	ND (0.089)	ND (0.089)	ND (0.15)	ND (69)
1,2-Dichloropropane	ug/m3	-	ND (0.18)	ND (0.24)	ND (0.24)	ND (0.43)	ND (190)
1,4-Dioxane	ug/m3	-	ND (0.22)	ND (0.29)	ND (0.29)	ND (0.50)	ND (220)
Dichlorodifluoromethane	ug/m3	-	4	19	24	118	1730000
Dibromochloromethane	ug/m3	-	ND (0.25)	ND (0.33)	ND (0.33)	ND (0.57)	ND (260)
trans-1,2-Dichloroethylene	ug/m3	-	ND (0.059)	ND (0.079)	ND (0.079)	ND (0.14)	ND (59)
cis-1,2-Dichloroethylene	ug/m3	-	ND (0.11)	ND (0.15)	ND (0.15)	ND (0.25)	ND (110)
cis-1,3-Dichloropropene	ug/m3	-	ND (0.086)	ND (0.11)	ND (0.11)	ND (0.20)	ND (86)
m-Dichlorobenzene	ug/m3	-	ND (0.15)	ND (0.20)	ND (0.20)	ND (0.35)	ND (150)
o-Dichlorobenzene	ug/m3	-	ND (0.17)	ND (0.23)	ND (0.23)	ND (0.41)	ND (180)
p-Dichlorobenzene	ug/m3	-	ND (0.13)	ND (0.17)	ND (0.17)	ND (0.30)	ND (130)
trans-1,3-Dichloropropene	ug/m3	-	ND (0.095)	ND (0.13)	ND (0.13)	ND (0.22)	ND (100)
Ethanol	ug/m3	-	ND (0.36)	9	2.8	3	ND (360)
Ethylbenzene	ug/m3	-	0.61 J	ND (0.12)	10	4.8	ND (91)
Ethyl Acetate	ug/m3	-	5.4	ND (0.27)	ND (0.27)	ND (0.47)	1000
4-Ethyltoluene	ug/m3	-	ND (0.074)	ND (0.098)	2.2	2.0 J	ND (74)
Freon 113	ug/m3	-	2.9	ND (0.21)	24	ND (0.37)	ND (160)
Freon 114	ug/m3	-	ND (0.15)	ND (0.20)	ND (0.20)	ND (0.34)	ND (150)
Heptane	ug/m3	-	2.7	11	22	21	ND (82)
Hexachlorobutadiene	ug/m3	-	ND (0.67)	ND (0.90)	ND (0.90)	ND (1.6)	ND (680)
Hexane	ug/m3	-	4.9	64.5	16	23	ND (56)
2-Hexanone	ug/m3	-	ND (0.10)	ND (0.13)	7.4	9	ND (100)
Isopropyl Alcohol	ug/m3	-	ND (0.096)	2.3	ND (0.13)	2.3	ND (98)
Methylene chloride	ug/m3	60	6.6	10	15	9.7	1170
Methyl ethyl ketone	ug/m3	-	0.53 J	25	16	29	782
Methyl Isobutyl Ketone	ug/m3	-	ND (0.12)	ND (0.16)	ND (0.16)	4	ND (120)
Methyl Tert Butyl Ether	ug/m3	-	ND (0.061)	ND (0.083)	36.1	44.7	ND (65)
Methylmethacrylate	ug/m3	-	ND (0.16)	ND (0.22)	ND (0.22)	ND (0.38)	ND (170)
Propylene	ug/m3	-	3.6	28.5	7.2	38	ND (55)
Styrene	ug/m3	-	ND (0.085)	ND (0.11)	ND (0.11)	ND (0.20)	ND (85)
1,1,1-Trichloroethane	ug/m3	-	ND (0.087)	2.2	ND (0.12)	ND (0.21)	ND (93)
1,1,2,2-Tetrachloroethane	ug/m3	-	ND (0.21)	ND (0.27)	ND (0.27)	ND (0.49)	ND (210)
1,1,2-Trichloroethane	ug/m3	-	ND (0.17)	ND (0.22)	ND (0.22)	ND (0.39)	ND (170)
1,2,4-Trichlorobenzene	ug/m3	-	ND (0.59)	ND (0.82)	ND (0.82)	ND (1.3)	ND (600)
1,2,4-Trimethylbenzene	ug/m3	-	0.98	ND (0.11)	5.9	5.9	ND (84)
1,3,5-Trimethylbenzene	ug/m3	-	ND (0.074)	ND (0.098)	1.9	1.6 J	ND (74)
2,2,4-Trimethylpentane	ug/m3	-	0.75 J	5.1	256	60.7	ND (100)
Tertiary Butyl Alcohol	ug/m3	-	ND (0.13)	8.8	2.5	4.5	ND (140)
Tetrachloroethylene	ug/m3	30	ND (0.20)	20	33	11	ND (200)
Tetrahydrofuran	ug/m3	-	ND (0.13)	ND (0.18)	ND (0.18)	ND (0.29)	ND (140)
Toluene	ug/m3	-	3.4	4.5	57.3	25	1210
Trichloroethylene	ug/m3	5	ND (0.10)	1.4	2.2	0.91	ND (110)
Trichlorofluoromethane	ug/m3	-	1.7	2.3	8.4	21	ND (79)
Vinyl chloride	ug/m3	-	ND (0.043)	ND (0.059)	ND (0.059)	ND (0.10)	ND (46)
Vinyl Acetate	ug/m3	-	ND (0.20)	38.7	ND (0.27)	ND (0.49)	ND (210)
m,p-Xylene	ug/m3	-	1.9	ND (0.19)	26	13	ND (140)
o-Xylene	ug/m3	-	0.74 J	ND (0.11)	13	5.6	ND (87)
Xylenes (total)	ug/m3	-	2.6	ND (0.11)	40	19	ND (87)

Legend:
Hit
Exceedance
J - Estimated Value

Table 15 - Remedial Action Schedule
511 West 21st Street, New York, NY



* Months will be defined from when NYSDEC approval is received.

Key Map	
(orange)	Fieldwork
(red)	Lab Analysis/Validation/EDDs
(purple)	Report Writing
(yellow)	Public Review
(gray)	Agencies Review/Approval
(green)	DEC Report Writing
(blue)	Agency Acceptance

Table 16 – Emergency Contact List
511 West 21st Street, New York, NY

Emergency	
New York City Police Department	911
New York City Fire Department	911
Emergency Medical Service (ambulance)	911
NYSDEC Spill Hotline	(800) 457-7362
National Response Center	(800) 424-8802
Bellevue Hospital Center 462 First Avenue New York, NY 10016 212-562-1000	(212) 562-1000
FLS Project Staff	
Daniel DiRocco, FLS Project Manager	(212) 675-3225 ext. 310
Raul Ramirez, Health and Safety Officer	(212) 675-3225 ext. 321
Arnold Fleming, Remedial Engineer	(212) 675-3225 ext. 301
Albanese Development Corporation	
Marty Dettling, Client Representative	(516) 746-6000

Table 17 – Typical Site Permit List
511 West 21st Street, New York, NY

Regulatory Agency	Typical Project Permits
Department of Transportation (NYCDOT)	Access, curb cuts
Fire Department (FDNY)	Access, roadway width, circulation and fire protection
Department of Environmental Conservation (NYSDEC)	Stormwater Pollution Prevention Plan
Department of Environmental Protection (NYCDEP)	Hydrant fire flow test, domestic water and fire service, sanitary service, amended drainage plan, sewer improvements)
Department of Buildings (NYCDOB)	Flood zone requirements, building permits
Board of Standards and Appeals (NYCBSA)	Zoning variance, special permits

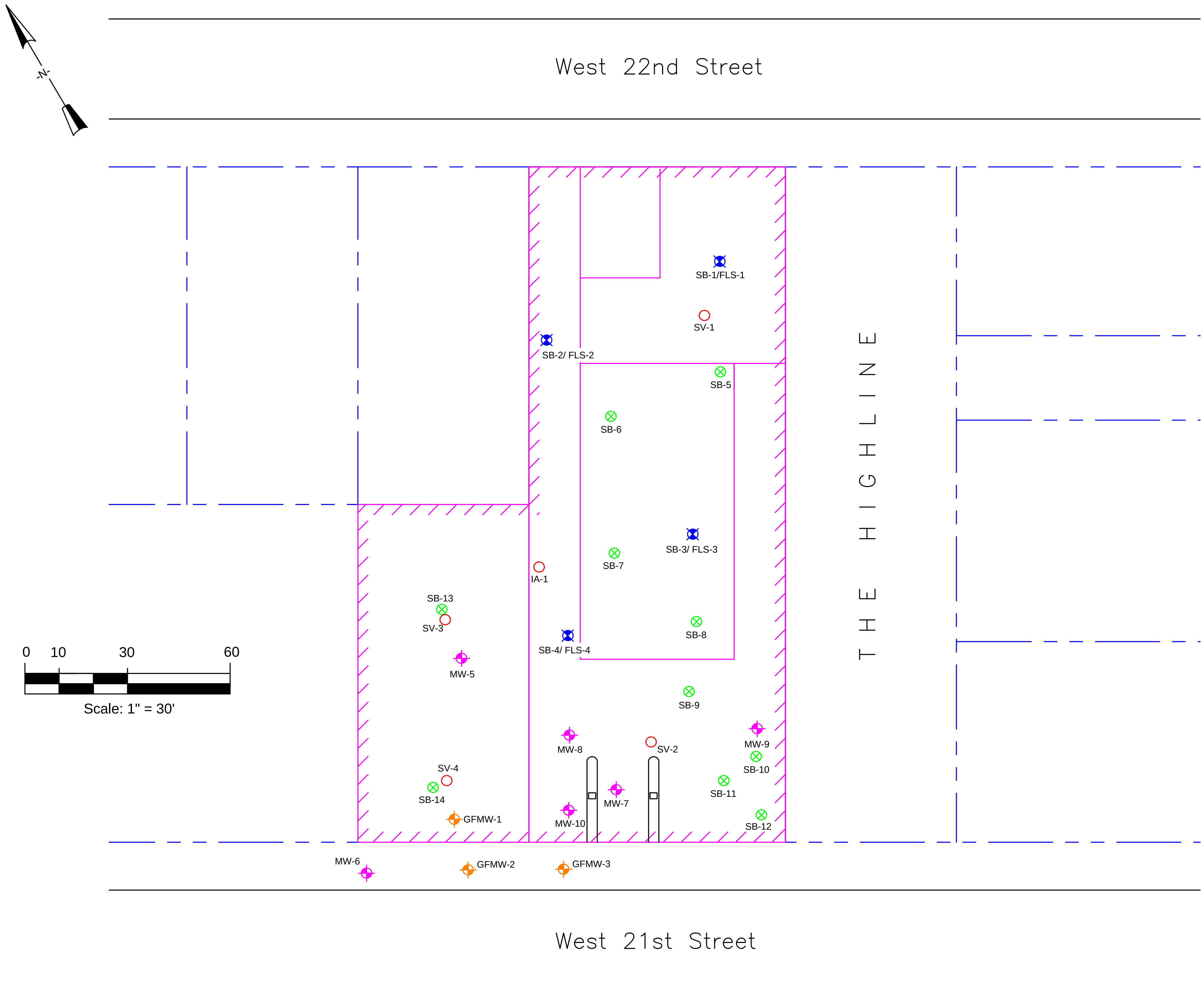
Table 18 - Remedial Alternatives Cost Analysis
511 21st West Street New York, New York

Item/Task	Alternative 1	Alternative 2	Alternative 3
Soil	$ 540,000	$ 284,400	$ 134,550
Underpinning	$ 273,000.00	NA	NA
Composite Cover	$ 553,000.00	$ 443,800.00	$ 443,000.00
Vapor Barrier	NA	$ 275,000.00	$ 275,000.00
SSDS Pits	NA	$ 20,000.00	$ 20,000.00
SSDS Piping	NA	$ 7,200.00	$ 7,200.00
Sheeting/Shoring	$ 370,000.00	$ 112,500.00	$ 112,500.00
Dewatering	$ 150,000.00	$ 100,000.00	$ 100,000.00
Excavation	$ 150,000.00	$ 100,000.00	$ 75,000.00
Backfill	$ 105,000.00	$ 60,000.00	$ 40,000.00
Total	**$ 2,141,000**	**$ 1,402,900**	**$ 1,207,250**

FIGURES

Fleming Lee Shue	**FIGURE 1: SITE LOCATION**
	511 West 21st Street New York, N.Y. BCP Site No. C231080

Environmental Management & Consulting, 158 West 29th Street, New York, NY 10001



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New York, NY 10001

511 West 21st Street
Block 693 Lot 23

FIGURE 2

SAMPLE LOCATIONS

Date
June 2014

Project Number
10173-002

LEGEND

PROPERTY LINES

BUILDING OUTLINE

SV-1 — SUB-SLAB SOIL VAPOR/ INDOOR AIR SAMPLE LOCATION

SB-5 — SOIL BORING LOCATION

SB-1/FLS-1 — FLS MONITORING WELL/ SOIL BORING LOCATION

MW-5 — LBG MONITORING WELL LOCATION

GFMW-1 — GF MONITORING WELL LOCATION

FILE: P:\Project Files\10173 - Albanese Development Corp\002 - 511 West 21st Street\Figures\RIR\FIG 2 - Sample Locations including GFMWs.dwg DATE: 7/11/2014

ARCHITECTURAL DRAWING REFERENCED FROM COOKFOX

FILE: P:\Project Files\10173 – Albanese Development Corp\002 – 511 West 21st Street\Figures\RAWP\FIG 3 – Development Plans.dwg DATE: 10/3/2014

Fleming Lee Shue

Environmental Management & Consulting

158 West 29th Street, 9th Fl.
New York, NY 10001

511 West 21st Street
Block 693 Lot 23

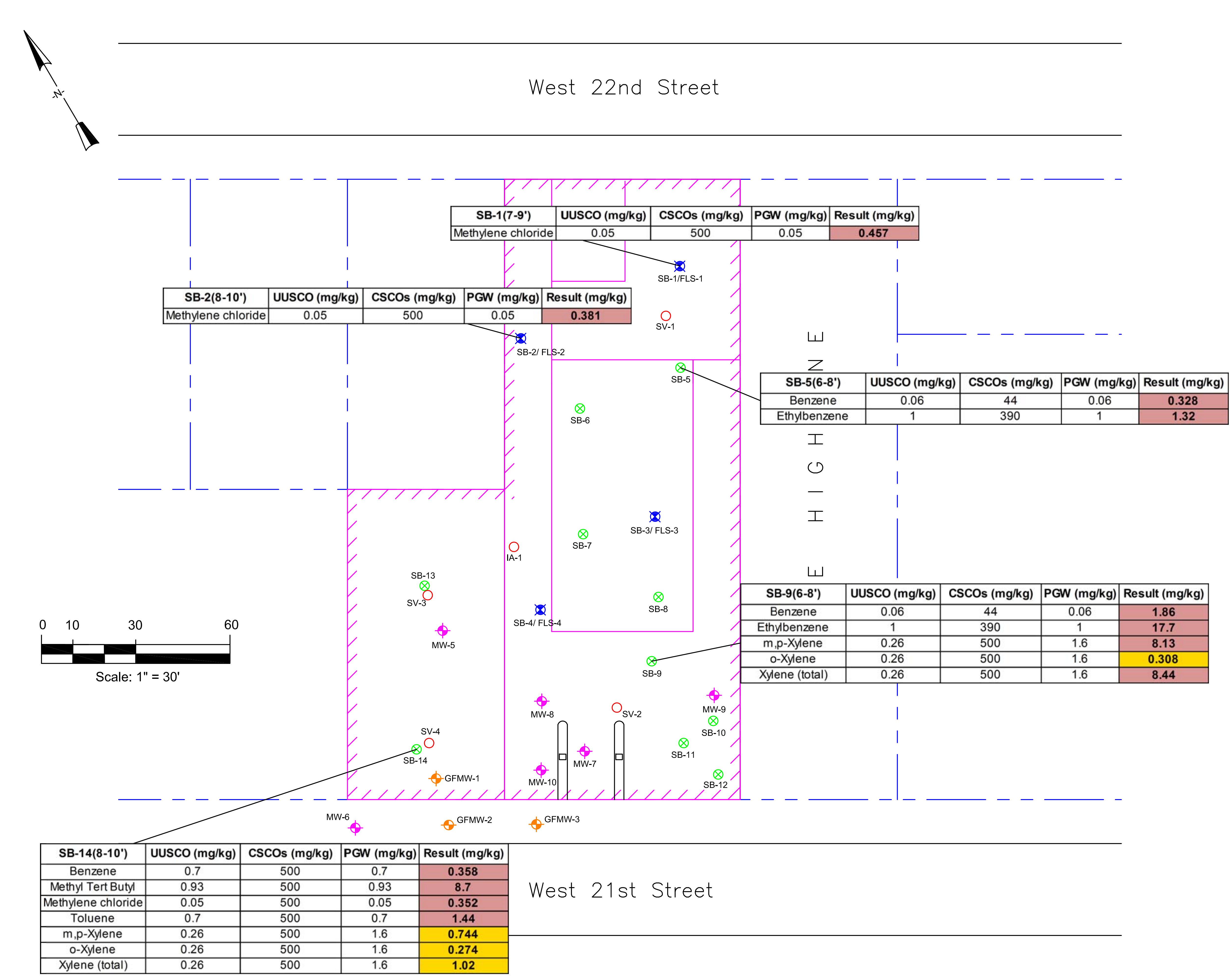
FIGURE 3

DEVELOPMENT PLAN

Date
October 2014

Project Number
10173-002

LEGEND



SB-1(7-9')	UUSCO (mg/kg)	CSCOs (mg/kg)	PGW (mg/kg)	Result (mg/kg)
Methylene chloride	0.05	500	0.05	0.457

SB-2(8-10')	UUSCO (mg/kg)	CSCOs (mg/kg)	PGW (mg/kg)	Result (mg/kg)
Methylene chloride	0.05	500	0.05	0.381

SB-5(6-8')	UUSCO (mg/kg)	CSCOs (mg/kg)	PGW (mg/kg)	Result (mg/kg)
Benzene	0.06	44	0.06	0.328
Ethylbenzene	1	390	1	1.32

SB-9(6-8')	UUSCO (mg/kg)	CSCOs (mg/kg)	PGW (mg/kg)	Result (mg/kg)
Benzene	0.06	44	0.06	1.86
Ethylbenzene	1	390	1	17.7
m,p-Xylene	0.26	500	1.6	8.13
o-Xylene	0.26	500	1.6	0.308
Xylene (total)	0.26	500	1.6	8.44

SB-14(8-10')	UUSCO (mg/kg)	CSCOs (mg/kg)	PGW (mg/kg)	Result (mg/kg)
Benzene	0.7	500	0.7	0.358
Methyl Tert Butyl	0.93	500	0.93	8.7
Methylene chloride	0.05	500	0.05	0.352
Toluene	0.7	500	0.7	1.44
m,p-Xylene	0.26	500	1.6	0.744
o-Xylene	0.26	500	1.6	0.274
Xylene (total)	0.26	500	1.6	1.02

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New York, NY 10001

511 West 21st Street
Block 693 Lot 23

FIGURE 4

EXCEEDANCES OF VOLATILE ORGANIC COMPOUNDS IN SOIL SAMPLES

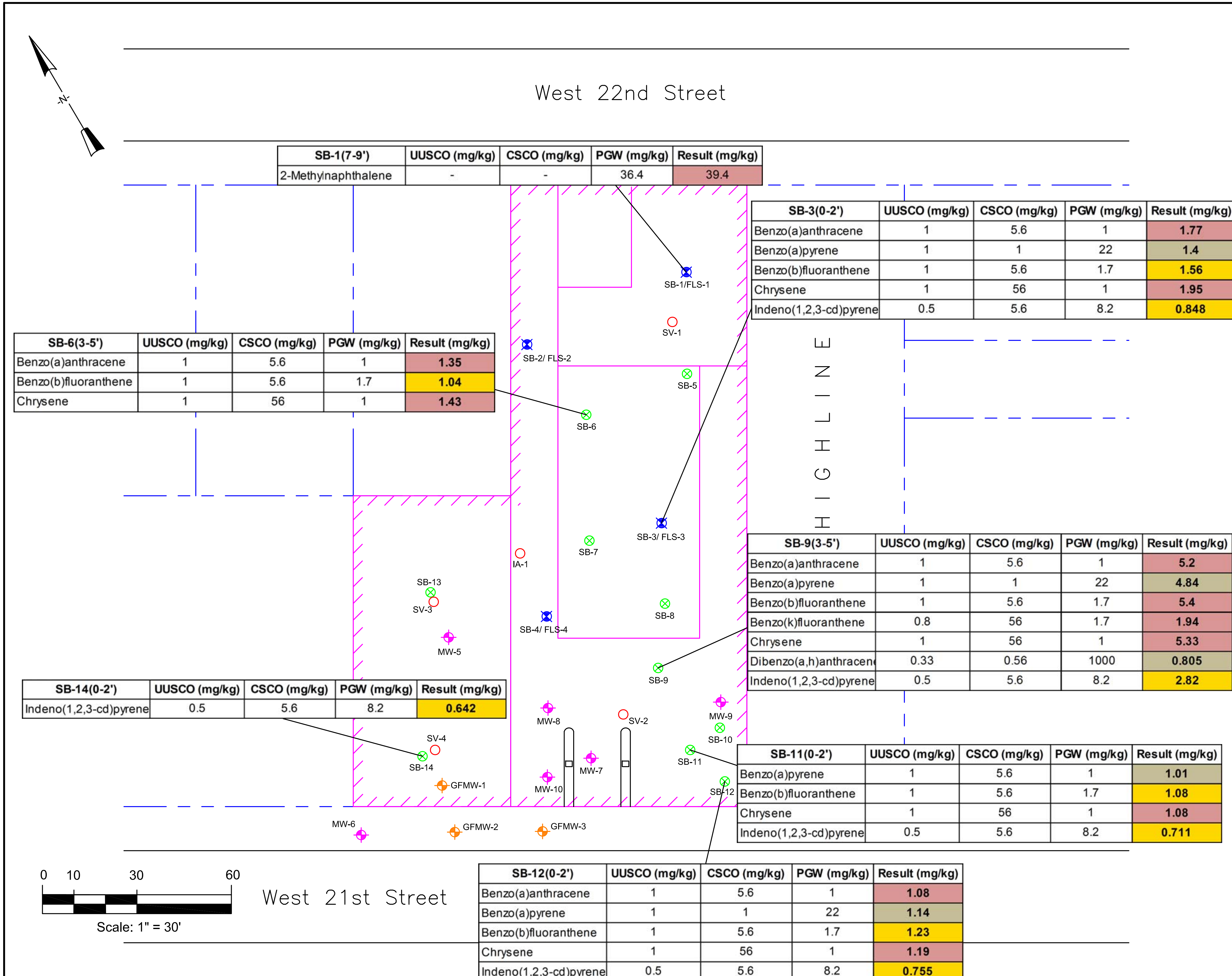
Date
July 2014

Project Number
10173-002

LEGEND

- PROPERTY LINES
- BUILDING OUTLINE
- SV-1 SUB-SLAB SOIL VAPOR/ INDOOR AIR SAMPLE LOCATION
- SB-5 SOIL BORING LOCATION
- SB-1/FLS-1 FLS MONITORING WELL/ SOIL BORING LOCATION
- MW-5 LBG MONITORING WELL LOCATION
- GFMW-1 GF MONITORING WELL LOCATION
- Exceedance of NY Unrestricted Use Soil Cleanup Objective (UUSCO)
- Exceedance of NY Commercial Use Soil Cleanup Objective (CSCO)
- Exceedance of Protection of Groundwater SCO AND UUSCO

FILE: P:\Project Files\10173 – Albanese Development Corp\002 – 511 West 21st Street\Figures\RAWP\FIG 4 – Soil VOC Exceedances.dwg DATE: 2/6/2014



SB-1(7-9')	UUSCO (mg/kg)	CSCO (mg/kg)	PGW (mg/kg)	Result (mg/kg)
2-Methylnaphthalene	-	-	36.4	39.4

SB-3(0-2')	UUSCO (mg/kg)	CSCO (mg/kg)	PGW (mg/kg)	Result (mg/kg)
Benzo(a)anthracene	1	5.6	1	1.77
Benzo(a)pyrene	1	1	22	1.4
Benzo(b)fluoranthene	1	5.6	1.7	1.56
Chrysene	1	56	1	1.95
Indeno(1,2,3-cd)pyrene	0.5	5.6	8.2	0.848

SB-6(3-5')	UUSCO (mg/kg)	CSCO (mg/kg)	PGW (mg/kg)	Result (mg/kg)
Benzo(a)anthracene	1	5.6	1	1.35
Benzo(b)fluoranthene	1	5.6	1.7	1.04
Chrysene	1	56	1	1.43

SB-9(3-5')	UUSCO (mg/kg)	CSCO (mg/kg)	PGW (mg/kg)	Result (mg/kg)
Benzo(a)anthracene	1	5.6	1	5.2
Benzo(a)pyrene	1	1	22	4.84
Benzo(b)fluoranthene	1	5.6	1.7	5.4
Benzo(k)fluoranthene	0.8	56	1.7	1.94
Chrysene	1	56	1	5.33
Dibenzo(a,h)anthracene	0.33	0.56	1000	0.805
Indeno(1,2,3-cd)pyrene	0.5	5.6	8.2	2.82

SB-14(0-2')	UUSCO (mg/kg)	CSCO (mg/kg)	PGW (mg/kg)	Result (mg/kg)
Indeno(1,2,3-cd)pyrene	0.5	5.6	8.2	0.642

SB-11(0-2')	UUSCO (mg/kg)	CSCO (mg/kg)	PGW (mg/kg)	Result (mg/kg)
Benzo(a)pyrene	1	5.6	1	1.01
Benzo(b)fluoranthene	1	5.6	1.7	1.08
Chrysene	1	56	1	1.08
Indeno(1,2,3-cd)pyrene	0.5	5.6	8.2	0.711

SB-12(0-2')	UUSCO (mg/kg)	CSCO (mg/kg)	PGW (mg/kg)	Result (mg/kg)
Benzo(a)anthracene	1	5.6	1	1.08
Benzo(a)pyrene	1	1	22	1.14
Benzo(b)fluoranthene	1	5.6	1.7	1.23
Chrysene	1	56	1	1.19
Indeno(1,2,3-cd)pyrene	0.5	5.6	8.2	0.755

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Block 693 Lot 23

FIGURE 5

EXCEEDANCES OF SEMI-VOLATILE ORGANIC COMPOUNDS IN SOIL SAMPLES

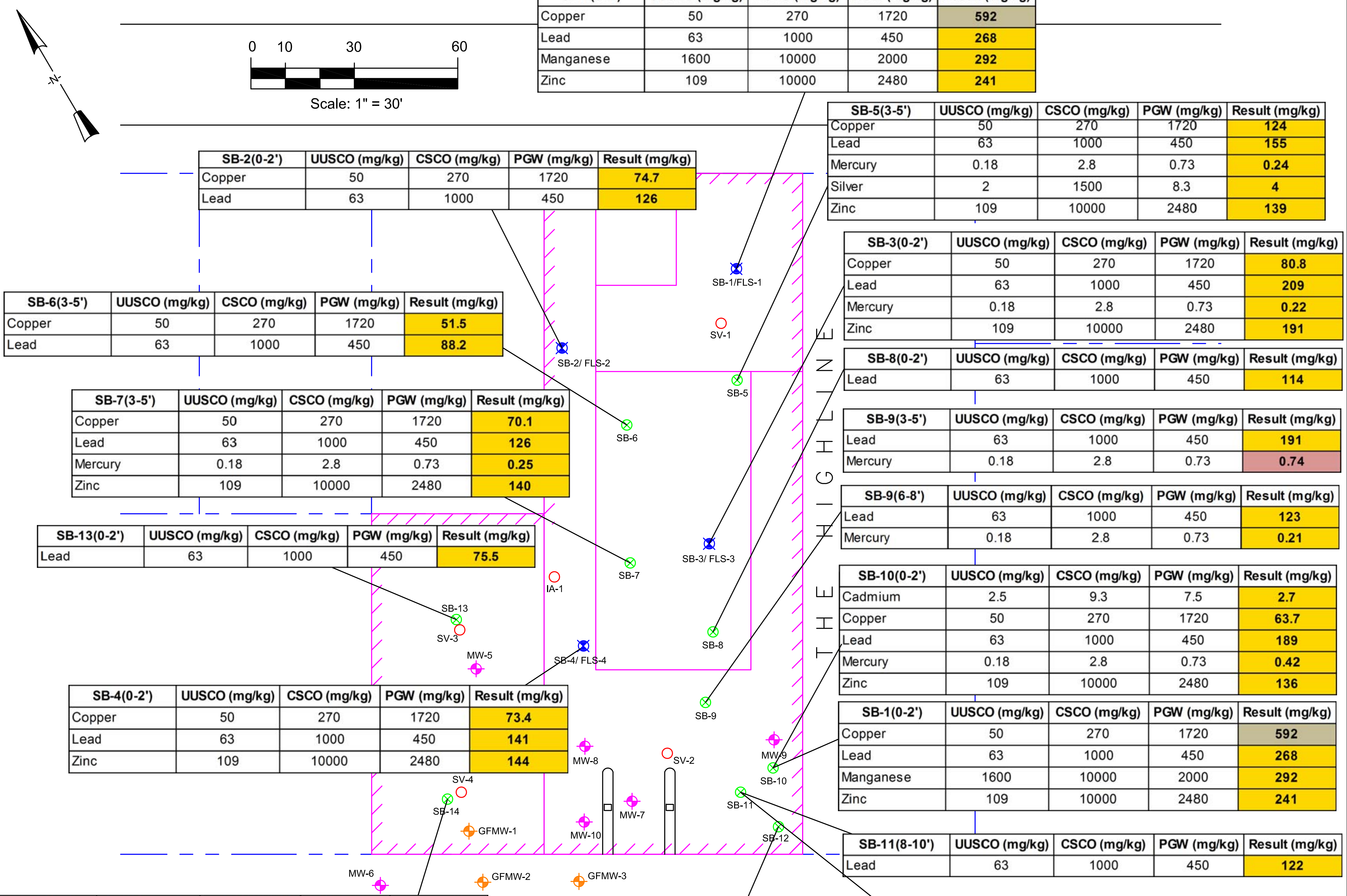
Date
June 2014

Project Number
10173-002

LEGEND

- PROPERTY LINES
- BUILDING OUTLINE
- SV-1 SUB-SLAB SOIL VAPOR/ INDOOR AIR SAMPLE LOCATION
- SB-5 SOIL BORING LOCATION
- SB-1/FLS-1 FLS MONITORING WELL/ SOIL BORING LOCATION
- MW-5 LBG MONITORING WELL LOCATION
- GFMW-1 GF MONITORING WELL LOCATION
- Exceedance of NY Unrestricted Use Soil Cleanup Objective (UUSCO)
- Exceedance of NY Commercial Use Soil Cleanup Objective (CSCO)
- Exceedance of Protection of Groundwater SCO AND UUSCO

FILE: P:\Project Files\10173 – Albanese Development Corp\002 – 511 West 21st Street\Figures\RAWP\FIG 5 – Soil SVOC Exceedances.dwg DATE: 6/10/2014



SB-1(0-2')	UUSCO (mg/kg)	CSCO (mg/kg)	PGW (mg/kg)	Result (mg/kg)
Copper	50	270	1720	592
Lead	63	1000	450	268
Manganese	1600	10000	2000	292
Zinc	109	10000	2480	241

SB-5(3-5')	UUSCO (mg/kg)	CSCO (mg/kg)	PGW (mg/kg)	Result (mg/kg)
Copper	50	270	1720	124
Lead	63	1000	450	155
Mercury	0.18	2.8	0.73	0.24
Silver	2	1500	8.3	4
Zinc	109	10000	2480	139

SB-2(0-2')	UUSCO (mg/kg)	CSCO (mg/kg)	PGW (mg/kg)	Result (mg/kg)
Copper	50	270	1720	74.7
Lead	63	1000	450	126

SB-3(0-2')	UUSCO (mg/kg)	CSCO (mg/kg)	PGW (mg/kg)	Result (mg/kg)
Copper	50	270	1720	80.8
Lead	63	1000	450	209
Mercury	0.18	2.8	0.73	0.22
Zinc	109	10000	2480	191

SB-6(3-5')	UUSCO (mg/kg)	CSCO (mg/kg)	PGW (mg/kg)	Result (mg/kg)
Copper	50	270	1720	51.5
Lead	63	1000	450	88.2

SB-8(0-2')	UUSCO (mg/kg)	CSCO (mg/kg)	PGW (mg/kg)	Result (mg/kg)
Lead	63	1000	450	114

SB-7(3-5')	UUSCO (mg/kg)	CSCO (mg/kg)	PGW (mg/kg)	Result (mg/kg)
Copper	50	270	1720	70.1
Lead	63	1000	450	126
Mercury	0.18	2.8	0.73	0.25
Zinc	109	10000	2480	140

SB-9(3-5')	UUSCO (mg/kg)	CSCO (mg/kg)	PGW (mg/kg)	Result (mg/kg)
Lead	63	1000	450	191
Mercury	0.18	2.8	0.73	0.74

SB-9(6-8')	UUSCO (mg/kg)	CSCO (mg/kg)	PGW (mg/kg)	Result (mg/kg)
Lead	63	1000	450	123
Mercury	0.18	2.8	0.73	0.21

SB-13(0-2')	UUSCO (mg/kg)	CSCO (mg/kg)	PGW (mg/kg)	Result (mg/kg)
Lead	63	1000	450	75.5

SB-10(0-2')	UUSCO (mg/kg)	CSCO (mg/kg)	PGW (mg/kg)	Result (mg/kg)
Cadmium	2.5	9.3	7.5	2.7
Copper	50	270	1720	63.7
Lead	63	1000	450	189
Mercury	0.18	2.8	0.73	0.42
Zinc	109	10000	2480	136

SB-4(0-2')	UUSCO (mg/kg)	CSCO (mg/kg)	PGW (mg/kg)	Result (mg/kg)
Copper	50	270	1720	73.4
Lead	63	1000	450	141
Zinc	109	10000	2480	144

SB-1(0-2')	UUSCO (mg/kg)	CSCO (mg/kg)	PGW (mg/kg)	Result (mg/kg)
Copper	50	270	1720	592
Lead	63	1000	450	268
Manganese	1600	10000	2000	292
Zinc	109	10000	2480	241

SB-11(8-10')	UUSCO (mg/kg)	CSCO (mg/kg)	PGW (mg/kg)	Result (mg/kg)
Lead	63	1000	450	122

SB-14(0-2')	UUSCO (mg/kg)	CSCO (mg/kg)	PGW (mg/kg)	Result (mg/kg)
Lead	63	1000	450	112

SB-11(0-2')	UUSCO (mg/kg)	CSCO (mg/kg)	PGW (mg/kg)	Result (mg/kg)
Copper	50	270	1720	95.3
Lead	63	1000	450	358
Mercury	0.18	2.8	0.73	0.93
Zinc	109	10000	2480	188

SB-12(0-2')	UUSCO (mg/kg)	CSCO (mg/kg)	PGW (mg/kg)	Result (mg/kg)
Copper	50	270	1720	65.9
Lead	63	1000	450	202
Mercury	0.18	2.8	0.73	2.7
Zinc	109	10000	2480	128

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Block 693 Lot 23

FIGURE 6

EXCEEDANCES OF METALS IN SOIL SAMPLES

Date
June 2014

Project Number
10173-002

LEGEND

PROPERTY LINES

BUILDING OUTLINE

SV-1 SUB-SLAB SOIL VAPOR/ INDOOR AIR SAMPLE LOCATION

SB-5 SOIL BORING LOCATION

SB-1/FLS-1 FLS MONITORING WELL/ SOIL BORING LOCATION

MW-5 LBG MONITORING WELL LOCATION

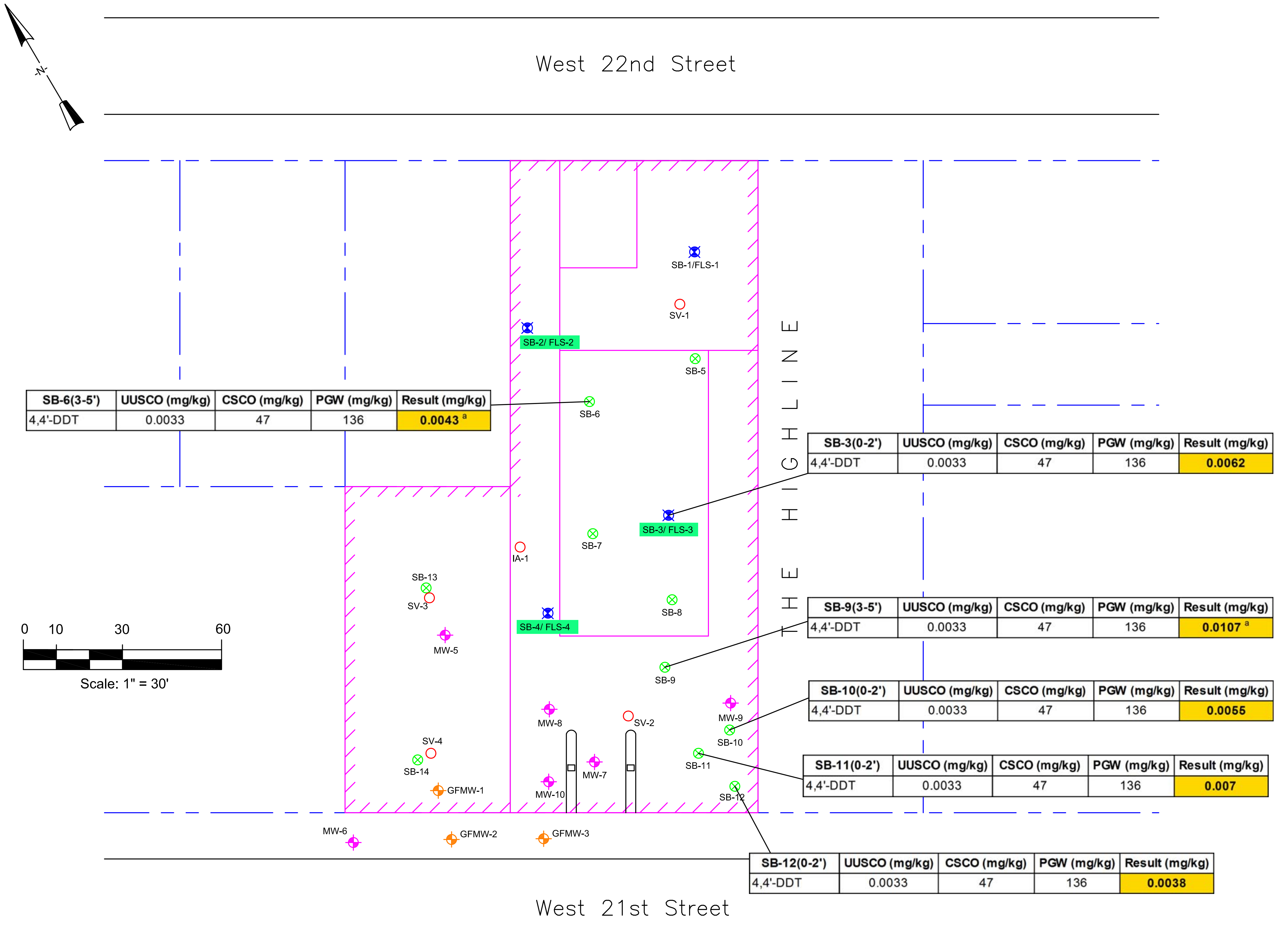
GFMW-1 GF MONITORING WELL LOCATION

Exceedance of NY Unrestricted Use Soil Cleanup Objective (UUSCO)

Exceedance of NY Commercial Use Soil Cleanup Objective (CSCO)

Exceedance of Protection of Groundwater SCO AND UUSCO

FILE: P:\Project Files\10173 - Albanese Development Corp\002 - 511 West 21st Street\Figures\RAWP\FIG 6 - Soil Metals Exceedances.dwg DATE: 6/10/2014



SB-6(3-5')	UUSCO (mg/kg)	CSCO (mg/kg)	PGW (mg/kg)	Result (mg/kg)
4,4'-DDT	0.0033	47	136	0.0043 [a]

SB-3(0-2')	UUSCO (mg/kg)	CSCO (mg/kg)	PGW (mg/kg)	Result (mg/kg)
4,4'-DDT	0.0033	47	136	0.0062

SB-9(3-5')	UUSCO (mg/kg)	CSCO (mg/kg)	PGW (mg/kg)	Result (mg/kg)
4,4'-DDT	0.0033	47	136	0.0107 [a]

SB-10(0-2')	UUSCO (mg/kg)	CSCO (mg/kg)	PGW (mg/kg)	Result (mg/kg)
4,4'-DDT	0.0033	47	136	0.0055

SB-11(0-2')	UUSCO (mg/kg)	CSCO (mg/kg)	PGW (mg/kg)	Result (mg/kg)
4,4'-DDT	0.0033	47	136	0.007

SB-12(0-2')	UUSCO (mg/kg)	CSCO (mg/kg)	PGW (mg/kg)	Result (mg/kg)
4,4'-DDT	0.0033	47	136	0.0038

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Block 693 Lot 23

FIGURE 7

EXCEEDANCES OF PCBs AND PESTICIDES IN SOIL SAMPLES

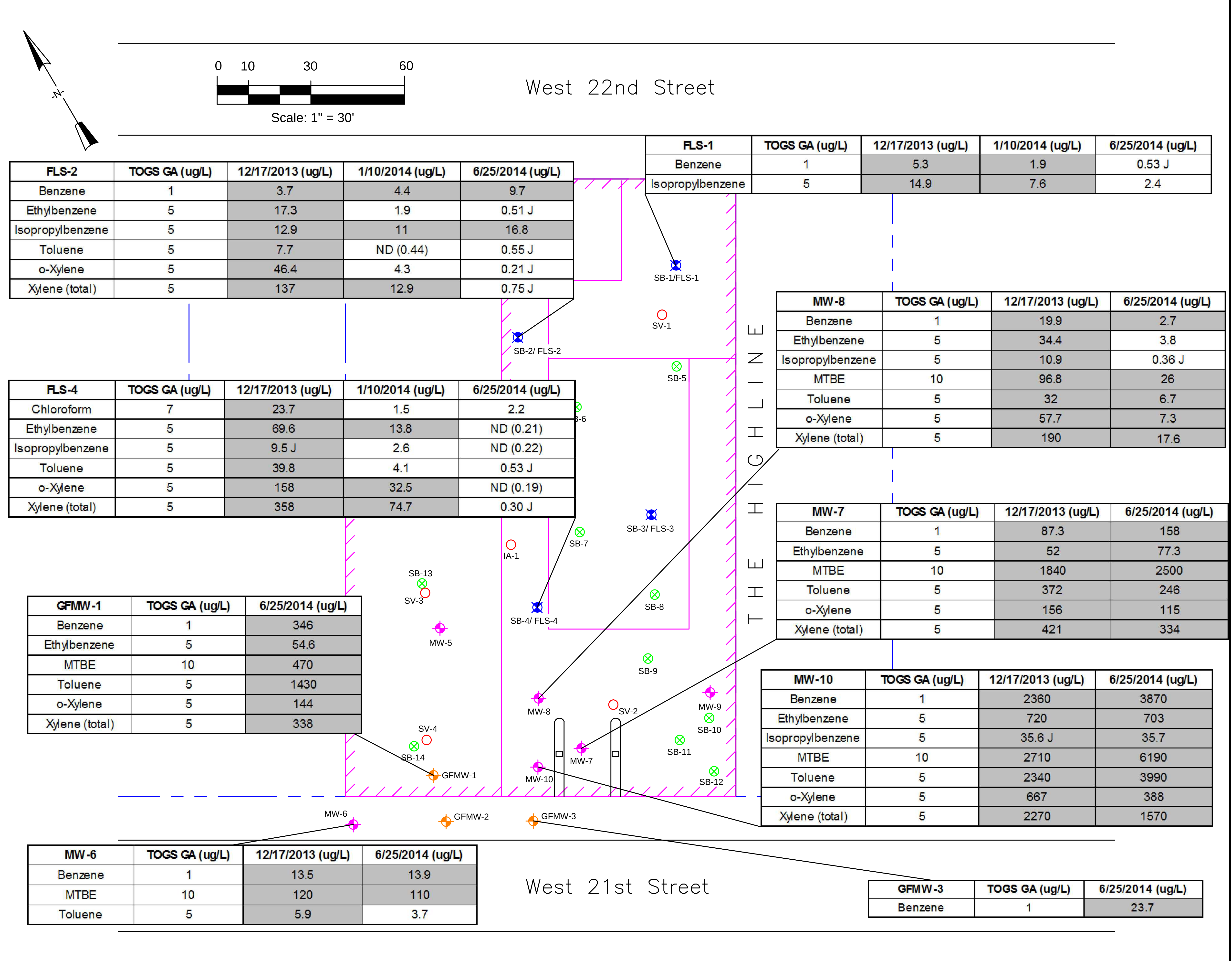
Date
June 2014

Project Number
10173-002

LEGEND

- PROPERTY LINES
- BUILDING OUTLINE
- SV-1 SUB-SLAB SOIL VAPOR/ INDOOR AIR SAMPLE LOCATION
- SB-5 SOIL BORING LOCATION
- SB-1/FLS-1 FLS MONITORING WELL/ SOIL BORING LOCATION
- MW-5 LBG MONITORING WELL LOCATION
- GFMW-1 GF MONITORING WELL LOCATION
- Exceedance of NY Unrestricted Use Soil Cleanup Objective (UUSCO)
- Exceedance of NY Commercial Use Soil Cleanup Objective (CSCO)
- Exceedance of Protection of Groundwater SCO AND UUSCO

FILE: P:\Project Files\10173 – Albanese Development Corp\002 – 511 West 21st Street\Figures\RAWP\FIG 7 – Soil PCB & Pest Exceedances.dwg DATE: 6/10/2014



FLS-1	TOGS GA (ug/L)	12/17/2013 (ug/L)	1/10/2014 (ug/L)	6/25/2014 (ug/L)
Benzene	1	5.3	1.9	0.53 J
Isopropylbenzene	5	14.9	7.6	2.4

FLS-2	TOGS GA (ug/L)	12/17/2013 (ug/L)	1/10/2014 (ug/L)	6/25/2014 (ug/L)
Benzene	1	3.7	4.4	9.7
Ethylbenzene	5	17.3	1.9	0.51 J
Isopropylbenzene	5	12.9	11	16.8
Toluene	5	7.7	ND (0.44)	0.55 J
o-Xylene	5	46.4	4.3	0.21 J
Xylene (total)	5	137	12.9	0.75 J

FLS-4	TOGS GA (ug/L)	12/17/2013 (ug/L)	1/10/2014 (ug/L)	6/25/2014 (ug/L)
Chloroform	7	23.7	1.5	2.2
Ethylbenzene	5	69.6	13.8	ND (0.21)
Isopropylbenzene	5	9.5 J	2.6	ND (0.22)
Toluene	5	39.8	4.1	0.53 J
o-Xylene	5	158	32.5	ND (0.19)
Xylene (total)	5	358	74.7	0.30 J

MW-8	TOGS GA (ug/L)	12/17/2013 (ug/L)	6/25/2014 (ug/L)
Benzene	1	19.9	2.7
Ethylbenzene	5	34.4	3.8
Isopropylbenzene	5	10.9	0.36 J
MTBE	10	96.8	26
Toluene	5	32	6.7
o-Xylene	5	57.7	7.3
Xylene (total)	5	190	17.6

MW-7	TOGS GA (ug/L)	12/17/2013 (ug/L)	6/25/2014 (ug/L)
Benzene	1	87.3	158
Ethylbenzene	5	52	77.3
MTBE	10	1840	2500
Toluene	5	372	246
o-Xylene	5	156	115
Xylene (total)	5	421	334

GFMW-1	TOGS GA (ug/L)	6/25/2014 (ug/L)
Benzene	1	346
Ethylbenzene	5	54.6
MTBE	10	470
Toluene	5	1430
o-Xylene	5	144
Xylene (total)	5	338

MW-10	TOGS GA (ug/L)	12/17/2013 (ug/L)	6/25/2014 (ug/L)
Benzene	1	2360	3870
Ethylbenzene	5	720	703
Isopropylbenzene	5	35.6 J	35.7
MTBE	10	2710	6190
Toluene	5	2340	3990
o-Xylene	5	667	388
Xylene (total)	5	2270	1570

MW-6	TOGS GA (ug/L)	12/17/2013 (ug/L)	6/25/2014 (ug/L)
Benzene	1	13.5	13.9
MTBE	10	120	110
Toluene	5	5.9	3.7

GFMW-3	TOGS GA (ug/L)	6/25/2014 (ug/L)
Benzene	1	23.7

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158 West 29th Street, 9th Fl.
New York, NY 10001

511 West 21st Street
Block 693 Lot 23

FIGURE 8

EXCEEDANCES OF VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER SAMPLES

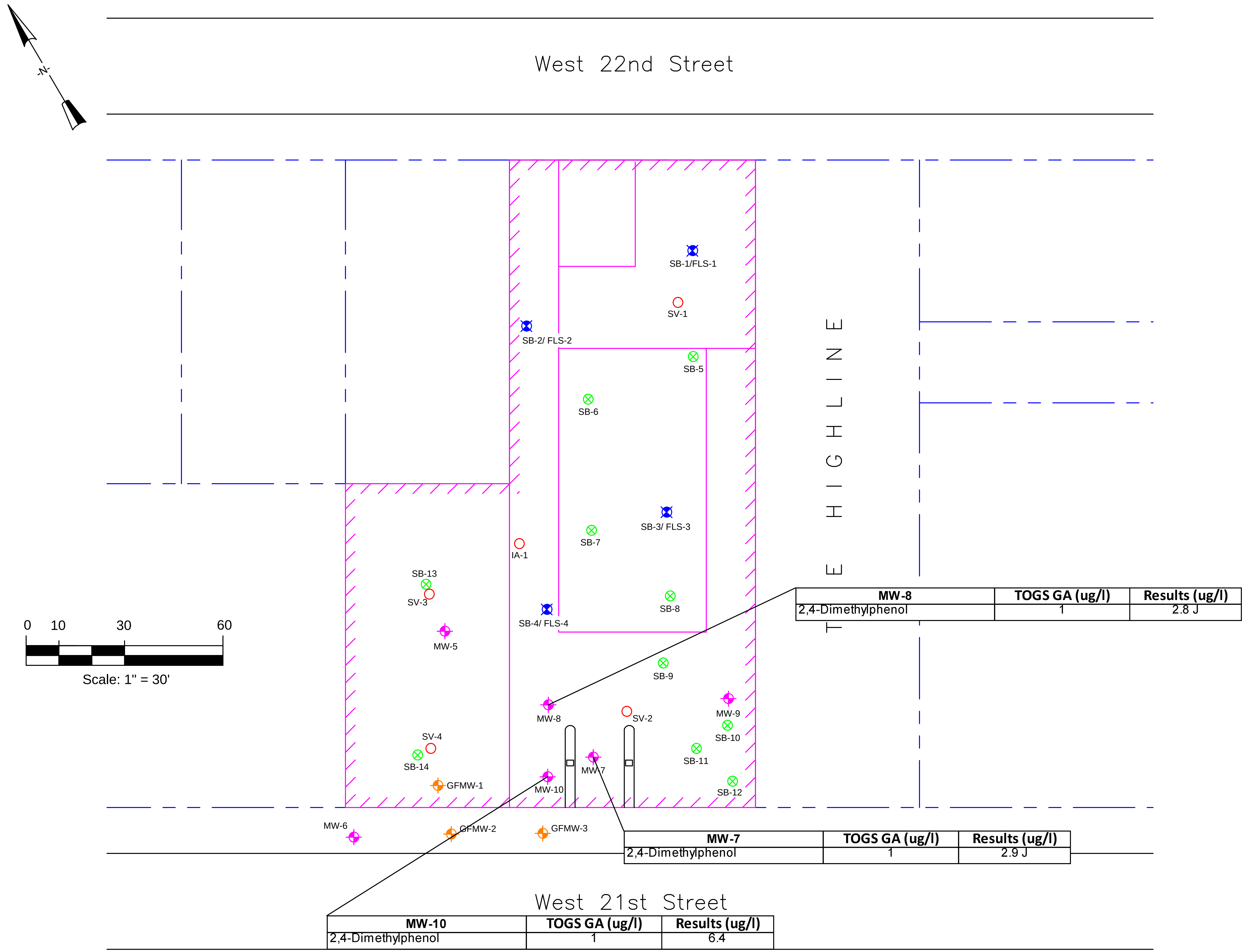
Date
July 2014

Project Number
10173-002

LEGEND

- PROPERTY LINES
- BUILDING OUTLINE
- SV-1 — SUB-SLAB SOIL VAPOR/ INDOOR AIR SAMPLE LOCATION
- SB-5 — SOIL BORING LOCATION
- SB-1/FLS-1 — FLS MONITORING WELL/ SOIL BORING LOCATION
- MW-5 — LBG MONITORING WELL LOCATION
- GFMW-1 — GF MONITORING WELL LOCATION
- TOGS GA (ug/L) 1.0 — NY TOGS CLASS GA GROUNDWATER STANDARDS (NYSDEC 6/2004)(TOGS GA)
- 12/17/2013 2360 — DATE OF SAMPLE COLLECTION AND SAMPLE RESULT
- 17.6 — SAMPLE RESULT EXCEEDING TOGS GA GROUNDWATER STANDARDS

FILE: P:\Project Files\10173 – Albanese Development Corp\002 – 511 West 21st Street\Figures\RAWP\FIG 8 – GW VOC Exceedances.dwg DATE: 2/6/2014



MW-8	TOGS GA (ug/l)	Results (ug/l)
2,4-Dimethylphenol	1	2.8 J

MW-7	TOGS GA (ug/l)	Results (ug/l)
2,4-Dimethylphenol	1	2.9 J

MW-10	TOGS GA (ug/l)	Results (ug/l)
2,4-Dimethylphenol	1	6.4

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New York, NY 10001

511 West 21st Street
Block 693 Lot 23

FIGURE 9

EXCEEDANCES OF SEMI-VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER SAMPLES

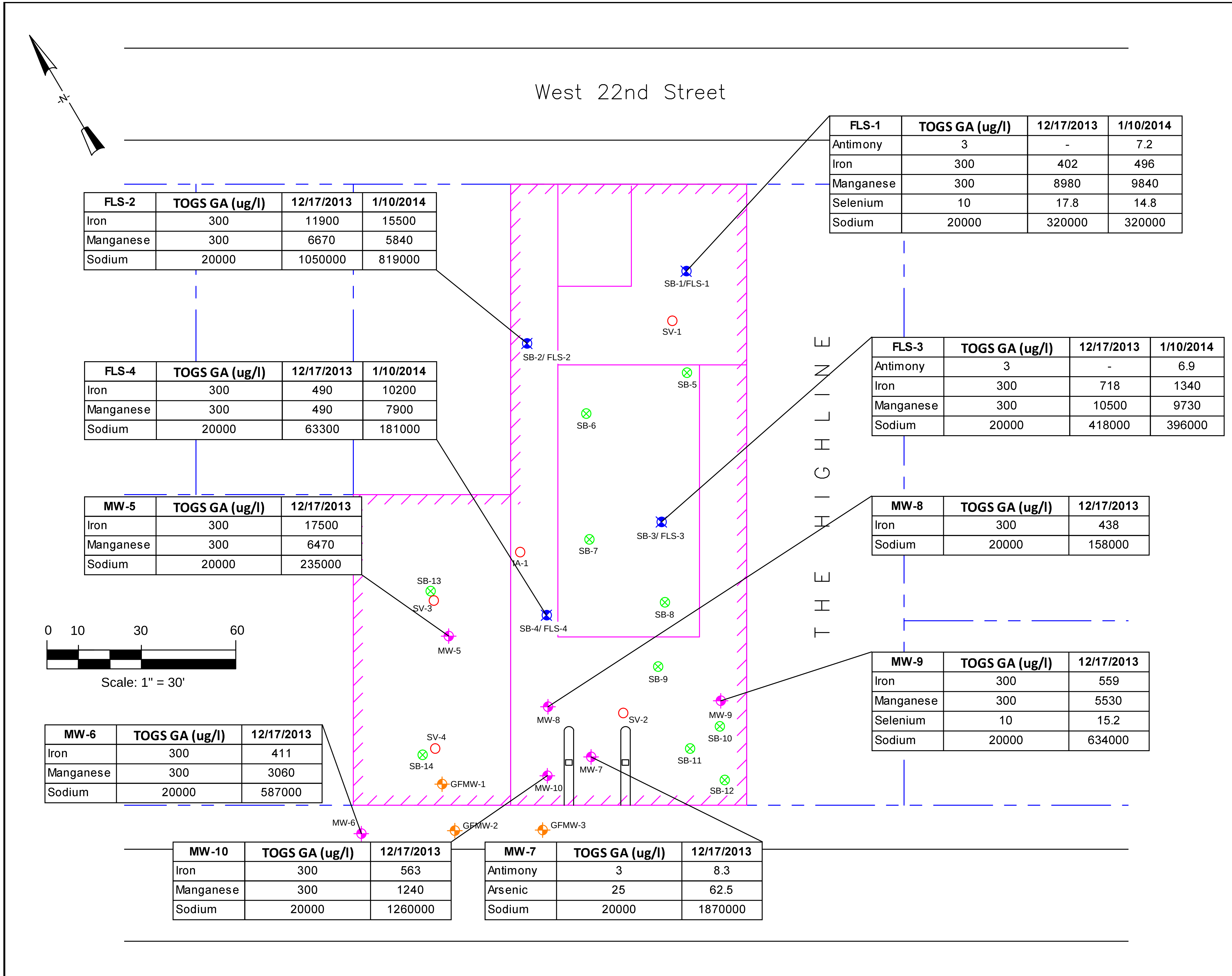
Date
June 2014

Project Number
10173-002

LEGEND

- PROPERTY LINES
- BUILDING OUTLINE
- SV-1 — SUB-SLAB SOIL VAPOR/ INDOOR AIR SAMPLE LOCATION
- SB-5 — SOIL BORING LOCATION
- SB-1/FLS-1 — FLS MONITORING WELL/ SOIL BORING LOCATION
- MW-5 — LBG MONITORING WELL LOCATION
- GFMW-1 — GF MONITORING WELL LOCATION
- TOGS GA (ug/l) 1 — NY TOGS CLASS GA GROUNDWATER STANDARDS (NYSDEC 6/2004)(TOGS GA)
- Result (ug/l) 2.9 J — SAMPLE RESULT EXCEEDING TOGS GA

FILE: P:\Project Files\10173 – Albanese Development Corp\002 – 511 West 21st Street\Figures\RAWP\FIG 9 – GW SVOC Exceedances.dwg DATE: 6/10/2014



FLS-1	TOGS GA (ug/l)	12/17/2013	1/10/2014
Antimony	3	-	7.2
Iron	300	402	496
Manganese	300	8980	9840
Selenium	10	17.8	14.8
Sodium	20000	320000	320000

FLS-2	TOGS GA (ug/l)	12/17/2013	1/10/2014
Iron	300	11900	15500
Manganese	300	6670	5840
Sodium	20000	1050000	819000

FLS-3	TOGS GA (ug/l)	12/17/2013	1/10/2014
Antimony	3	-	6.9
Iron	300	718	1340
Manganese	300	10500	9730
Sodium	20000	418000	396000

FLS-4	TOGS GA (ug/l)	12/17/2013	1/10/2014
Iron	300	490	10200
Manganese	300	490	7900
Sodium	20000	63300	181000

MW-5	TOGS GA (ug/l)	12/17/2013
Iron	300	17500
Manganese	300	6470
Sodium	20000	235000

MW-8	TOGS GA (ug/l)	12/17/2013
Iron	300	438
Sodium	20000	158000

MW-9	TOGS GA (ug/l)	12/17/2013
Iron	300	559
Manganese	300	5530
Selenium	10	15.2
Sodium	20000	634000

MW-6	TOGS GA (ug/l)	12/17/2013
Iron	300	411
Manganese	300	3060
Sodium	20000	587000

MW-10	TOGS GA (ug/l)	12/17/2013
Iron	300	563
Manganese	300	1240
Sodium	20000	1260000

MW-7	TOGS GA (ug/l)	12/17/2013
Antimony	3	8.3
Arsenic	25	62.5
Sodium	20000	1870000

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New York, NY 10001

511 West 21st Street
Block 693 Lot 23

FIGURE 10

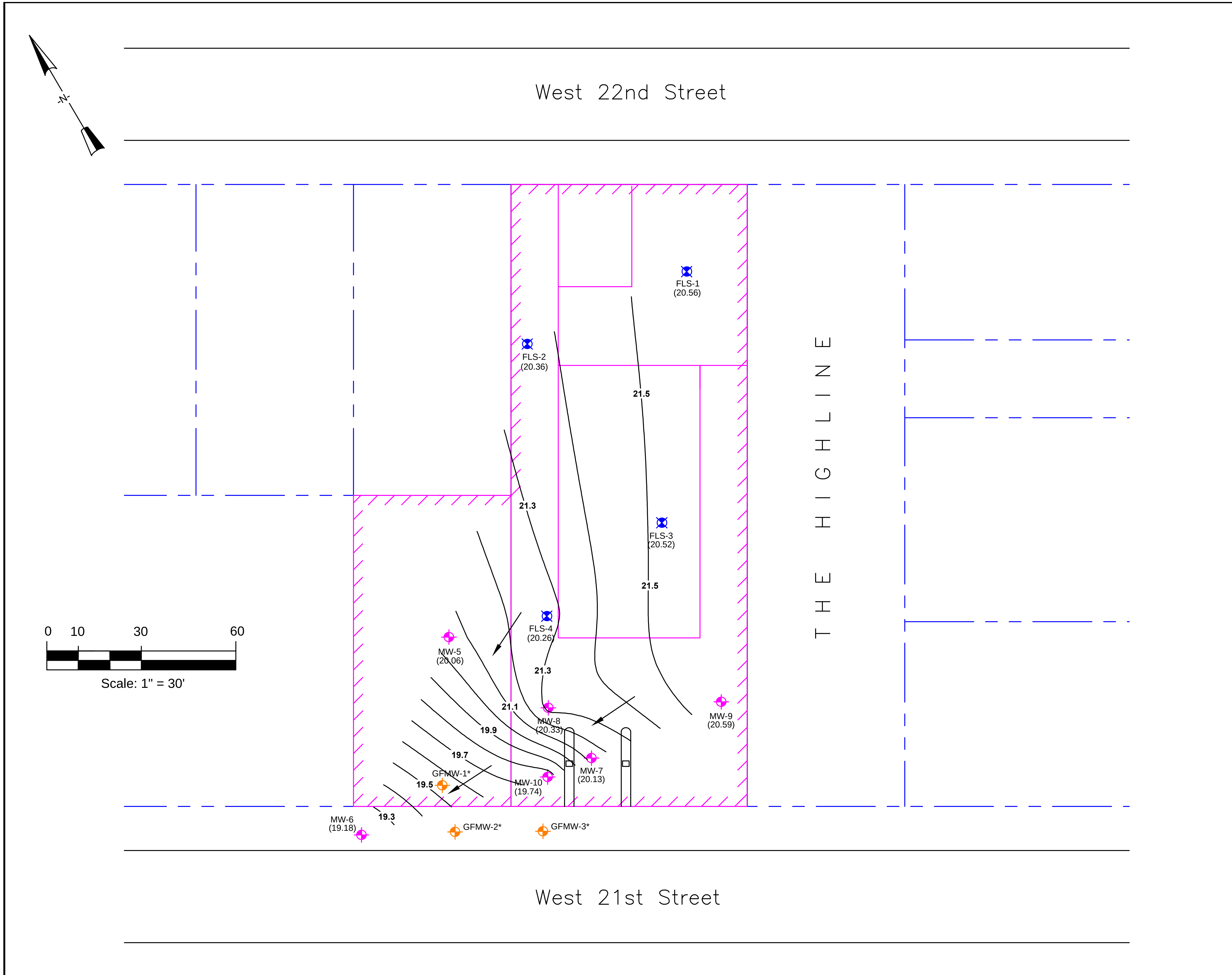
EXCEEDANCES OF METALS IN GROUNDWATER SAMPLES

Date
June 2014

Project Number
10173-002

LEGEND

- PROPERTY LINES
- BUILDING OUTLINE
- SV-1 — SUB-SLAB SOIL VAPOR/ INDOOR AIR SAMPLE LOCATION
- SB-5 — SOIL BORING LOCATION
- SB-1/FLS-1 — FLS MONITORING WELL/ SOIL BORING LOCATION
- MW-5 — LBG MONITORING WELL LOCATION
- GFMW-1 — GF MONITORING WELL LOCATION
- TOGS GA (ug/l) 300 — NY TOGS CLASS GA GROUNDWATER STANDARDS (NYSDEC 6/2004)(TOGS GA)
- 12/17/2013 559 — DATE OF SAMPLE COLLECTION AND SAMPLE RESULT EXCEEDING TOGS GA



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511 West 21st Street
Block 693 Lot 23

FIGURE 11

GROUNDWATER CONTOUR DIAGRAM - DECEMBER 2013

Date
June 2014

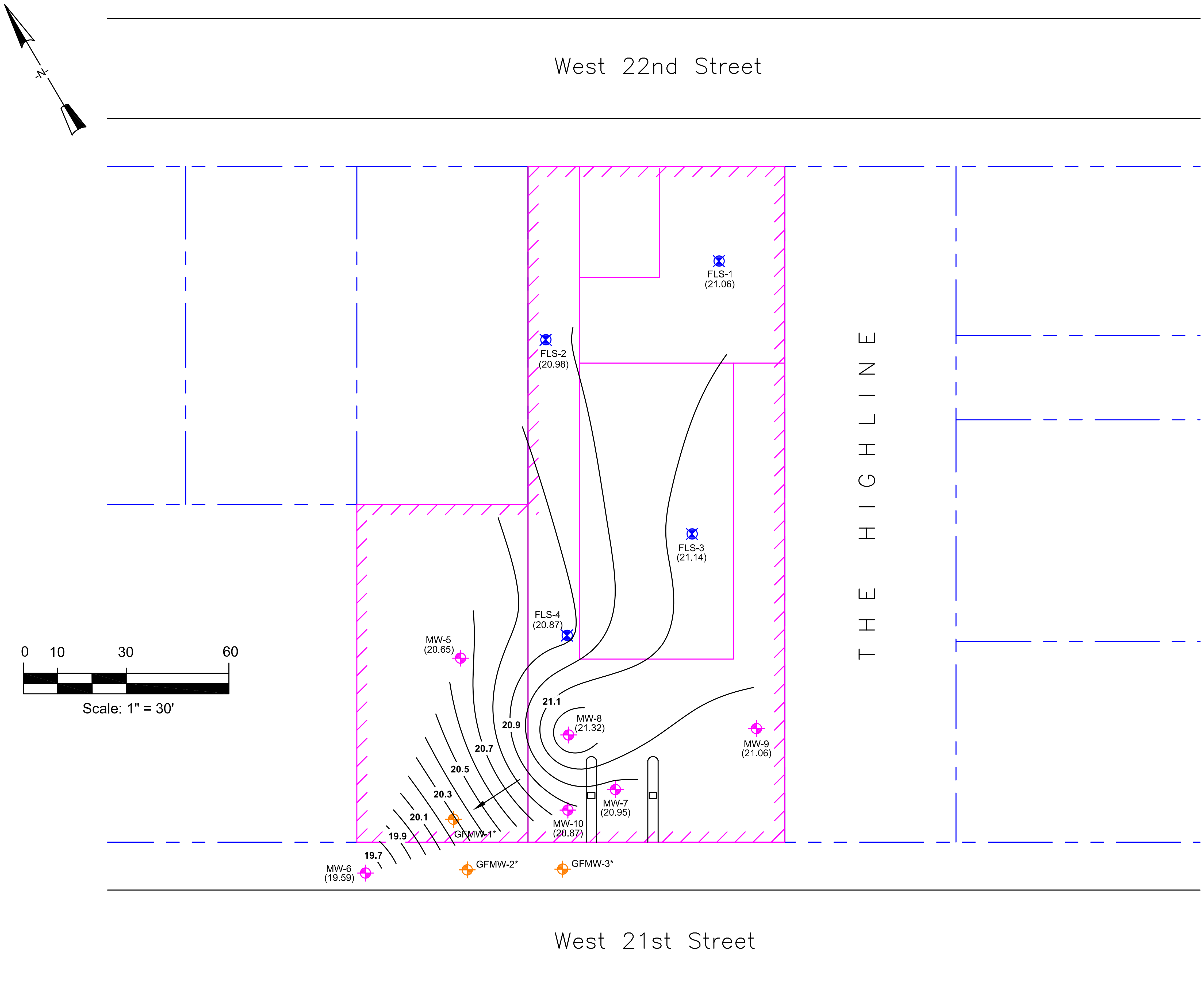
Project Number
10173-002

LEGEND

- PROPERTY LINES
- BUILDING OUTLINE
- FLS-1 (20.56) — FLS MONITORING WELL (GROUNDWATER ELEVATION)
- MW-5 (20.06) — LBG MONITORING WELL (GROUNDWATER ELEVATION)
- GFMW-1 — GF MONITORING WELL LOCATION
- 19.5 — GROUNDWATER ELEVATION (FEET)
- GROUNDWATER FLOW DIRECTION
- GFMW-1* — MONITORING WELL EXCLUDED FROM CONTOUR GENERATION

FILE: P:\Project Files\10173 – Albanese Development Corp\002 – 511 West 21st Street\Figures\RAWP\FIG 11 – Groundwater Contour Diagram Dec 2013.dwg DATE: 10/3/2014

FILE: P:\Project Files\10173 – Albanese Development Corp\002 – 511 West 21st Street\Figures\RAWP\FIG 12 – Groundwater Contour Diagram June 2014.dwg DATE: 10/3/2014



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New York, NY 10001

511 West 21st Street
Block 693 Lot 23

FIGURE 12

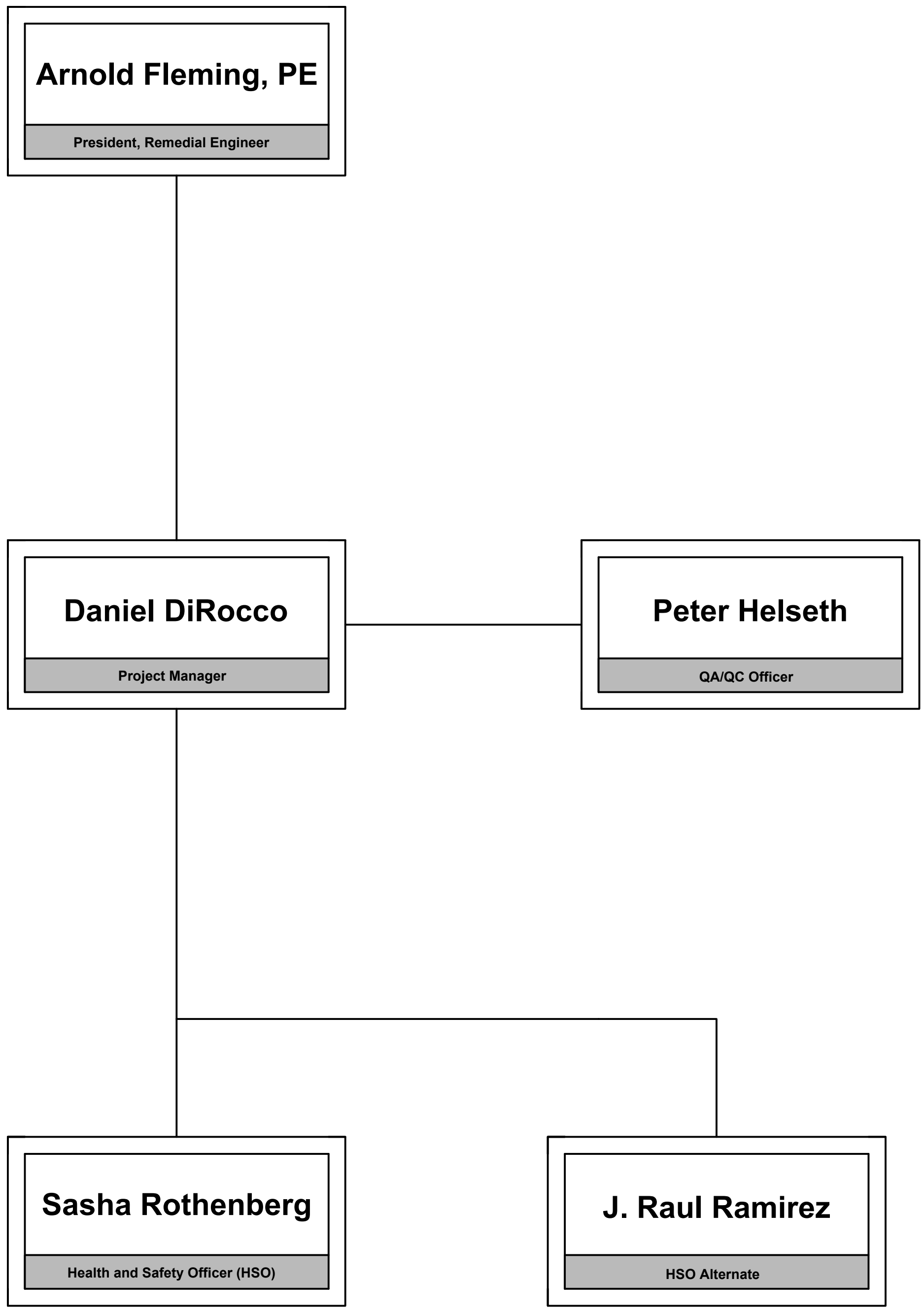
GROUNDWATER CONTOUR DIAGRAM - JUNE 2014

Date
October 2014

Project Number
10173-002

LEGEND

	PROPERTY LINES
	BUILDING OUTLINE
FLS–1 (20.56)	FLS MONITORING WELL (GROUNDWATER ELEVATION)
MW–5 (20.06)	LBG MONITORING WELL (GROUNDWATER ELEVATION)
GFMW–1	GF MONITORING WELL LOCATION
19.5	GROUNDWATER ELEVATION (FEET)
	GROUNDWATER FLOW DIRECTION
GFMW–1*	MONITORING WELL EXCLUDED FROM CONTOUR GENERATION



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New York, NY 10001

Date
October 2014

FIGURE 13

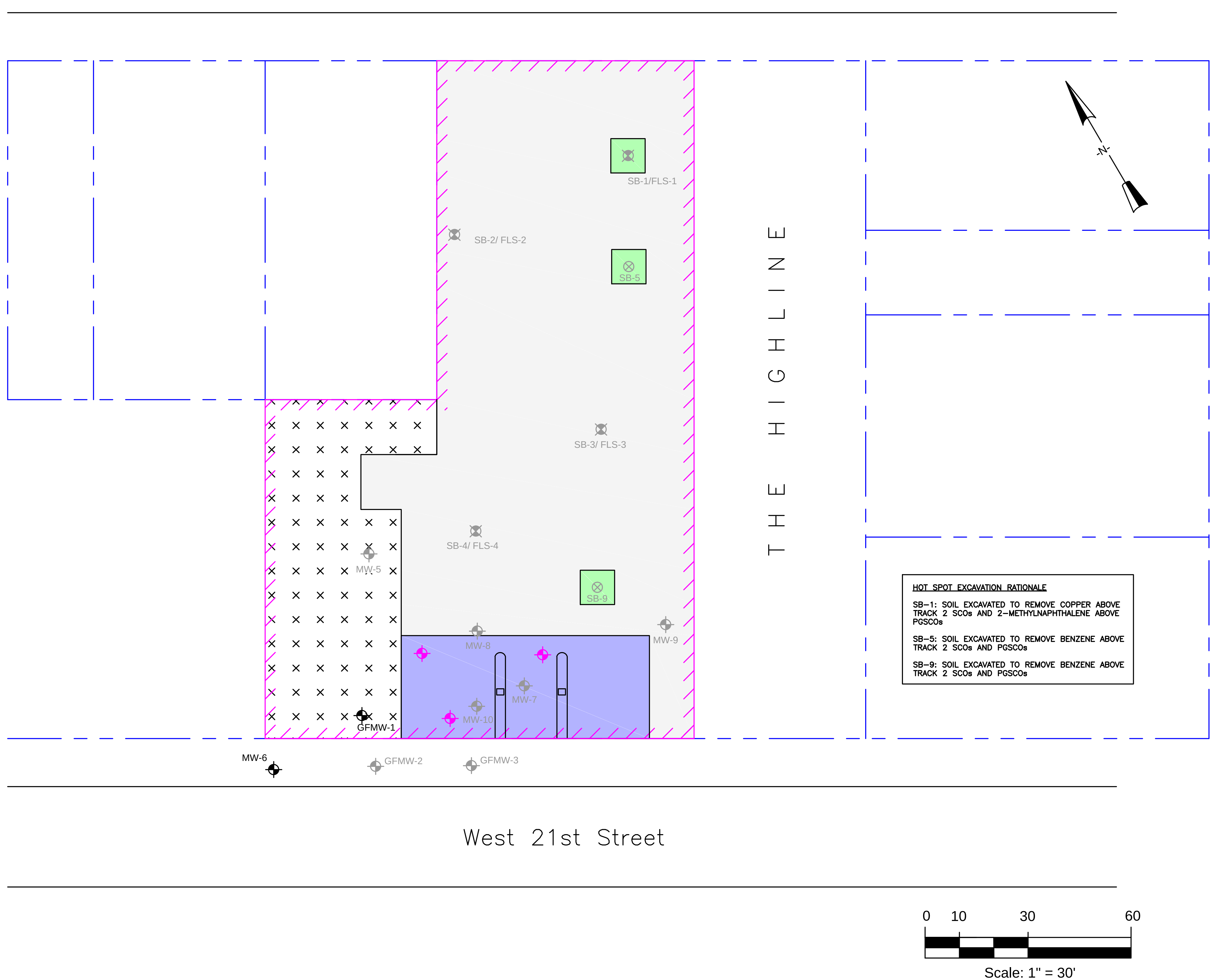
Project Number
10173-002

PROJECT ORGANIZATION CHART

511 West 21st Street
Block 693, Lot 23
BCP Site # C231080

FILE: P:\Project Files\10173 - Albanese Development Corp\002 - 511 West 21st Street\Figures\RAWP\FIG 13 - Project Organization Chart.dwg DATE: 10/6/2014

FILE: P:\Project Files\10173 – Albanese Development Corp\002 – 511 West 21st Street\Figures\RAWP\FIG 14 – Excavation Plan.dwg DATE: 10/6/2014



HOT SPOT EXCAVATION RATIONALE

SB-1: SOIL EXCAVATED TO REMOVE COPPER ABOVE TRACK 2 SCOs AND 2-METHYLNAPHTHALENE ABOVE PGSCOs

SB-5: SOIL EXCAVATED TO REMOVE BENZENE ABOVE TRACK 2 SCOs AND PGSCOs

SB-9: SOIL EXCAVATED TO REMOVE BENZENE ABOVE TRACK 2 SCOs AND PGSCOs

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New York, NY 10001

511 West 21st Street
Block 693 Lot 23

FIGURE 14

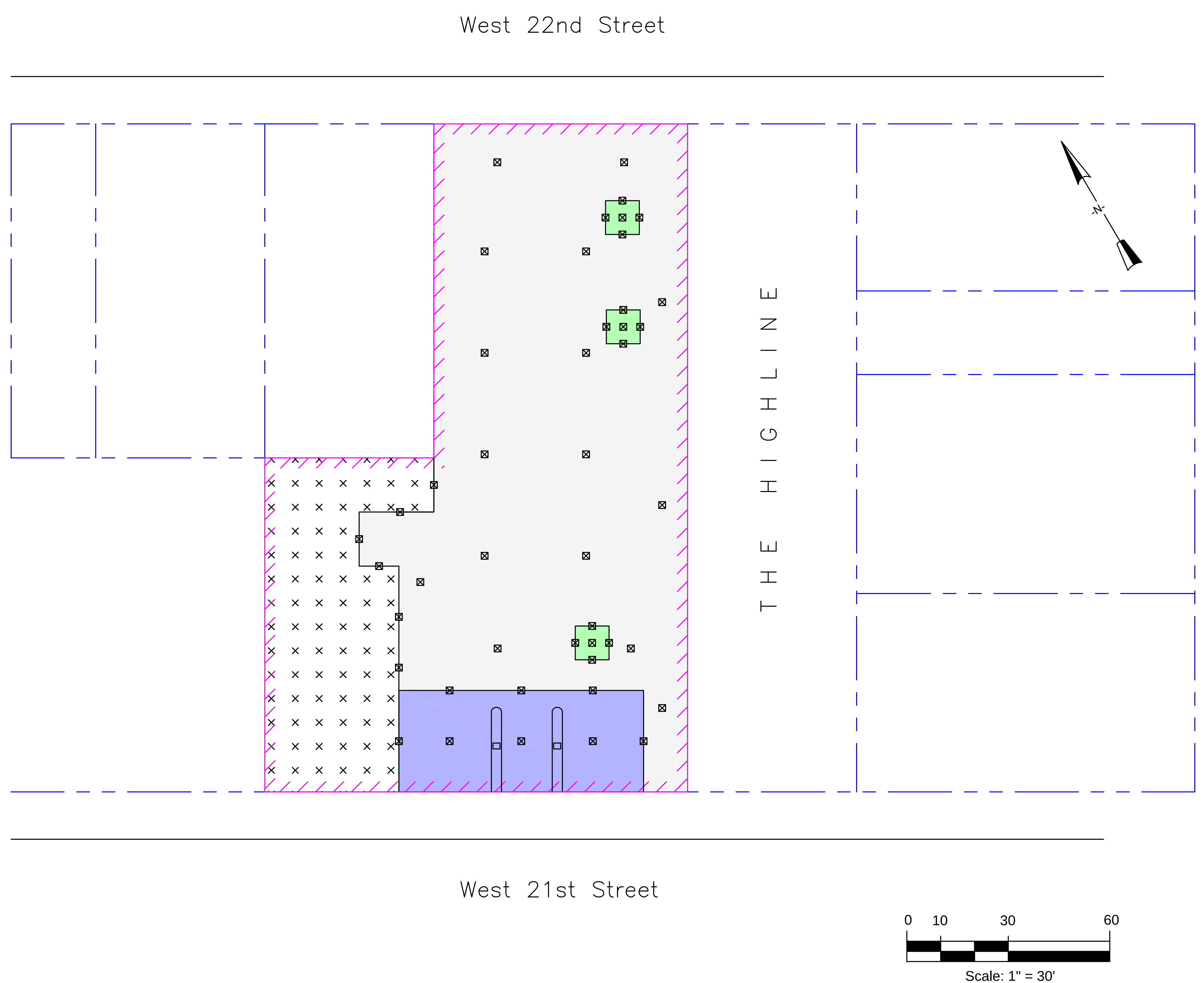
EXCAVATION PLAN

Date
October 2014

Project Number
10173-002

LEGEND

- PROPERTY LINES
- BUILDING OUTLINE
- NEW SLAB DEPTH PLUS 2 FT. EXCAVATION
- EXISTING SLAB TO REMAIN
- HOT SPOT EXCAVATION TO TRACK 2 SCOs
- PETROLEUM IMPACTED EXCAVATION TO TRACK 2 SCOs
- MONITORING WELL TO BE ABANDONED
- MONITORING WELL TO REMAIN
- NEW MONITORING WELL TO BE INSTALLED POST CONSTRUCTION



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New York, NY 10001

511 West 21st Street
Block 693 Lot 23

FIGURE 15

END-POINT SAMPLE LOCATION MAP

Date
October 2014

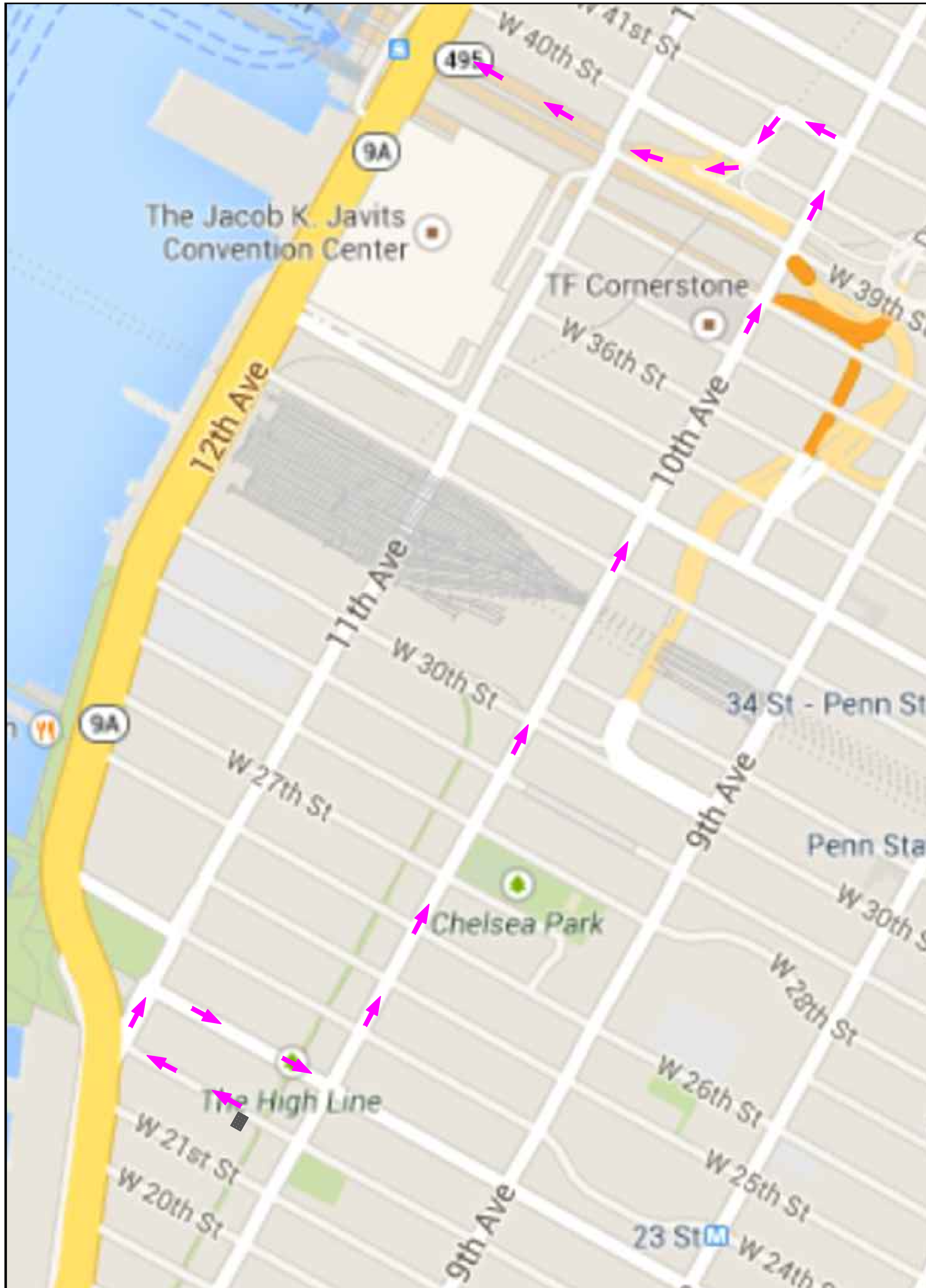
Project Number
10173-002

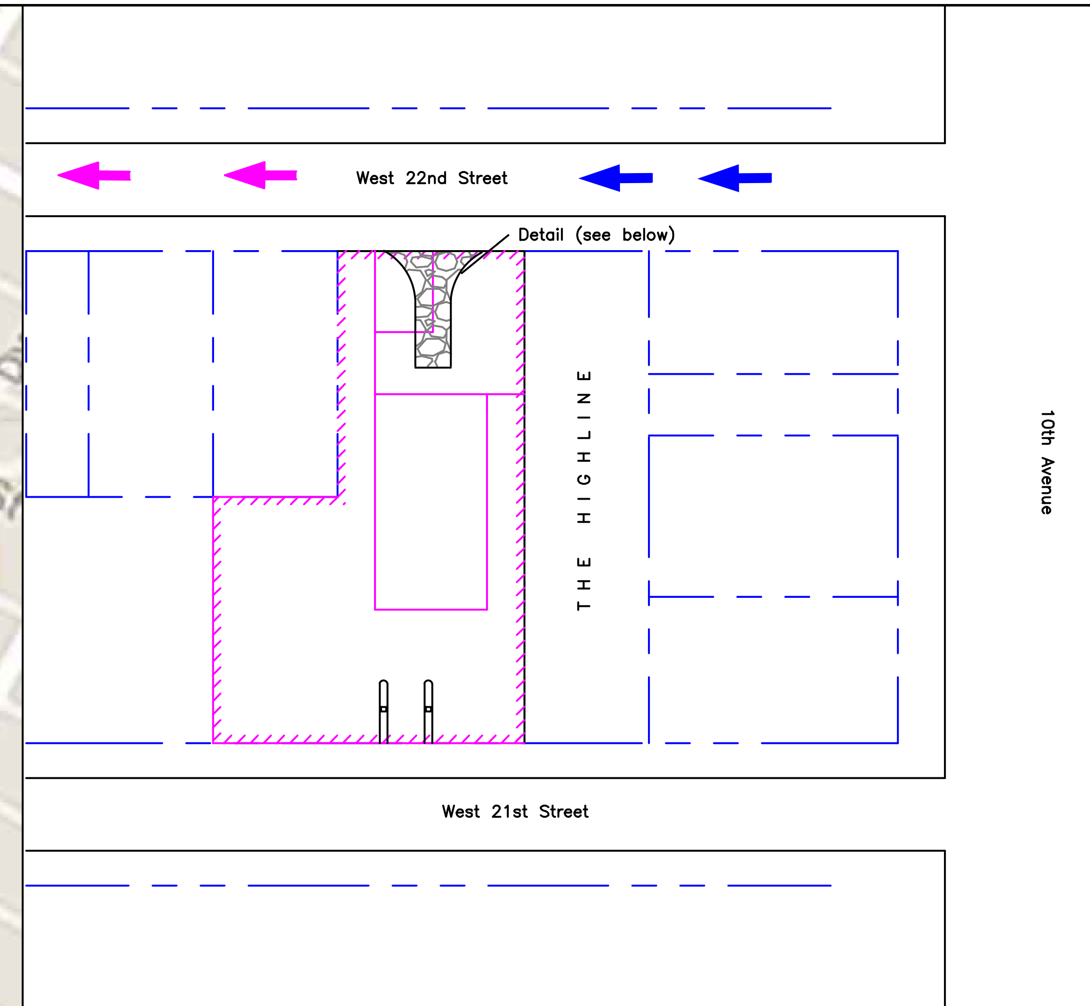
LEGEND

- PROPERTY LINES
- BUILDING OUTLINE
- NEW SLAB DEPTH PLUS 2 FT. EXCAVATION
- EXISTING SLAB TO REMAIN
- HOT SPOT EXCAVATION TO TRACK 2 SCOs
- PETROLEUM IMPACTED EXCAVATION TO TRACK 2 SCOs
- END POINT SAMPLE

FILE: P:\Project Files\10173 – Albanese Development Corp\002 – 511 West 21st Street\Figures\RAWP\FIG 15 – End-Point Sample Location.dwg DATE: 10/3/2014

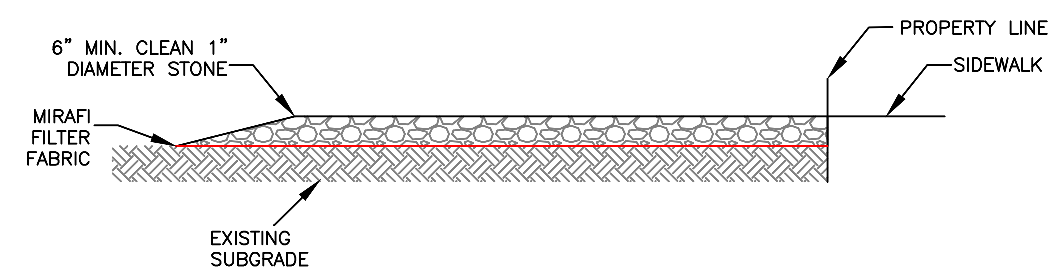
FILE: P:\Project Files\10173 – Albanese Development Corp\002 – 511 West 21st Street\Figures\RAWP\FIG 16 – Truck Transport Route.dwg DATE: 1/7/2015





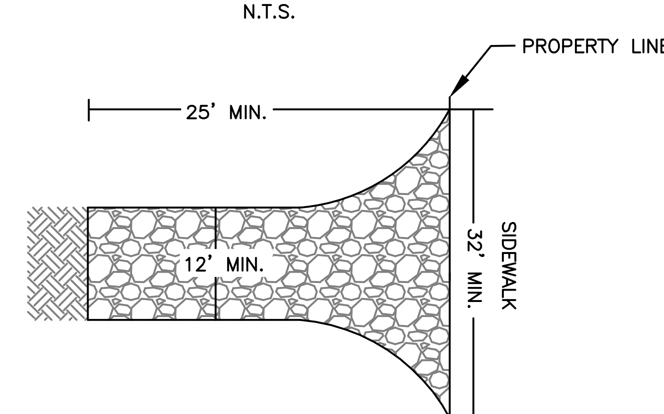
CROSS SECTION

N.T.S.



PLAN VIEW

N.T.S.



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New York, NY 10001

511 West 21st Street
Block 693 Lot 23

FIGURE 16

TRUCK TRANSPORT ROUTE AND CONSTRUCTION ENTRANCE DETAIL

Date
October 2014

Project Number
10173-002

LEGEND

- PROPERTY LINES
- BUILDING OUTLINE
- TRUCK INSPECTION PAD
- ENTRANCE ROUTE
- EXIT ROUTE

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New York, NY 10001

511 West 21st Street
Block 693 Lot 23

FIGURE 17

SELECTED SITE REMEDY COMPOSITE COVER SYSTEM

Date
October 2014

Project Number
10173-002

LEGEND

- PROPERTY LINES
- BUILDING OUTLINE
- TRACK 2 REMEDY WITH NEW SLAB
- TRACK 4 REMEDY WITH EXISTING SLAB TO REMAIN

FILE: P:\Project Files\10173 – Albanese Development Corp\002 – 511 West 21st Street\Figures\RAWP\FIG 17 – Composite Cover System Design.dwg DATE: 10/14/2014

APPENDIX A

Metes and Bounds

SCHEDULE A DESCRIPTION
Amended 12/21/2011

File No.: **LSA-NY-9030**

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

BEGINNING at a point on the northerly side of West 21st Street, distant 150 feet westerly from the corner formed by the intersection of the said northerly side of West 21st Street with the westerly side of Tenth Avenue;

RUNNING THENCE westerly along the said northerly side of 21st Street, 125 feet;

THENCE northerly and parallel with the westerly side of Tenth Avenue, 98 feet 9 inches to the center line of the block;

THENCE easterly along the center line of the block 50 feet;

THENCE northerly and parallel with the said westerly side of Tenth Avenue, 98 feet 9 inches to the southerly side of West 22nd Street;

THENCE easterly along the said southerly side of West 22nd Street, 75 feet;

THENCE southerly and parallel with the said westerly side of Tenth Avenue, 197 feet 6 inches to the northerly side of West 21st Street at the point or place of BEGINNING.

Together with development rights conveyed pursuant to that certain Zoning Lot Development Agreement (CRFN: 2007000469743) dated August 6, 2007 made between J Hotels Fee Owner LLC and 204 Lafayette S. Properties, LLC duly recorded in the Office of the City Register, New York County.

APPENDIX B

NYSDEC Significant Threat Determination Letter

New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau B, 12th Floor
625 Broadway, Albany, New York 12233-7016
Phone: (518) 402-9768 • **Fax:** (518) 402-9773
Website: www.dec.ny.gov

Joe Martens
Commissioner

November 25, 2014

510 West 22nd Street Partners LLC
C/o Albanese Development Corporation
1050 Franklin Avenue
Garden City, NY 11530
Attention: Martin Dettling

Re: Remedial Investigation Report for
511 West 21st Street Site ("Site")
Site ID No.: C231080
New York County, New York

Dear Mr. Dettling:

The New York State Department of Environmental Conservation and the New York State Department of Health have reviewed the final Remedial Investigation Report (RIR), dated October 10, 2014, for the 511 West 21st Street BCP Site at 511 West 21st Street in New York, NY. Based on this review, the RIR is hereby approved.

Should you have any questions regarding this communication, please call me at (518) 402-9768 or at 1-888-212-9586.

Sincerely,

Project Manager

ec: J. Brown
J. O'Connell
L. Oliva
S. Karpinski
J. Deming
M. Chertok
A. Fleming
P. Helseth
D. DiRocco

(Fact Sheet Begins Next)

Act Now to Continue Receiving Information About This Site!

DEC's Division of Environmental Remediation (DER) now distributes information about contaminated sites *electronically by email*.

If you would like to continue to receive information about the contaminated site featured in this fact sheet:

You must sign up for the DER email listserv:

www.dec.ny.gov/chemical/61092.html

DER cannot register your email address - only the email address owner can do so. If you already have signed up for the listserv for the county in which the site is located, you need do nothing.

Why You Should Go "Paperless":

- Get site information faster and share it easily;
- Receive information about all sites in a chosen county - read what you want, delete the rest;
- It helps the environment and stretches your tax dollars.

If "paperless" is not an option for you, call or write to the DER project manager identified in this fact sheet. Indicate that you need to receive paper copies of fact sheets through the Postal Service. Include the site name in your correspondence. The option to receive paper is available to individuals only. Groups, organizations, businesses, and government entities are assumed to have email access.

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New York State Department of Environmental Conservation

October 2014

FACT SHEET

Brownfield Cleanup Program

Receive Site Fact Sheets by *Email.* See "For More Information" to Learn How.

Site Name: 511 West 21st Street
DEC Site #: C231080
Address: 511 West 21st Street
NewYork, NY 10011

Have questions? See "Who to Contact" Below

Report Recommends Cleanup of Brownfield Site Contamination

The New York State Department of Environmental Conservation (NYSDEC) is reviewing the Remedial Investigation Report for the 511 West 21st Street site ("site") located at 511 West 21st Street, New York, NY. Please see the map for the site location. Documents related to the cleanup of this site can be found at the location(s) identified below under "Where to Find Information."

Remedial Investigation Report

NYSDEC is reviewing the "Remedial Investigation Report" that was submitted by 510 West 22nd Street Partners LLC ("applicant(s)"). The report describes the results of the site investigation and recommends development of a remedy to address the contamination that was found.

Based on the findings of the investigation, NYSDEC, in consultation with the New York State Department of Health (NYSDOH), has determined that the site does not pose a significant threat to public health or the environment.

Highlights of the Remedial Investigation Report

An initial Phase I Environmental Site Assessment was conducted in May 2007, a Phase II Subsurface Investigation in August 2008 and an additional Phase I Environmental Site Assessment in November 2011. The Remedial Investigation was conducted in December 2013-June 2014.

The primary contaminants of concern at the site include some metals, semi-volatile organic compounds (specifically polycyclic aromatic hydrocarbon [PAHs]), and volatile organic compounds (e.g., petroleum related products and methylene chloride) mostly in shallow soil (0-5 feet). Analytical results from soils sampling reported metals (e.g., copper, mercury) and PAHs above Commercial Use Soil Cleanup Objectives (SCOs) and Protection of Groundwater SCOs, as well as petroleum-related products (e.g., benzene, ethylbenzene and toluene) and a methylene chloride above Protection of Groundwater SCO's.

Groundwater sampling indicates petroleum-related products, semi-volatile organic compounds (e.g.,2,4-Dimethylphenol) and metals (e.g., antimony and arsenic) contamination above groundwater standards (depth to groundwater at 6-7 feet below ground surface).

Methylene chloride was detected in indoor air at concentrations below the NYSDOH Air Guideline Value and in sub-slab vapor. Also, elevated petroleum-related compounds, methyl ethyl ketone and dichlorodifluoromethane were also detected in sub-slab soil vapor. While there is currently no standard or guidance addressing the particular contaminants, these elevated levels have a potential to impact indoor air in the building through soil vapor intrusion.

Next Steps

NYSDEC will complete its review, make any necessary revisions and, if appropriate, approve the investigation report. The approved report will be made available to the public (see "Where to Find Information" below). The applicant(s) may then develop a cleanup plan, called a "Remedial Work Plan." This plan describes how contamination will be addressed, with NYSDEC and NYSDOH overseeing the work. NYSDEC will present the draft cleanup plan to the public for its review and comment during a 45-day comment period.

NYSDEC will keep the public informed throughout the investigation and cleanup of the site.

Background

Location: The Brownfield Cleanup Program (BCP) site is located at 511 West 21st Street in Manhattan, NY. The property is bound by West 21st Street to the south and West 22nd Street to the north between 10th Avenue and 11th Avenue in Manhattan. The property has frontage on the north side of West 21st Street and the south side of West 22nd Street.

Site Features: The site is approximately 0.45 acres in size, and includes a vacant 5-story parking garage building with a 1-story annex in the southwest corner. The property is flat with average elevation approximately 10 feet above mean sea level, and the elevated High Line Park runs along the eastern property boundary.

Current Zoning and Land Use: The area is zoned for manufacturing and commercial use and the City's zoning code for the site is M1-5.

Past Use of the Site: The site has been used for manufacturing by a gas meter company and also as a service station. Most recently it has been used by a television cable company for vehicle parking and maintenance, storage and offices.

Site Geology and Hydrogeology: The site is underlain by historic fill. Native soils beneath the fill layer consist of organic silty clay of estuarine origin as well as sand and silt of glacial origin. The depth-to-bedrock varies from approximately 33 feet below grade at the northern end of the site to 65 feet below grade at the southern end of the site.

The depth-to-groundwater at the site is approximately 6 to 7 feet below sidewalk grade and the local groundwater flow direction is to the southwest.

Additional site details, including environmental and health assessment summaries, are available on NYSDEC's website at:
http://www.dec.ny.gov/cfmx/extapps/derexternal/haz/details.cfm?pageid=3&progno=C231080

Brownfield Cleanup Program: New York's Brownfield Cleanup Program (BCP) encourages the voluntary cleanup of contaminated properties known as "brownfields" so that they can be reused and redeveloped. These uses may include recreation, housing, business or other uses.

A **brownfield** is any real property that is difficult to reuse or redevelop because of the presence or potential presence of contamination.

For more information about the BCP, visit: **http://www.dec.ny.gov/chemical/8450.html**

FOR MORE INFORMATION

Where to Find Information

Project documents are available at the following location(s) to help the public stay informed.

Muhlenberg Library
209 West 23rd Street
New York, NY 10011-2379
phone: 212-924-1585

Who to Contact

Comments and questions are always welcome and should be directed as follows:

Project-Related Questions
Javier Perez-Maldonado
Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway
Albany, NY 12233-7016
Tel: 518-402-9768
Email: javier.perez-maldonado@dec.ny.gov

Site-Related Health Questions
Steve Karpinski
New York State Department of Health
Bureau of Environmental Exposure Investigation
Empire State Plaza, Corning Tower, Room 1787
Albany, NY 12237
Tel: 518-402-7860
Email: BEEI@health.ny.gov

We encourage you to share this fact sheet with neighbors and tenants, and/or post this fact sheet in a prominent area of your building for others to see.

Receive Site Fact Sheets by Email

Have site information such as this fact sheet sent right to your email inbox. NYSDEC invites you to sign up with one or more contaminated sites county email listservs available at the following web page: http://www.dec.ny.gov/chemical/61092.html. It's quick, it's free, and it will help keep you *better informed*.

As a listserv member, you will periodically receive site-related information/announcements for all contaminated sites in the county(ies) you select.

Note: Please disregard if you already have signed up and received this fact sheet electronically.

Figure 1

Site Location Map

511 West 21st Street Site
New York, New York
Site No. C231080

APPENDIX C

Community Air Monitoring Plan

Community Air Monitoring Plan

511 W. 21st St, New York, New York

As required by the New York State Department of Health (NYSDOH) real-time air monitoring for volatile organic compounds (VOCs) and particulate levels will be implemented at the Site during intrusive activities, such as soil excavation, advancement of soil borings and installation of groundwater monitoring wells. As currently proposed, the bulk of the initial work will be conducted within the confines of the building and therefore there are no routes of exposure to the surrounding properties. A photo-ionization detector (PID) will be used to provide continuous indoor air monitoring for VOCs during the duration of the interior field work. This will also include additional periodic monitoring during sample collection which will consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap, monitoring during well bailing/purging, and taking a reading prior to leaving a sample location. Dust levels will be visually monitored and if visible dust is noted the appropriate dust suppression measures will be implemented.

If project related tasks are conducted exterior to the building, real-time air monitoring for 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 exterior non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. Depending upon the proximity of potentially exposed individuals, continuous monitoring may be performed during sampling activities. Any observed detections exceeding action levels during performance of the CAMP will be reported to the New York State Department of Environmental Conservation (NYSDEC) Project Manager and included in the Monthly Report.

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

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

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

Particulate Monitoring and Actions

During exterior activities, 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/m3 of the upwind level and in preventing visible dust migration.

All readings will be recorded and be available for NYSDEC personnel to review. 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 no visible dust is migrating from the work area. If, after implementation of dust suppression techniques, visible dust is still migrating from the work area, work will be stopped and re-evaluation of activities initiated. Work will resume provided that dust suppression measures and other controls are successful in preventing visible dust migration.

APPENDIX D

Citizen Participation Plan

New York State Department of Environmental Conservation

Brownfield Cleanup Program

Citizen Participation Plan
for
511 West 21st Street
BCP Site #C231080

511 West 21st Street Site
511 West 21st Street
New York, NY
BCP# C231080

October 2014

Contents

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Note: The information presented in this Citizen Participation Plan was current as of the date of its approval by the New York State Department of Environmental Conservation. Portions of this Citizen Participation Plan may be revised during the brownfield Site's remedial process.

Applicants: **510 West 22nd Street Partners LLC c/o Albanese Development Corporation, 1050 Franklin Avenue, Garden City, New York, 11530**

Site Name: **511 West 21st Street Site**

Site Address: **511 West 21st Street**

Site County: **New York**

Site Number: **BCP # C231080**

1. What is New York's Brownfield Cleanup Program?

New York's Brownfield Cleanup Program (BCP) is designed to encourage the private sector to investigate, remediate (clean up) and redevelop brownfields. A brownfield is any real property where redevelopment or reuse may be complicated by the presence or potential presence of a contaminant. A brownfield typically is a former industrial or commercial property where operations may have resulted in environmental contamination. A brownfield can pose environmental, legal and financial burdens on a community. If the brownfield is not addressed, it can reduce property values in the area and affect economic development of nearby properties.

The BCP is administered by the New York State Department of Environmental Conservation (NYSDEC) which oversees Applicants that conduct brownfield Site remedial activities.[1] An Applicant is a person whose request to participate in the BCP has been accepted by NYSDEC. The BCP contains investigation and remediation (cleanup) requirements, ensuring that cleanups protect public health and the environment. When NYSDEC certifies that these requirements have been met, the property can be reused or redeveloped for the intended use.

For more information about the BCP, go online at: **www.dec.ny.gov/chemical/8450.html.**

2. Citizen Participation Plan Overview

This Citizen Participation (CP) Plan provides members of the affected and interested public with information about how NYSDEC will inform and involve them during the investigation and remediation of the Site identified above. The public information and involvement program will be carried out with assistance, as appropriate, from the Applicant.

Appendix A contains a map identifying the location of the Site.

[1] "Remedial activities", "remedial action", and "remediation" are defined as all activities or actions undertaken to eliminate, remove, treat, abate, control, manage, or monitor contaminants at or coming from a brownfield Site.

Project Contacts

Appendix B identifies NYSDEC project contact(s) to which the public should address questions or request information about the Site's remedial program. The public's suggestions about this CP Plan and the CP program for the Site are always welcome. Interested people are encouraged to share their ideas and suggestions with the project contacts at any time.

Document Repositories

The locations of the Site's document repositories also are identified in Appendix B. The document repositories provide convenient access to important project documents for public review and comment.

Site Contact List

Appendix C contains the brownfield Site contact list. This list has been developed to keep the community informed about, and involved in, the Site's investigation and remediation process. The brownfield Site contact list will be used periodically to distribute fact sheets that provide updates about the status of the project. These will include notifications of upcoming remedial activities at the Site (such as fieldwork), as well as availability of project documents and announcements about public comment periods.

The brownfield Site contact list includes, at a minimum:

- chief executive officer and official(s) principally involved with relevant zoning and planning matters of each county, city, town and village in which the Site is located;
- residents, owners, and occupants of the Site and properties adjacent to the Site;
- the public water supplier which services the area in which the Site is located;
- any person who has requested to be placed on the Site contact list;
- the administrator of any school or day care facility located on or near the Site for purposes of posting and/or dissemination of information at the facility;
- location of document repositories.

Where the Site or adjacent real property contains multiple dwelling units, the Applicant will work with NYSDEC to develop an alternative method for providing such notice in lieu of mailing to each individual. For example, the owner of such a property that contains multiple dwellings may be requested to prominently display fact sheets and notices required to be developed during the Site's remedial process. This procedure would substitute for the mailing of such notices and fact sheets, especially at locations where renters, tenants and other residents may number in the hundreds or thousands, making the mailing of such notices impractical.

The brownfield Site contact list will be reviewed periodically and updated as appropriate. Individuals and organizations will be added to the Site contact list upon request. Such requests should be submitted to the NYSDEC project contact(s) identified in Appendix B. Other additions to the brownfield Site contact list may be made on a Site-specific basis at the discretion of the NYSDEC project manager, in consultation with other NYSDEC staff as appropriate.

CP Activities

Appendix D identifies the CP activities, at a minimum, that have been and will be conducted during the Site's remedial program. The flowchart in Appendix E shows how these CP activities integrate with the Site remedial process. The public is informed about these CP activities through fact sheets and notices developed at significant points in the Site's remedial process.

- **Notices and fact sheets** help the interested and affected public to understand contamination issues related to a brownfield Site, and the nature and progress of efforts to investigate and remediate a brownfield Site.

- **Public forums, comment periods and contact with project managers** provide opportunities for the public to contribute information, opinions and perspectives that have potential to influence decisions about a brownfield Site's investigation and remediation.

The public is encouraged to contact project staff at any time during the Site's remedial process with questions, comments, or requests for information about the remedial program.

This CP Plan may be revised due to changes in major issues of public concern identified in Section 6 or in the nature and scope of remedial activities. Modifications may include additions to the brownfield Site contact list and changes in planned citizen participation activities.

3. Site Information

Site Description

The subject property is in New York, New York. It is bound by West 21st Street to the south and West 22nd Street to the north, between 10th Avenue and 11th Avenues. The property is flat with average elevation approximately 10 feet (Manhattan Datum - 2.75 feet above National Geodetic Vertical Datum). It is served by New York City public utilities. The elevated High Line Park runs along the eastern property boundary.

The property is an L-shaped lot encompassing 19,750 ft^2. It fronts the north side of West 21st Street and the south side of West 22nd Street. A vacant, 88,030 gross square foot, 5-story parking garage with a 1-story annex occupy the property.

The Site is in an area of Manhattan zoned by the New York City Department of City Planning for manufacturing and commercial use. The City's zoning code for the Site is M1-5, which is a manufacturing district. This zoning allows as-of-right all of the uses proposed by the project.

The Site is underlain by urban and disturbed fill. Native soils beneath the fill layer consist of organic silty clay of estuarine origin as well as sand and silt of glacial origin. The depth- to bedrock varies from approximately 33 feet below grade at the northern end of the Site to 65 feet below grade at the southern end of the Site. Published geologic data indicates that the Site is underlain with mica schist that is known as the Manhattan Schist. The Manhattan Schist is a mass of metamorphic rock covering the deeper limestone stratum which is the firm bedrock providing the foundation for New York City's skyscrapers. The depth- to -groundwater at the Site is approximately 6 to 7 feet below sidewalk grade. The previous investigations indicated that the local groundwater flow direction is to the southwest.

Site History

Sanborn maps from the 1800s indicate a gas meter factory at the Site. According to The American Gas Light Journal of July 1909, a gas meter manufacturer occupied the Site from 1836 until 1863 as Down and Merryfield. After 1863, three gas meter companies merged into The American Gas Meter Company, continuing operations in Manhattan through 1909, though not at this Site. Around 1900, site operators included the Atlantic Macaroni Company, the Industrial Development Company, another unidentified factory and a sculptor.

The parking garage building was constructed in 1919, but there is little information available regarding site operators until it was leased to Manhattan Cable TV in 1988. The Site was later occupied by Time Warner Cable in 1991. Time Warner vacated the building in 2008. The Site was purchased by 510 West 22nd Street Partners LLC in 2012. The site owner, 510 West 22nd Street Partners LLC, entered into the BCP in 2013.

Environmental History

The Site is confirmed to have soil and groundwater contaminated with benzene, toluene, ethylbenzene, and xylenes (BTEX), and methyl-tert butyl ether (MTBE). Elevated Mercury was also identified in one area of the Site, which may be derived from manufacturing operations on the Site in the 1800s. The Site is also suspected to contain additional metals contamination from these operations. In addition, there are potential additional petroleum impacts from historical auto maintenance on the Site, and from an open spill case on an adjoining site.

Two spills have been reported at this site. One spill from 1989 has been closed. Spill No. 00-10394 is still open. Leaking underground storage tanks (USTs) and/or piping resulted in gasoline contamination of soil and groundwater at the site. UST removal was completed in 2007. Endpoint samples confirm contamination left onsite along the 21st Street side of the Site due to structural concerns. Thirteen groundwater monitoring wells are currently associated with the site and quarterly groundwater monitoring is ongoing.

4. Remedial Process

Note: See Appendix E for a flowchart of the brownfield Site remedial process.

Application

The Applicant has applied for and been accepted into New York’s Brownfield Cleanup Program as a Volunteer. This means that that the Applicant was not responsible for the disposal or discharge of the contaminants or whose ownership or operation of the site took place after the discharge or disposal of contaminants. The Volunteer must fully characterize the nature and extent of contamination onsite, and must conduct a qualitative exposure assessment, a process that characterizes the actual or potential exposures of people, fish and wildlife to contaminants on the site and to contamination that has migrated from the site.

The Applicant in its Application proposes that the Site will be used for restricted purposes.

To achieve this goal, the Applicant will conduct investigation activities at the Site with oversight provided by NYSDEC. The Brownfield Cleanup Agreement executed by NYSDEC and the Applicant sets forth the responsibilities of each party in conducting these activities at the Site.

The Applicant proposes that the Site be used for a 10-story office building with ground-floor retail.

To achieve this goal, the Applicant will conduct investigation activities at the Site and adjacent properties with oversight provided by NYSDEC. The Brownfield Cleanup Agreement executed by NYSDEC and the Applicant sets forth the responsibilities of each party in conducting these activities at the Site.

Investigation

The Applicant has submitted a Remedial Investigation Work Plan for the Site, dated November 2012, to the NYSDEC. The investigation which has been documented in the Remedial Investigation Report (RIR) dated October 2014 consisted of the following:

- Soil vapor sampling to assess the potential for vapor intrusion
- Soil sampling to further evaluate subsurface conditions and collect information for a remedial design
- Groundwater sampling to monitor groundwater conditions and collect information for a remedial design
- Community air monitoring to ensure that sampling activities pose no adverse effects on the community

The NYSDEC has determined that this Site does not pose a Significant Threat to public health or the environment based on the findings of the October 2014 RIR.

Remedy Selection

After the NYSDEC approves the remedial investigation report, the Applicant will be able to develop a Remedial Action Work Plan (RAWP) if remediation is required. The RAWP describes the Applicant’s proposed remedy for addressing contamination related to the Site.

After the Applicant submits the proposed RAWP for approval, NYSDEC will announce the availability of the proposed plan for public review during a 45-day public comment period.

A remedial action work plan (RAWP) has been prepared and submitted to NYSDEC for approval. The RAWP addresses remaining petroleum contaminated soils along the 21st Street side of the building as well as urban fill in the shallow soils and several hotspots contaminated with benzene and contaminants typically found in urban fill. Engineering and institutional controls have been proposed in the RAWP and will be incorporated into the new building design to protect the building inhabitants and public from contact with contaminants related to urban fill to remain below the Site. The building's concrete slab will function as the engineering control and an Environmental Easement will be executed. The Environmental Easement contains the use restriction(s) and/or any prohibition(s) on the use of land in a manner inconsistent with engineering controls. The placement of an Environmental Easement provides an effective and enforceable means of encouraging the reuse and redevelopment of a controlled property, at a level that has been determined to be safe for a specific use, while ensuring the performance of operation, maintenance, and/or monitoring requirements.

Cleanup Action

NYSDEC will consider the public comments, and revise the RAWP if necessary before approving the proposed remedy. The New York State Department of Health (NYSDOH) must concur with the proposed remedy. After approval the proposed remedy becomes the selected remedy.

The Applicant will then design and perform the cleanup action to address the site contamination. NYSDEC and NYSDOH will oversee the activities. When the Applicant completes the cleanup activities, they will prepare a final engineering report that certifies that cleanup requirements have been achieved or will be achieved within a specific time frame. NYSDEC will review the report to be certain that the cleanup is protective of public health and the environment for the intended use of the Site.

Certificate of Completion

When NYSDEC is satisfied that the cleanup requirements have been achieved or will be achieved for the Site, it will approve the Final Engineering Report (FER). NYSDEC then will issue a Certificate of Completion (COC) to the Applicant. This COC states that cleanup goals have been achieved, and relieves the Applicant from future remedial liability for site-related contamination, subject to certain conditions. The Applicant will be eligible to redevelop the Site after it receives the COC.

Site Management

Site management is the last phase of the site cleanup program. This phase begins when the COC is issued. Site management will be conducted by the Applicant under NYSDEC oversight, if contamination will remain in place. Site management incorporates any institutional and engineering controls required to ensure that the remedy implemented for the Site remains protective of public health and environment. All significant activities will be detailed in a Site Management Plan.

An institutional control is a non-physical restriction on use of the Site, such as a deed restriction that would prevent or restrict certain uses of the property. An institutional control may be used when the cleanup action leaves some contamination that makes the Site suitable for some, but not all uses.

An engineering control is a physical barrier or method to manage contamination. Examples include: caps, covers, barriers, fences, and treatment of water supplies.

Site management may include the operation and maintenance of a component of the remedy, such as a system that is pumping and treating groundwater. Site management continues until NYSDEC determines that it is no longer needed.

5. Citizen Participation Activities

CP activities that have already occurred and are planned during the investigation and remediation of the Site under the BCP are identified in Appendix D: Identification of Citizen Participation Activities. These activities also are identified in the flowchart of the BCP process in Appendix E. NYSDEC will ensure that these CP activities are conducted, with appropriate assistance from the Applicant.

All CP activities are conducted to provide the public with significant information about Site findings and planned remedial activities, and some activities announce comment periods and request public input about important draft documents such as the RAWP.

All written materials developed for the public will be reviewed and approved by NYSDEC for clarity and accuracy before they are distributed. Notices and fact sheets can be combined at the discretion, and with the approval of, the NYSDEC.

6. Major Issues of Public Concern

This section of the CP Plan identifies major issues of public concern, if any, that relate to the Site. There are no major issues of public concern from the Site. Additional major issues of public concern may be identified during the site's remedial process and will be addressed accordingly at that time. If needed, public concerns will be addressed through fact sheets or public meetings.

If remediation is warranted, then all work will be performed in a manner that protects the public from adverse exposure to contaminants during remediation.

Proper air monitoring will be performed to ensure that levels of dust and/or organic vapors are below that of Occupational Safety and Health Associations' (OSHA) standards for workers and National Institute for Occupational Safety and Health's (NIOSH) standards for the public.

In addition, once the remediation of the Site begins, there may be other issues such as impacts resulting from noise or dust coming from the Site. Site is located in an Environmental Justice Area. The applicant will be required to fill out a Scoping Sheet for Major Issues of Public Concern. Environmental Justice is defined as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations and policies.

Appendix A

Site Location Map and Site Plan

FIGURE 1: SITE LOCATION

511 West 21st Street
New York, N.Y.

BCP Site No. C231080

Fleming Lee Shue

Environmental Management & Consulting, 158 West 29th Street, New York, NY 10001

Appendix B – Project Contacts and Document Repositories

Project Contacts
For information about the Site's remedial program, the public may contact any of the following NYSDEC project staff:

Mr. Javier Pérez-Maldonado
NYS Department of Environmental Conservation
Division of Environmental Remediation, 625 Broadway, 12th Floor
Albany, NY 12233-7016
Phone: (518) 402-9768
Email: jxperezm@gw.dec.state.ny.us

Steven Karpinski
Public Health Specialist
New York State Department of Health
Flannigan Square
547 River Street
Troy, NY 12180-2216E-mail: beei@health.state.ny.us.
(518) 402-7880

Lou Oliva, Esq.
NYS Department of Environmental Conservation
Office of General Counsel
One Hunters Point Plaza
47-20 21st Street
Long Island City, NY 11101
E-mail: lpoliva@gw.dec.state.ny.us.

Document Repositories
The document repository identified below has been established to provide the public with convenient access to important project documents:

Muhlenberg Library
209 West 23rd Street
New York, NY 10011-2379
(212) 924-1585

Hours:
Monday 11am-6pm, Tuesday 11am-7pm, Wednesday 11am-6pm, Thursday 11am-7pm, Friday 10am-5pm, Saturday 10am-5pm, Sunday Closed

Appendix C – Brownfield Site Contact List

FEDERAL ELECTED OFFICIALS

US Senator: Charles E. Schumer Address: 780 3rd Avenue Suite 2301 New York, NY 10017 Phone: (212) 486-4430 Fax: (202) 228-2838 Web Email Form: http://schumer.senate.gov/SchumerWebSite/contact/webform.cfm	US Senator: Kristen Gillibrand Address: 780 3rd Avenue Suite 2601 New York, NY 10017 Phone: (212) 688-6262 Fax: (212) 688-7444 Web Email Form: http://gillibrand.senate.gov/contact/
Hon. Jerrold Nadler U.S. House of Representatives 201 Varick Street, Suite 669 New York, NY 10014	

Executive Offices

NY City Mayor: Hon. Bill de Blasio Address: City Hall New York, NY 10007 Phone: 311 or (212) 788-9600 Fax: (212) 788-2460 Web Email Form: http://nyc.gov/html/mail/html/mayor.html	Manhattan Borough President : Gale A. Brewer Address: 1 Centre Street 19th Floor New York NY, 10007 Phone: (212) 669-8300 Email Address: bp@manhattanbp.org

State Elected Officials

Hon. Brad Hoylman NYS Senator 322 Eighth Avenue, Suite 1700 New York, NY 10001 Email Address: http://**hoylman@nysenate.gov**	Hon. Richard N. Gottfried NYS Assembly Member 242 West 27th Street New York, NY 10001 Email Address: http://GottfriedR@assembly.state.ny.us

City Officials

New York City Dept. of City Planning: Carl Weisbrod, Chairperson Address: 22 Reade Street, New York, NY 10007 -1216	NY City Public Advocate: Hon. Letitia James Public Advocate 1 Centre Street, 15th Floor New York, NY 10007	NYC Office of Environmental Remediation Daniel Walsh, Ph.D. Address: 100 Gold Street, 2nd Floor New York, NY 10038

County of New York County Clerk: Norman Goodman 60 Centre Street, Room 161 New York, NY 10007 Phone: (646)-386-5955	NYC Office of Environmental Coordination Nilda MesaAddress: 100 Gold Street, 2nd Floor New York, NY 10038	NYC Department of Environmental Protection - Office of Environmental Planning & Assessment John Wuthenow 96-05 Horace Harding Expressway Flushing, NY 11373
Manhattan Community Board 4 – Chelsea J. Lee Compton & Brent Firfer, Co-chairs, Chelsea Planning & Preservation Committee 330 W. 42nd St., 26th Fl. New York, NY 10036	(Water Supply) New York City Dept. of Environmental Protection Hon. Carter Strickland 59-17 Junction Blvd. Flushing, NY 11373	Manhattan Community Board 4 330 West 42nd Street., Suite 2618 New York, NY 10036 Attn: Corey Johnson, chair Robert J. Benfatto, District Manager
Hon. Scott M. Stringer NYC Comptroller 1 Centre Street New York, NY 10001	Hon. Melissa Mark-Viverito NYC Councilmember 224 West 30th Street, Suite 1206 New York, NY 10001	

Media

Chelsea Now 515 Canal St. New York, NY 10013	Chelsea-Clinton News 79 Madison Ave., 16th Fl. New York, NY 10016	New York 1 News 75 Ninth Avenue New York, NY 10011
New York Post 1211 Avenue of the Americas New York, NY 10036	Gotham Gazette Citizens Union Foundation 299 Broadway, Suite 700 New York, NY 10007	New York Daily News 4 New York Plaza New York, NY 10004

Schools and Daycare Facilities

San Jose Day Nursery Sister Trinidad 432 W 20th St New York, NY 10011	Secret Garden Preschool Attn. School Administrator 422 W 20th St New York, NY 10011	Guardian Angel School Principal Maureen McElduff 193 10th Ave New York, NY 10011

Community, Civic, Religious and Other Educational Institutions

Friends of the Highline 529 West 20th Street, Suite 8W New York, NY 10011 Attn: Joshua David, Co-founder Robert Hammond, Co-founder	Friends of Hudson River Park Executive Director 311 West 43rd Street, suite 300 New York, NY 10036	Manhattan Chamber of Commerce 1375 Broadway, Third Floor New York, NY 10018

Owners/Occupants of Adjacent Properties

Names of private owner/occupants have been redacted

Residence/Business Owner of Surrounding Properties

	NUMBER	ADDRESS	CITY	STATE	ZIPCODE
RESIDENT/BUSINESS OWNER	112	11 AVENUE	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	100	11 AVENUE	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	527	WEST 19 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	521	WEST 19 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	517	WEST 19 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	515	WEST 19 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	505	WEST 19 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	153	10 AVENUE	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	161	10 AVENUE	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	165	10 AVENUE	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	504	WEST 20 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	508	WEST 20 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	512	WEST 20 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	516	WEST 20 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	532	WEST 20 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	120	11 AVENUE	NEW YORK	NY	10011

Owners/Occupants of Adjacent Properties

Emmasam LLC Emma & Sam’s Dad LLC c/o Michael Weinstein 520 W 22 St New York, NY, 10011	Richard Spalding 520 W 22nd St, Apt 1 New York, NY 10011-1291 521 W 21 St, New York, NY 10011	Chelsea Operating Inc. 415 W 127th St New York NY 10027-2544
Susie M. Kravets 521 W 21st St, Apt. 1 New York, NY 10011-2846 522 W 22 St, New York, NY 10011	Autumn Rhythm Inc. 523 W 24 St New York, NY, 10011 507 W 21 St, New York, NY 10011	510 West 22nd Street Partners LLC c/o S & G Acquisitions LLC 100 Washington St Newark, NJ 07102 510 W 21 St, New York, NY 10011
West 21st Street Properties LLC 100 Washington St Newark NJ 07102-3024 525 W 22 St, New York, NY 10011	Chelsea Warehouse Associates L.L.C. 80 Fifth Avenue, 18th Floor New York, NY 10011	Andrew’s Building Corporation 666 Broadway 13th Floor New York, NY 10012

Residence/Business Owner of Surrounding Properties

	NUMBER	ADDRESS	CITY	STATE	ZIPCODE
RESIDENT/BUSINESS OWNER	112	11 AVENUE	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	100	11 AVENUE	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	527	WEST 19 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	521	WEST 19 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	517	WEST 19 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	515	WEST 19 STREET	NEW YORK	NY	10011
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RESIDENT/BUSINESS OWNER	161	10 AVENUE	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	165	10 AVENUE	NEW YORK	NY	10011
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RESIDENT/BUSINESS OWNER	509	WEST 20 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	169	10 AVENUE	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	510	WEST 21 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	522	WEST 21 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	530	WEST 21 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	534	WEST 21 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	540	WEST 21 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	542	WEST 21 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	550	WEST 21 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	130	11 AVENUE	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	144	11 AVENUE	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	547	WEST 21 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	541	WEST 21 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	531	WEST 21 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	521	WEST 21 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	511	WEST 21 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	507	WEST 21 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	185	10 AVENUE	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	191	10 AVENUE	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	195	10 AVENUE	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	197	10 AVENUE	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	518	WEST 22 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	522	WEST 22 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	526	WEST 22 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	542	WEST 22 STREET	NEW YORK	NY	10011

RESIDENT/BUSINESS OWNER	548	WEST 22 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	154	11 AVENUE	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	532	WEST 22 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	162	11 AVENUE	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	164	11 AVENUE	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	555	WEST 22 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	551	WEST 22 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	545	WEST 22 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	541	WEST 22 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	533	WEST 22 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	531	WEST 22 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	505	WEST 22 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	203	10 AVENUE	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	205	10 AVENUE	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	207	10 AVENUE	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	500	WEST 23 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	512	WEST 23 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	514	WEST 23 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	524	WEST 23 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	536	WEST 23 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	548	WEST 23 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	552	WEST 23 STREET	NEW YORK	NY	10011
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RESIDENT/BUSINESS OWNER	527	WEST 23 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	525	WEST 23 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	519	WEST 23 STREET	NEW YORK	NY	10011

RESIDENT/BUSINESS OWNER	511	WEST 23 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	509	WEST 23 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	505	WEST 23 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	501	WEST 23 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	225	10 AVENUE	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	229	10 AVENUE	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	231	10 AVENUE	NEW YORK	NY	10011
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RESIDENT/BUSINESS OWNER	514	WEST 24 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	227	10 AVENUE	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	521	WEST 23 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	150	10 AVENUE	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	454	WEST 20 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	456	WEST 20 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	458	WEST 20 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	460	WEST 20 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	175	9 AVENUE	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	473	WEST 21 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	471	WEST 21 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	469	WEST 21 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	467	WEST 21 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	465	WEST 21 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	463	WEST 21 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	461	WEST 21 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	459	WEST 21 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	457	WEST 21 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	455	WEST 21 STREET	NEW YORK	NY	10011
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RESIDENT/BUSINESS OWNER	449	WEST 21 STREET	NEW YORK	NY	10011
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RESIDENT/BUSINESS OWNER	493	WEST 22 STREET	NEW YORK	NY	10011
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RESIDENT/BUSINESS OWNER	489	WEST 22 STREET	NEW YORK	NY	10011
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RESIDENT/BUSINESS OWNER	479	WEST 22 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	477	WEST 22 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	475	WEST 22 STREET	NEW YORK	NY	10011
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RESIDENT/BUSINESS OWNER	467	WEST 22 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	463	WEST 22 STREET	NEW YORK	NY	10011
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RESIDENT/BUSINESS OWNER	454	WEST 23 STREET	NEW YORK	NY	10011
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RESIDENT/BUSINESS OWNER	458	WEST 23 STREET	NEW YORK	NY	10011
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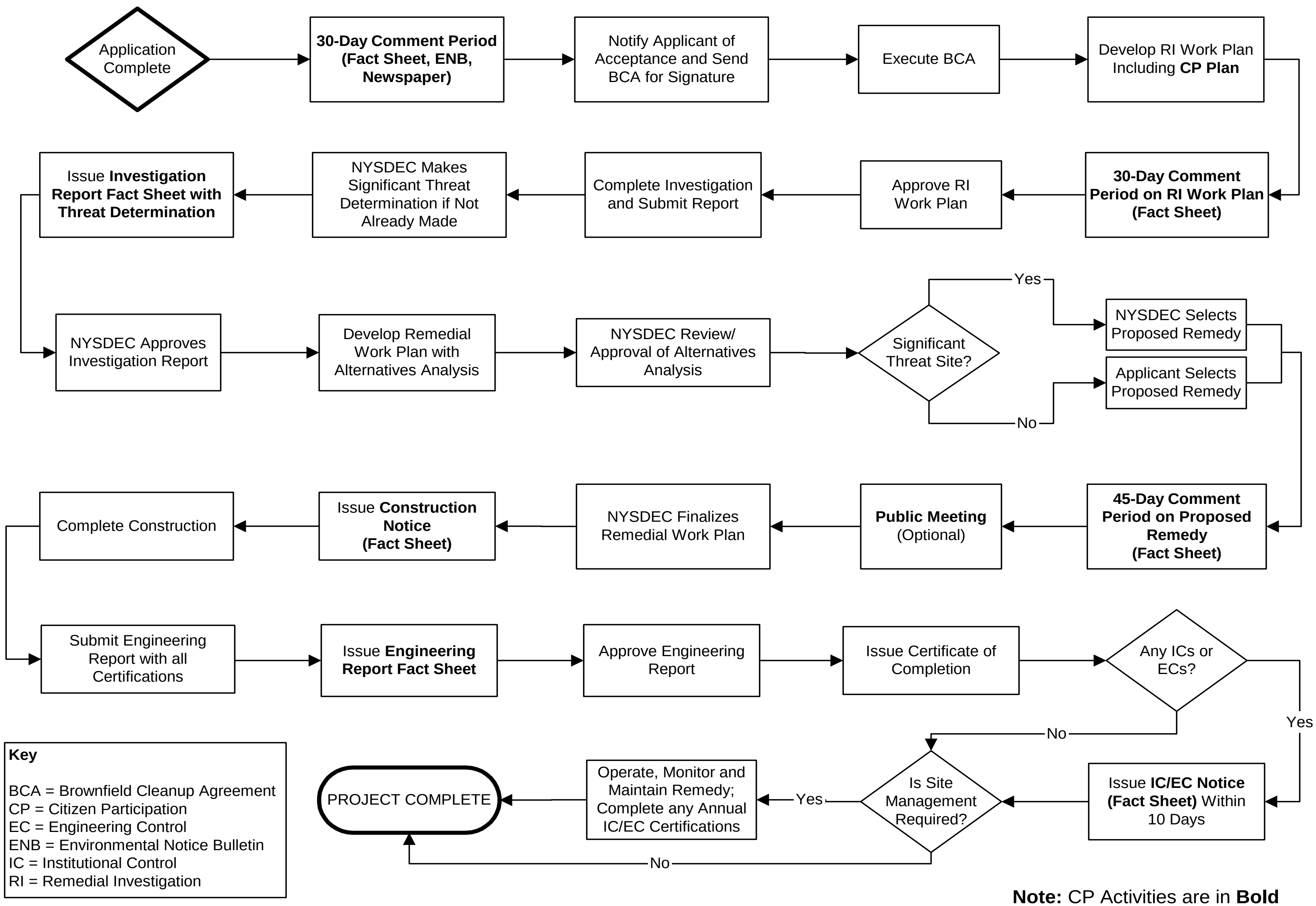
RESIDENT/BUSINESS OWNER	464	WEST 23 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	466	WEST 23 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	470	WEST 23 STREET	NEW YORK	NY	10011

RESIDENT/BUSINESS OWNER	468	WEST 23 STREET	NEW YORK	NY	10011
RESIDENT/BUSINESS OWNER	465	WEST 23 STREET	NEW YORK	NY	10011

Appendix D – Identification of Citizen Participation Activities

Required Citizen Participation (CP) Activities	CP Activities) Occur at this Point
Application Process:	
• Prepare brownfield Site contact list (BSCL) • Establish document repositories	At time of preparation of application to participate in BCP.
• Publish notice in Environmental Notice Bulletin (ENB) announcing receipt of application and 30-day comment period	When NYSDEC determines that BCP application is complete. The 30-day comment period begins on date of publication of notice in ENB. End date of comment period is as stated in ENB notice. Therefore, ENB notice, newspaper notice and notice to the BSCL should be provided to the public at the same time.
After Execution of Brownfield Site Cleanup Agreement:	
• Prepare citizen participation (CP) plan	Draft CP Plan must be submitted within 20 days of entering Brownfield Site Cleanup Agreement. CP Plan must be approved by NYSDEC before distribution.
After Remedial Investigation (RI) Work Plan Received:	
• Mail fact sheet to BSCL about proposed RI activities and announcing 30-day public comment period on draft RI Work Plan	Before NYSDEC approves RI Work Plan. If RI Work Plan is submitted with application, comment periods will be combined and public notice will include fact sheet. 30-day comment period begins/ends as per dates identified in fact sheet.
After RI Completion:	
• Mail fact sheet to BSCL describing results of RI	Before NYSDEC approves RI Report.
After Remedial Work Plan (RWP) Received:	
• Mail fact sheet to BSCL about proposed RWP and announcing 45-day comment period • Public meeting by NYSDEC about proposed RWP (if requested by affected community or at discretion of NYSDEC project manager in consultation with other NYSDEC staff as appropriate)	Before NYSDEC approves RWP. 45-day comment period begins/ends as per dates identified in fact sheet. Public meeting would be held within the 45-day comment period.
After Approval of RWP:	
• Mail fact sheet to BSCL summarizing upcoming remedial construction	Before the start of remedial construction.
After Remedial Action Completed:	
• Mail fact sheet to BSCL announcing that remedial construction has been completed • Mail fact sheet to BSCL announcing issuance of Certificate of Completion (COC)	At the time NYSDEC approves Final Engineering Report. These two fact sheets should be combined when possible if there is not a delay in issuance of the COC.

Appendix E – Brownfield Cleanup Program Process



APPENDIX E

Environmental Easement

ENVIRONMENTAL EASEMENT GRANTED PURSUANT TO ARTICLE 71, TITLE 36 OF THE NEW YORK STATE ENVIRONMENTAL CONSERVATION LAW

THIS INDENTURE made this _______day of _____________, 20__, between Owner(s) 510 West 22nd Street Partners, LLC, having an office at 1050 Franklin Avenue, Garden City, County of Nassau County, State of New York (the "Grantor"), and The People of the State of New York (the "Grantee."), acting through their Commissioner of the Department of Environmental Conservation (the "Commissioner", or "NYSDEC" or "Department" as the context requires) with its headquarters located at 625 Broadway, Albany, New York 12233,

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to encourage the remediation of abandoned and likely contaminated properties ("sites") that threaten the health and vitality of the communities they burden while at the same time ensuring the protection of public health and the environment; and

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to establish within the Department a statutory environmental remediation program that includes the use of Environmental Easements as an enforceable means of ensuring the performance of operation, maintenance, and/or monitoring requirements and the restriction of future uses of the land, when an environmental remediation project leaves residual contamination at levels that have been determined to be safe for a specific use, but not all uses, or which includes engineered structures that must be maintained or protected against damage to perform properly and be effective, or which requires groundwater use or soil management restrictions; and

WHEREAS, the Legislature of the State of New York has declared that Environmental Easement shall mean an interest in real property, created under and subject to the provisions of Article 71, Title 36 of the New York State Environmental Conservation Law ("ECL") which contains a use restriction and/or a prohibition on the use of land in a manner inconsistent with engineering controls which are intended to ensure the long term effectiveness of a site remedial program or eliminate potential exposure pathways to hazardous waste or petroleum; and

WHEREAS, Grantor, is the owner of real property located at the address of 511 West 21st Street in the City of New Yrok, County of New York and State of New York, known and designated on the tax map of the County Clerk of New York as tax map parcel numbers: Section Enter Tax ID Section #. Block 693 Lot 23, being the same as that property conveyed to Grantor by deed dated December 22, 2011 and recorded in the Enter county name or leave blank for NY City deeds City Register of the City of New York in Instrument No. 2011122800958004. The property subject to this Environmental Easement (the "Controlled Property") comprises approximately 0.45 +/- acres, and is hereinafter more fully described in the Land Title Survey dated December 11, 2011, revised August 18, 2012 prepared by New York City Land Surveyors, PC , which will be attached to the Site Management Plan. The Controlled Property description is set forth in and attached hereto as Schedule A; and

WHEREAS, the Department accepts this Environmental Easement in order to ensure the protection of public health and the environment and to achieve the requirements for remediation established for the Controlled Property until such time as this Environmental Easement is extinguished pursuant to ECL Article 71, Title 36; and

NOW THEREFORE, in consideration of the mutual covenants contained herein and the terms and conditions of Brownfield Cleanup Agreement Index Number: C2310800213, Grantor conveys to Grantee a permanent Environmental Easement pursuant to ECL Article 71, Title 36 in, on, over, under, and upon the Controlled Property as more fully described herein ("Environmental Easement")

1. Purposes. Grantor and Grantee acknowledge that the Purposes of this Environmental Easement are: to convey to Grantee real property rights and interests that will run with the land in perpetuity in order to provide an effective and enforceable means of encouraging the reuse and redevelopment of this Controlled Property at a level that has been determined to be safe for a specific use while ensuring the performance of operation, maintenance, and/or monitoring requirements; and to ensure the restriction of future uses of the land that are inconsistent with the above-stated purpose.

2. Institutional and Engineering Controls. The controls and requirements listed in the Department approved Site Management Plan ("SMP") including any and all Department approved amendments to the SMP are incorporated into and made part of this Environmental Easement. These controls and requirements apply to the use of the Controlled Property, run with the land, are binding on the Grantor and the Grantor's successors and assigns, and are enforceable in law or equity against any owner of the Controlled Property, any lessees and any person using the Controlled Property.

A. (1) The Controlled Property may be used for:

Commercial as described in 6 NYCRR Part 375-1.8(g)(2)(iii) and Industrial as described in 6 NYCRR Part 375-1.8(g)(2)(iv) if current land use is selected, enter current use.

(2) All Engineering Controls must be operated and maintained as specified in the Site Management Plan (SMP);

(3) All Engineering Controls must be inspected at a frequency and in a manner defined in the SMP;

(4) The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the New York County Department of Health to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department;

(5) Groundwater and other environmental or public health monitoring must be performed as defined in the SMP;

(6) Data and information pertinent to Site Management of the Controlled Property must be reported at the frequency and in a manner defined in the SMP;

(7) All future activities on the property that will disturb remaining contaminated material must be conducted in accordance with the SMP;

(8) Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in the SMP;

(9) Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical components of the remedy shall be performed as defined in the SMP;

(10) Access to the site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by this Environmental Easement.

B. The Controlled Property shall not be used for Residential or Restricted Residential purposes as defined in 6NYCRR 375-1.8(g)(2)(i) and (ii), and the above-stated engineering controls may not be discontinued without an amendment or extinguishment of this Environmental Easement.

C. The SMP describes obligations that the Grantor assumes on behalf of Grantor, its successors and assigns. The Grantor's assumption of the obligations contained in the SMP which may include sampling, monitoring, and/or operating a treatment system, and providing certified reports to the NYSDEC, is and remains a fundamental element of the Department's determination that the Controlled Property is safe for a specific use, but not all uses. The SMP may be modified in accordance with the Department's statutory and regulatory authority. The Grantor and all successors and assigns, assume the burden of complying with the SMP and obtaining an up-to-date version of the SMP from:

Site Control Section
Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, New York 12233
Phone: (518) 402-9553

D. Grantor must provide all persons who acquire any interest in the Controlled Property a true and complete copy of the SMP that the Department approves for the Controlled Property and all Department-approved amendments to that SMP.

E. Grantor covenants and agrees that until such time as the Environmental Easement is extinguished in accordance with the requirements of ECL Article 71, Title 36 of the ECL, the property deed and all subsequent instruments of conveyance relating to the Controlled Property shall state in at least fifteen-point bold-faced type:

This property is subject to an Environmental Easement held by the New York State Department of Environmental Conservation

pursuant to Title 36 of Article 71 of the Environmental Conservation Law.

F. Grantor covenants and agrees that this Environmental Easement shall be incorporated in full or by reference in any leases, licenses, or other instruments granting a right to use the Controlled Property.

G. Grantor covenants and agrees that it shall, at such time as NYSDEC may require, submit to NYSDEC a written statement by an expert the NYSDEC may find acceptable certifying under penalty of perjury, in such form and manner as the Department may require, that:

(1) the inspection of the site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under the direction of the individual set forth at 6 NYCRR Part 375-1.8(h)(3).

(2) the institutional controls and/or engineering controls employed at such site:

(i) are in-place;

(ii) are unchanged from the previous certification, or that any identified changes to the controls employed were approved by the NYSDEC and that all controls are in the Department-approved format; and

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

(3) the owner will continue to allow access to such real property to evaluate the continued maintenance of such controls;

(4) nothing has occurred that would constitute a violation or failure to comply with any site management plan for such controls;

(5 the report and all attachments were prepared under the direction of, and reviewed by, the party making the certification;

(6) to the best of his/her knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program, and generally accepted engineering practices; and

(7) the information presented is accurate and complete.

3. Right to Enter and Inspect. Grantee, its agents, employees, or other representatives of the State may enter and inspect the Controlled Property in a reasonable manner and at reasonable times to assure compliance with the above-stated restrictions.

4. Reserved Grantor's Rights. Grantor reserves for itself, its assigns, representatives, and successors in interest with respect to the Property, all rights as fee owner of the Property, including:

A. Use of the Controlled Property for all purposes not inconsistent with, or limited by the terms of this Environmental Easement;

B. The right to give, sell, assign, or otherwise transfer part or all of the underlying fee interest to the Controlled Property, subject and subordinate to this Environmental Easement;

5. Enforcement

A. This Environmental Easement is enforceable in law or equity in perpetuity by Grantor, Grantee, or any affected local government, as defined in ECL Section 71-3603, against the owner of the Property, any lessees, and any person using the land. Enforcement shall not be defeated because of any subsequent adverse possession, laches, estoppel, or waiver. It is not a defense in any action to enforce this Environmental Easement that: it is not appurtenant to an interest in real property; it is not of a character that has been recognized traditionally at common law; it imposes a negative burden; it imposes affirmative obligations upon the owner of any interest in the burdened property; the benefit does not touch or concern real property; there is no privity of estate or of contract; or it imposes an unreasonable restraint on alienation.

B. If any person violates this Environmental Easement, the Grantee may revoke the Certificate of Completion with respect to the Controlled Property.

C. Grantee shall notify Grantor of a breach or suspected breach of any of the terms of this Environmental Easement. Such notice shall set forth how Grantor can cure such breach or suspected breach and give Grantor a reasonable amount of time from the date of receipt of notice in which to cure. At the expiration of such period of time to cure, or any extensions granted by Grantee, the Grantee shall notify Grantor of any failure to adequately cure the breach or suspected breach, and Grantee may take any other appropriate action reasonably necessary to remedy any breach of this Environmental Easement, including the commencement of any proceedings in accordance with applicable law.

D. The failure of Grantee to enforce any of the terms contained herein shall not be deemed a waiver of any such term nor bar any enforcement rights.

6. Notice. Whenever notice to the Grantee (other than the annual certification) or approval from the Grantee is required, the Party providing such notice or seeking such approval shall identify the Controlled Property by referencing the following information:

County, NYSDEC Site Number, NYSDEC Brownfield Cleanup Agreement, State Assistance Contract or Order Number, and the County tax map number or the Liber and Page or computerized system identification number.

Parties shall address correspondence to:

Site Number: C231080
Office of General Counsel
NYSDEC
625 Broadway
Albany New York 12233-5500

With a copy to:

Site Control Section
Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, NY 12233

All notices and correspondence shall be delivered by hand, by registered mail or by Certified mail and return receipt requested. The Parties may provide for other means of receiving and communicating notices and responses to requests for approval.

7. Recordation. Grantor shall record this instrument, within thirty (30) days of execution of this instrument by the Commissioner or her/his authorized representative in the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

8. Amendment. Any amendment to this Environmental Easement may only be executed by the Commissioner of the New York State Department of Environmental Conservation or the Commissioner's Designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

9. Extinguishment. This Environmental Easement may be extinguished only by a release by the Commissioner of the New York State Department of Environmental Conservation, or the Commissioner's Designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

10. Joint Obligation. If there are two or more parties identified as Grantor herein, the obligations imposed by this instrument upon them shall be joint and several.

IN WITNESS WHEREOF, Grantor has caused this instrument to be signed in its name.

Martin Dettling:

By: ____

Print Name: ________________________________

Title:_____________________ Date:______________

Grantor's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF)

On the _______ day of _________, in the year 20 __, before me, the undersigned, personally appeared ___________________, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

____
Notary Public - State of New York

THIS ENVIRONMENTAL EASEMENT IS HEREBY ACCEPTED BY THE PEOPLE OF THE STATE OF NEW YORK, Acting By and Through the Department of Environmental Conservation as Designee of the Commissioner,

By: ____
Robert W. Schick, Director
Division of Environmental Remediation

Grantee's Acknowledgment

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

On the _______ day of _________, in the year 20__, before me, the undersigned, personally appeared Robert W. Schick, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/ executed the same in his/her/ capacity as Designee of the Commissioner of the State of New York Department of Environmental Conservation, and that by his/her/ signature on the instrument, the individual, or the person upon behalf of which the individual acted, executed the instrument.

____
Notary Public - State of New York

____

SCHEDULE "A" PROPERTY DESCRIPTION

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

BEGINNING at a point on the northerly side of West 21St Street, distant 150 feet westerly from the corner formed by the intersection of the said northerly side of West 21st Street with the westerly side of Tenth Avenue;

RUNNING THENCE westerly along the said northerly side of 21st Street, 125 feet;

THENCE northerly and parallel with the westerly side of Tenth Avenue, 98 feet 9 inches to the center line of the block;

THENCE easterly along the center line of the block 50 feet;

THENCE northerly and parallel with the said westerly side of Tenth Avenue, 98 feet 9 inches to the southerly side of West 22nd Street;

THENCE easterly along the said southerly side of West 22nd Street, 75 feet;

THENCE southerly and parallel with the said westerly side of Tenth Avenue, 197 feet 6 inches to the northerly side of West 21St Street at the point or place of BEGINNING.

APPENDIX F

Quality Assurance Project Plan

511 West 21st Street

New York, New York

NYSDEC BCP # C231080

QUALITY ASSURANCE PROJECT PLAN

510 West 22nd Street Partners, LLC
c/o Albanese Development Corporation
1050 Franklin Avenue
Garden City, New York 11530

FLS Project Number: 10173-002

Submitted to:
New York State Department of Environmental Conservation
Division of Environmental Remediation
1 Hunters Point Plaza
47-40 21st Street
Long Island City, NY 11101

October 2014

Arnold F. Fleming, P.E.
and

Fleming Lee Shue

Environmental Management & Consulting
158 West 29th Street, 9th Floor
New York, New York 10001
http://www.flemingleeshue.com

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

1.0 INTRODUCTION

The Quality Assurance Project Plan (QAPP) outlines the protocols and procedures that will be followed during the remedial investigation of 511 West 21st Street, New York (Manhattan), NY, Brownfield Cleanup Program (BCP) site # C231080, located on Block 693, Lot 23 (hereafter referred to as the "Site"). A Site Location Map is included as Figure 1. The Site remediation will be conducted in accordance with the approved Remedial Action Work Plan (RAWP) for the Site. The QAPP has been prepared in order to ensure Quality Assurance/Quality Control (QA/QC) for the environmental sampling activities which will be conducted under the RAWP and to ensure the acquisition of defensible data.

2.0 PROJECT TEAM

The project team will consist of FLS personnel and subcontractors. All field personnel and subcontractors will have completed a 40-hour Hazardous Waste Operations (HAZWOPER) training course and the annual HAZWOPER 8-hour refresher in accordance with the Occupational Safety and Health Administration (OSHA) regulations and will have the training required for their respective duties as outlined for this investigation.

2.1 Remedial Engineer

The oversight of all aspects of the project will be conducted by the Remedial Engineer (RE). The RE is responsible for compliance with the RIWP. Mr. Arnold F. Fleming, P.E., will act as the RE for the remedial action at the Site.

2.2 Project Director

The general oversight of all aspects of the project will be conducted by the project director. Tasks will include the scheduling, budgeting, data management and decision-making for the field program. Mr. Peter Helseth, P.E.; will act as the Project Director for the remedial action at the Site.

2.3 Project Manager

All components of the Site remediation will be directed and coordinated by the Project Manager. He/she will ensure a smooth flow of information between all parties involved in the investigation by communicating regularly with professionals from the New York State Department of Environmental Conservation (NYSDEC), the Site management personnel, and all members of the FLS project team. Mr. Daniel DiRocco., will act as the Project Manager for the project.

2.4 Field Team Leader

Daily onsite sampling and health and safety activities will be supervised by a Field Team Leader. The team leader's responsibilities will include ensuring adherence to the work plan and Health and Safety Plan (HASP) and regularly reporting daily progress and deviations from the work plan to the Project Manager. FLS will assign the role of Field Team Leader to appropriate FLS personnel.

2.5 Project Quality Assurance / Quality Control Officer

Adherence to the QAPP will be ensured by a FLS QA/QC Officer. Tasks will include reviewing the QA procedures with all personnel before any fieldwork is conducted on-site as well as completing periodic site visits in order to assess the implementation of these procedures. Mr. Peter Helseth, P.E.., Director, will act as the QA/QC officer for the remedial activities.

2.6 Laboratory Quality Assurance / Quality Control Officer

Quality control procedures will be ensured by a laboratory QA/QC officer in the designated laboratory. This officer will be responsible for the adherence to laboratory protocols, quality control procedures, and checks in the laboratory. The officer will track the movement of the samples from check in to issue of the analytical results, conducting a final check on the analytical calculations. The laboratory groups performing the respective analyses will complete their own QA/QC and sign off on the data. The Accutest QA/QC manual is attached to the end of this document.

The sample analytical reports will undergo a third-party review of the analyses conducted. The third-party will produce a Data Usability Summary Report (DUSR) which will be submitted to the NYSDEC.

3.0 LABORATORY PROCEDURES

3.1 Laboratory Methods

The sample container type, preservation, applicable holding time, and laboratory methods of analysis of the field samples have been included as Table 1. Holding times are based on the SW-846 analytical method which, when adjusted to account for an assumed 2-day sample shipping time, match NYSDEC Analytical Services Protocol (ASP) holding times. Sample analyses will be completed by a New York State Department of Health Environmental Laboratory Approval Program (NYSDOH-ELAP) certified laboratory and reported as NYSDEC ASP Category B deliverables.

3.2 Quality Control Sampling

Additional analysis will be conducted for quality control assurance in addition to the laboratory analysis of the field soil and ground water samples. Quality control samples will include: equipment rinsate blanks (for non-disposable sampling equipment), duplicate samples, matrix spike and matrix spike duplicate samples, and trip blanks. The quantities of field samples and quality control samples have been summarized in Table 2.

The equipment blank and duplicate samples will be analyzed for the same parameters as the samples, as shown on Table 1.

4.0 STANDARD OPERATING PROCEDURES

The standard operating procedures for post-excavation soil sampling, soil gas sampling, monitoring well installation and development, and sampling equipment decontamination are described in the following sections. Safety monitoring will be performed in accordance with the Site-Specific HASP, sections of which mandate that all field personnel wear the appropriate personal protective equipment.

4.1 Soil Sampling

Collection of samples from near-surface soil will be accomplished with either disposable or pre-cleaned stainless steel tools such as spades, shovels, trowels, and scoops. Surface material will be removed to the required depth and a stainless steel or plastic scoop is then used to collect the sample. To reduce the chance of cross-contamination during sampling, non-disposable sampling equipment will be decontaminated between uses a with non-phosphate detergent wash followed by a clean water rinse, followed by a final rinse with deionized water.

Subsurface soil samples will be obtained using either a split-spoon soil sampler (with a hollow-stem auger drill rig), or a macro-core sampler (with a Geoprobe® rig). Split-spoon samples will be collected continuously at 2-foot intervals and macro-core samples at 5-foot intervals, to retrieve relatively undisturbed soil cores down to approximately 15 feet. The borings will be advanced 7 to 10 feet into the saturated zone. To reduce the chance of cross-contamination during sampling, non-disposable sampling equipment will be decontaminated between uses a with non-phosphate detergent wash followed by a clean water rinse, followed by a final rinse with deionized water. The drilling equipment (cutting heads, augers and drill rods) will be cleaned between uses. The macro-core sampler will use disposable acetate sleeves to collect intact soil cores.

Soil samples will be collected and analyzed for the parameters included on Table 1 and will be subject to the QA/QC requirements listed in Table 2.

4.2 Soil Gas Sampling

Soil gas and near-slab samples will be collected by driving a sample probe approximately 5 feet below grade (ft-bg) using a Geoprobe® rig or a portable hand-held roto-hammer, inserting a 5/8-inch-diameter steel shaft with a hardened point and retractable slotted intake attached to a length of dedicated Teflon or polyethylene tubing into the hole. Once the soil gas sampling probe is secured, the shaft will be retracted to expose the screen, the annulus sealed with clay and/or bentonite, and a vacuum applied to the sampling probe head and the system purged to allow the collection and subsequent analysis of a representative sample of soil gas.

Sub-slab soil gas will be collected in a similar manner by drilling a ½-$^{5}/_{8}$ inch diameter hole through the slab and extending the hole approximately one foot of soils below the bottom of the slab. Insert a length of dedicated Teflon or polyethylene tubing into the hole extending the end six inches below the bottom of the slab. The annulus around the tubing will be sealed with clay and/or bentonite, and a vacuum applied to the sampling probe head and the system purged to allow the collection and subsequent analysis of a representative sample of soil gas.

A minimum of one soil gas volume will be purged from the borehole before collecting the sample according to NYSDOH requirements. With the vacuum maintained, soil gas samples will be collected using Summa Canisters by attaching the tubing to the dedicated SUMMA canister flow controller set to a sampling rate of 0.2 liters/minute or less.

4.3 Groundwater Sampling

Groundwater samples will be collected from any new monitoring wells at least 1 week following installation by applying the following procedures:

- As the well plug is removed, measure the vapor concentrations in the well using a photo-ionization detector (PID).

- Measure depth-to-water and check for light non-aqueous phase liquid (LNAPL) utilizing an oil/water interface probe. If measurable LNAPL is present, groundwater samples will not be collected.

- Connect dedicated tubing to either a submersible or peristaltic pump and lower such that the intake of the pump is set at a mid-point of the water column within the screened interval of the well. The intake should be a minimum of 2 feet above the bottom of the well screen. Record the depth of the intake in the field notes. Connect the discharge end of the tubing to the flow-through cell of a multi-parameter (or equivalent) meter, such as a Horiba U-22. Connect tubing to the output of the cell and place the discharge end of the tubing in a 5-gallon bucket.

- At its lowest flow rate setting, activate the pump.

- Measure the depth-to-water within the well. Increase the pump flow rate such that the water-level measurement does not deviate more than 0.3 feet compared to the initial static reading.

- Transfer discharged water from the 5-gallon buckets to 55-gallons drums designated for well-purge water.

- During purging, record periodic readings (every 5 minutes) of water-quality indicators (e.g., turbidity, pH, temperature, dissolved oxygen (DO), reduction-oxidation potential (ORP), and specific conductivity).

- Continue purging the well until water-quality indicators have stabilized (three successive readings) for the following parameters and criteria:

Parameter	Stabilization Criteria
pH	+/- 0.1 pH units
Specific Conductance	+/- 3% S / cm
ORP / Eh	+/- 10 mV
Turbidity	+/- 10% NTUs (< 50 NTUs,)
Dissolved Oxygen	+/- 0.3 mg/l

- If, after three well volumes, water-quality parameters are not stabilized, discontinue purging. Record all efforts to stabilize the water quality for the well in the field book, and then collect samples as described below.

- After purging, disconnect the tubing to the inlet of the flow-through cell. Collect groundwater samples directly from the discharge end of the tubing (first volatile organic compounds [VOCs] then semi-volatile organic compounds [SVOCs]) and place into the sample containers as described in Section 3.0. The containers are to be labeled as described in Section 4.4 and put in an ice-filled cooler. The samples should be maintained at 4° +/- 2° C in the field and during transport.

- Once sampling is complete, remove the pump and tubing from the well. Disconnect the tubing and place it back in the well for reuse during the next sampling event. Dispose of any sample filters in a 55-gallon drum designated for disposable sampling materials and personal protective equipment.

- Decontaminate the pump, oil/water interface probe and flow-through cell as described in Section 4.3.

- In the project logbook and field data sheet, record all measurements (depth-to-water, depth-to-NAPL, water-quality parameters, turbidity), calculations (well volume) and observations.

4.4 Decontamination Procedures

Decontamination will be performed on plastic sheeting or other containment area that is deemed to prevent runoff to the ground. Prior to use on-site and between sampling locations, the hand trowel, pump, oil/water interface probe, and other non-disposable sampling equipment will be decontaminated using the following protocol:

1. Scrub using tap water / non-phosphate detergent mixture and bristle brush.
2. Rinse with tap water.
3. Repeat step 1 and 2
4. Final rinse with distilled water.
5. Air-dry the equipment.

4.5 Sampling Handling

4.5.1 Sample Identification

All samples collected will be identified using an alphanumeric code. The following table identifies the various sample identification scheme for the Site:

Sample Type	Prefix	Suffix 1	Suffix 2	Example
Soil Gas	SG	Sequential Number / Location	Depth (ft-bg)	SG-01 (0-3)
Post Excavation Soil Sample/ End Point (Bottom Sample)	BS	Alphanumeric Grid Location/ Unique Identifier	Depth (ft-bg)	BS-A1 (20)
Post Excavation Soil Sample/ End Point (Wall Sample)	SW[1] WW[2]	Distance From Origin located at the Southeast Corner of Grid Section A-1	Depth (ft-bg)	SW-30 (15) WW-30 (15)
Groundwater Sample (Monitoring Well)	MW	Well ID Number	--	MW-01

1-South Wall
2-West Wall

4.5.2 Sample Labeling and Shipping

All sample containers must contain the following information on the label:

- Project identification
- Sample identification
- Date and time of collection
- Analysis(es) to be performed
- Samplers initials

Collected and labeled samples will be placed in ice-filled coolers away from direct sunlight to await shipment/delivery to the laboratory. Samples will be maintained at 4° +/- 2° C in the field and during transport.

To prepare the samples for shipment place each sample in a sealable plastic bag. Finally, add fresh ice in two sealable plastic bags, or "blue ice" blocks, and the chain-of-custody (COC) form. Samples may be shipped overnight (e.g., via Federal Express) or transported by a laboratory courier. All coolers shipped to the laboratory will be sealed with mailing tape and a COC seal to ensure that the coolers remain sealed during delivery.

4.5.3 Sample Custody

Field personnel will be responsible for maintaining the sample coolers in a secured area until arrival at the laboratory. Sample possession record from the time of obtainment in the field to the time of delivery to the laboratory or shipping off-site will be documented on COC forms. The COC forms will contain the following information: project name; names of sampling personnel; sample number; date and time of collection and matrix; signatures of individuals involved in sample transfer; and the dates and times of transfers. Laboratory personnel will examine the custody seal's condition at sample check-in.

4.6 Field Instrumentation

Equipment will be calibrated at the start of each day of field work in accordance with the manufacturer's specifications. In the instance that an instrument fails calibration, the Project Manager or QA/QC Officer must be contacted immediately so as to arrange repairs or obtain a replacement instrument. A calibration log will be maintained on-site in the field book in order to record specific details regarding instrument calibration, including: dates, problems, and corrective actions. The PID will be calibrated each day using a standard of 100 parts per million (ppm) isobutylene, zeroed as per manufacturer specifications.

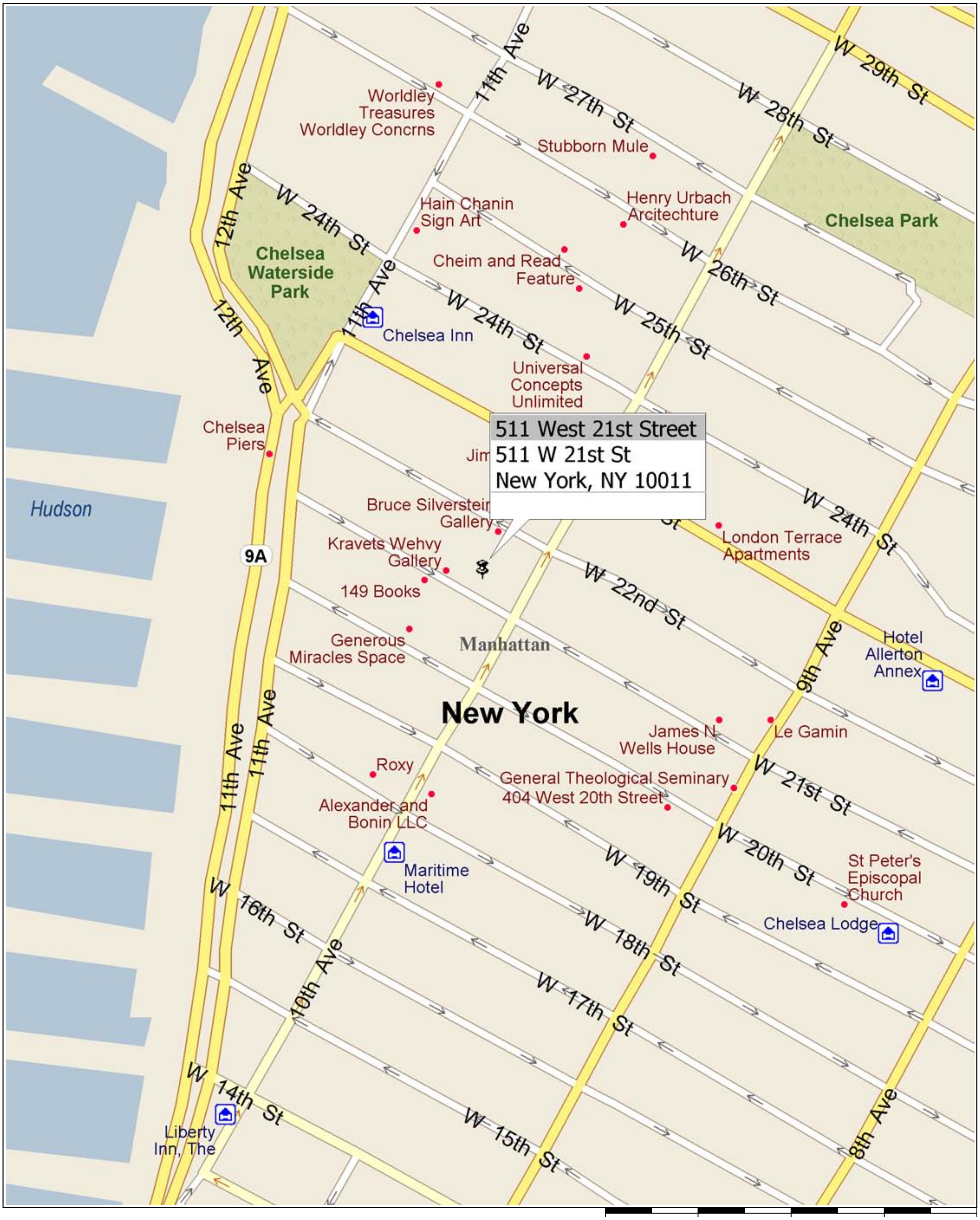
Field personnel will be trained in the proper operation of all field instruments at the start of the field program; however, instruction manuals for all equipment may be stored on-site as a reference of the proper procedures for operation, maintenance and calibration.

5.0 DATA VALIDATION

The sample analytical reports will undergo a third party review of the analyses conducted. The data validator will have the required qualifications as outlined in Appendix 2B in DER-10. The third party will produce a DUSR which will be submitted to the NYSDEC. Five percent of the soil and groundwater analytical data will undergo third party data review.

FIGURES

Site Location Map



TABLES

Table 1
Summary of Analytical Methods
511 West 21st Street
New York, New York

Sample Type	Sample Matrix	Analytical Parameter	No. of Samples[1]	Analytical Method	Sample Preservation	Holding Time[2]	Sample Container[3]
Soil Boring	Soil	TCL VOCS + 10 TICS	TBD	SW-846 Method 8260B	Cool to 4° C; no headspace	14 days to analysis	(2) 2 oz. glass jars
Soil Boring	Soil	TCL SVOCs + 20 TICS	TBD	SW-846 Method 9060A	Cool to 4° C	28 days to extraction	(1) 8 oz glass jar; H_2SO_4 to preserve
Soil Boring	Soil	Metals, TAL	TBD	SW-846 Method 6010B/7000 Series Hg –SW-846 7491A	Cool to 4° C	6 months to analysis	(1) 8 oz glass jar
Soil Boring	Soil	PCBs/Pesticides	TBD	SW-846 Method 8082 & 8081	Cool to 4° C	14 days to extraction	(1) 300 ml amber glass jar
Trip Blank	Aqueous	TCL VOCs	TBD	SW-846 Method 8260B	Cool to 4° C; no headspace, HCl	14 days to analysis	(2) 40mL VOA Vials
Groundwater	Aqueous	TCL VOCs + 10 TICs	TBD	SW-846 Method 8260B	Cool to 4° C; no headspace, HCl	14 days to analysis	(3) 40mL VOA Vials
Groundwater	Aqueous	TCL SVOCs + 20 TICs	TBD	EPA 200.7	Cool to 4° C	6 months	(1) 1 Liter amber glass jar w/HNO_3
Groundwater	Aqueous	TAL Metals	TBD	SW-846 Method 6010B/7000	Cool to 4° C HNO3	28 days to analysis for Hg; 6 months to analysis for other metals	(1) 500 or 950 mL Polyethylene container

[1] Actual number of samples may vary depending on field conditions, sample material availability, and field observations

[2] From date of sample collection, based on SW-846 and consistent with NYSDEC ASP when assuming 2 days for sample shipping

TBD - To Be Determined

TCL – Target Compound List

TAL – Target Analyte List

Table 1 (Cont.)
Summary of Analytical Methods
511 West 21st Street
New York, New York

Sample Type	Sample Matrix	Analytical Parameter	No. of Samples[1]	Analytical Method	Sample Preservation	Holding Time[2]	Sample Container[3]
Waste Disposal/Post Excavation	Soil	TCL VOCS	TBD	SW-846 Method 8260B	Cool to 4° C; no headspace	7 days	(2) 2 oz. glass jars
Waste Disposal/Post Excavation	Soil	TCL SVOCs	TBD	SW-846 Method 8270	Cool to 4° C	14 days	(1) liter glass - amber
Waste Disposal/Post Excavation	Soil	Metals, TAL	TBD	SW-846 Method 6010B/7000 Series Hg –SW-846 7491A	Cool to 4° C	6 months	(1) 8 oz glass jar
Waste Disposal/Post Excavation	Soil	TCLP Metals	TBD	SW846	Cool to 4° C	28 days	(1) 8 oz glass jar
Waste Disposal/Post Excavation	Soil	Total Petroleum Hydrocarbons	TBD	SW846/8015	Cool to 4° C	14 days	(1) 8 oz glass jar
Trip Blank	Aqueous	VOCs, TCL	TBD	SW-846 Method 8260B	Cool to 4° C; no headspace, HCl	14 days	(2) 40mL VOA Vials

[1] – Actual number of samples may vary depending on field conditions, sample material availability and field observations.
[2] – From date of sample collection, based on SW-846 and consistent with NYSDEC ASP when assuming 2 days for sample shipping.
TBD – To Be Determined
TCL – Target Compound List
TAL – Target Analyte List

Table 2
Summary of Quality Control Samples
511 West 21st Street
New York, New York

Sample Type	Sample Matrix	Analytical Parameter	No. of QA/QC Samples
Trip Blank	Water	VOCs	1 per cooler
Duplicate	Soil/Water	VOC, Metals	1 per 20 samples
Equipment Blank	Water	VOC, Metals	1 per 20 samples per equipment type used

APPENDIX A

Accutest Quality Assurance/Quality Control Manual

Quality Systems Manual

Volume XV, Revision 0: February 2014

Effective Date: February 2014

Document Control Number: 116

Nancy Cole

Nancy Cole, Laboratory Director
Technical Director-Inorganics

Phillip M. Worby

Phillip M. Worby, Director, Quality Assurance

Wen-Wen Chi

WenWen Chi, Technical Director-Organics

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Introduction

The Accutest Laboratories Quality Assurance System, detailed in this plan, has been designed to meet the quality program requirements of the National Environmental Laboratory Accreditation Conference (NELAC), ISO Guide 17025, the Department of Defense Environmental Laboratory Approval Program (DOD ELAP) and other National environmental monitoring programs. The plan establishes the framework for documenting the requirements of the quality processes regularly practiced by the Laboratory. The Quality Assurance Director is responsible for changes to the Quality Assurance Program, which is appended to the Quality System Manual (QSM) during the annual program review. The plan is also reviewed annually for compliance purposes by the Company President and Laboratory Director and edited if necessary. Changes that are incorporated into the plan are itemized in a summary of changes following the introduction. Plan changes are communicated to the general staff in a meeting conducted by the Director of Quality Assurance following the plan's approval.

The Accutest plan is supported by standard operating procedures (SOPs), which provide specific operational instructions on the execution of each quality element and assure that compliance with the requirements of the plan are achieved. Accutest employees are responsible for knowing the requirements of the SOPs and applying them in the daily execution of their duties. These documents are updated as changes occur and the staff is trained to apply the changes.

At Accutest, we believe that satisfying client requirements and providing a product that meets or exceeds the standards of the industry is the key to a good business relationship. However, client satisfaction cannot be guaranteed unless there is a system that assures the product consistently meets its design requirements and is adequately documented to assure that all procedural steps are executed, properly documented and traceable.

This plan has been designed to assure that this goal is consistently achieved and the Accutest product withstands the rigors of scrutiny that are routinely applied to analytical data and the processes that support its generation.

Summary of Changes
Accutest Laboratories Quality System Manual – February 2014

Section	**Page**	**Description**
2.0	7	Revised Chang of Command Titles
2.4	8	Inserted New Org Chart
3.0	9	Revised titles in Management Team Definitions
5.0	20	Signature Hierarchy Revised added electronic signature procedures
16.0	62	Added reference to EQA065 & EQA038 for Non-Conformance Procedures & Data Inquiry.
Appendix II, III & IV	---	Revisions Applied as Appropriate: Hg Analyzers revised, ICP & ICP-MS, Hot Blocks, TOC Analyzers, Added Lachat to Gen Chem, Added Organic Prep Water Baths, Added GCMS 4P & 5P to Semivolatiles, Removed ASES from OP and revised Sonicators. Removed Ethos Microwaves from OP, added the N-EVAPs, revised all OP balance identifications. Removed GC & GCMS no longer in Volatiles, added GC-3V & 4V.

Table of Contents

1.0 QUALITY POLICY

1.1 ***Accutest Mission***:

Accutest Laboratories provides analytical services to commercial and government clients in support of environmental monitoring and remedial activities as requested. The Laboratory's mission is dedicated to providing reliable data that satisfies client's requirements as explained in the following:

"Provide easy access, high quality, analytical support to commercial and government clients which meets or exceeds data quality objectives and provides them with the data needed to satisfy regulatory requirements and/or make confident decisions on the effectiveness of remedial activities."

These services are provided impartially and are not influenced by undue commercial or financial pressures which might impact the staff's technical judgment. Coincidently, Accutest does not engage in activities that endanger the trust in our independent judgment and integrity in relation to the testing activities performed.

1.2 ***Policy Statement***:

The management and staff of Accutest Laboratories share the responsibility for product quality and the commitment to the continual improvement of the quality system. Accordingly, Accutest's quality assurance program is designed to assure that all processes and procedures, which are components of environmental data production, meet established industry requirements, are adequately documented from a procedural and data traceability perspective, and are consistently executed by the staff. It also assures that analytical data of known quality, meeting the quality objectives of the analytical method in use and the data user's requirements, is consistently produced in the laboratory. This assurance enables the data user to make rational, confident, cost-effective decisions on the assessment and resolution of environmental issues.

The laboratory Quality System also provides the management staff with data quality and operational feedback information. This enables them to determine if the laboratory is achieving the established quality and operational standards, which are dictated by the client or established by regulation. The information provided to management, through the QA program, is used to assess operational performance from a quality perspective and to perform corrective action as necessary.

All employees of Accutest Laboratories participating in environmental testing receive quality system training and are responsible for knowing and complying with the system requirements. The entire staff shares Accutest's commitment to good professional practice.

Sue Malloy

1/07/14

Date

2.0 ORGANIZATION

2.1 ***Organizational Entity***. Accutest Laboratories is a privately held, independent testing laboratory founded in 1956 and registered as a New Jersey Corporation. The headquarters are located in Dayton, New Jersey where it has conducted business since 1987. Satellite laboratories are maintained in Marlborough, Massachusetts; Orlando, Florida, Houston, Texas, San Jose, California, Wheat Ridge, Colorado, and Scott Louisiana.

2.2 *Management Responsibilities*

Requirement: Each laboratory facility has an established chain of command. The duties and responsibilities of the management staff are linked to the Chairman/CEO of Accutest Laboratories who establishes the agenda for all company activities.

President/CEO. Primary responsibility for all operations and business activities. Delegates authority to laboratory directors, general managers, and the quality assurance director to conduct day to day operations and execute quality assurance duties. Each of the seven operational entities (New Jersey, Florida, Massachusetts, Texas, California, Colorado, and Louisiana) report to the Chairman.

Laboratory Director. Executes day to day responsibility for laboratory operations including technical aspects of production activities and associated logistical procedures. Reports directly to the Presidnet/CEO.

Quality Assurance Director. Design, oversight, and facilitation responsibility for all Quality System elements identified in the Quality Program. Reports directly to the Presidnet/CEO.

Technical Directors (Organics/Inorganic). Responsible for day to day operations and activities of the organics and inorganics laboratories including scheduling, production and data quality. Reports directly to the Laboratory Director.

Organics Manager. Responsible for laboratory managers, supervisors and analyst performing daily laboratory procedures in semi-volatiles and organic prep.

Department Managers. Executes day to day responsibility for specific laboratory areas including technical aspects of production activities and associated logistical procedures. Directly report to the laboratory director.

Section Supervisors. Executes day to day responsibility for specific laboratory units including technical aspects of production activities and associated logistical procedures. Direct report to the Department Manager.

2.3 ***Chain of Command***

The responsibility for managing all aspects of the Company's operation is delegated to specific individuals, who have been assigned the authority to act in the absence of the senior staff. These individuals are identified in the following Chain of Command:

Phillip B. Rooney, Chairman
Gene Malloy, President & Chief Executive Officer
Chad Tate, Chief Financial Officer
Nancy Cole, Laboratory Director
Phillip Worby, Director, Corporate Quality Assurance
Matt Cordova, Director, Client Services

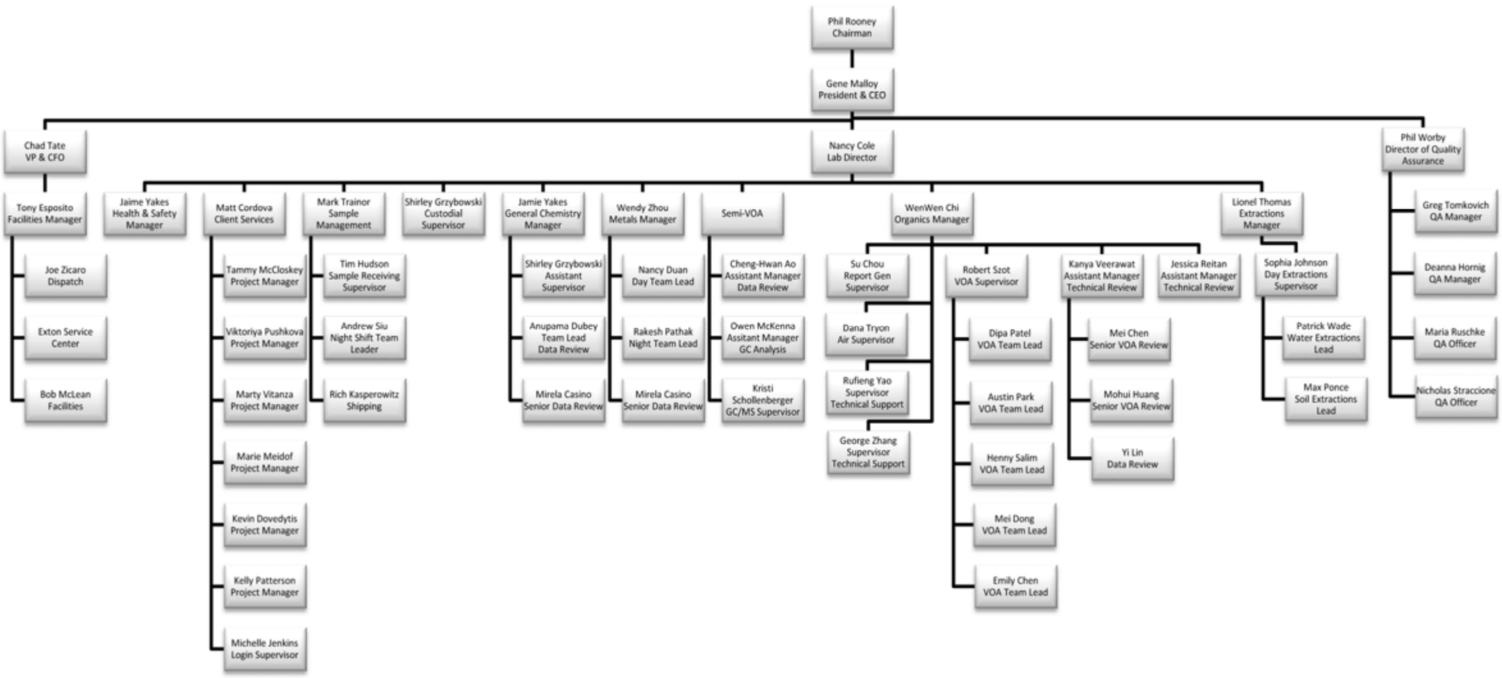
2.4 ***Organization Chart***

The hierarchy of the Company's operational control and oversight is illustrated in the Accutest Laboratories Organization Chart. Employees listed with an asterisk would be considered to be the appointed deputy in the event that the technical director or corporate quality assurance director are absent from their respective position for a period of time exceeding fifteen (15) consecutive calendar days. If this absence exceeds thirty-five (35) consecutive calendar days the laboratory shall notify the NJDEP-Office of Quality Assurance in writing.

Should this absence exceed sixty-five consecutive calendar days the DOD ELAP Accrediting Body shall be notified in writing.

Accutest New Jersey
Organization Chart
January 30, 2014

Core



3.0 QUALITY RESPONSIBILITIES OF THE MANAGEMENT TEAM

3.1 ***Requirement***: Each member of the management team has a defined responsibility for the Quality System. System implementation and operation is designated as an operational management responsibility. System design and implementation is designated as a Quality Assurance Responsibility.

Chairman. Primary responsibility for all quality activities. Delegates program responsibility to the Quality Assurance Director. Has the ultimate responsibility for implementation of the Quality System.

President/CEO. Primarily responsible for process improvements to all business aspects of the company.

Laboratory Director. Responsible for implementing and operating the Quality System in all laboratory areas. Responsible for the design and implementation of corrective action for defective processes. Has the authority to delegate Quality System implementation responsibilities.

Quality Assurance Director. Responsible for design, implementation support, training, and monitoring of the quality system. Identifies product, process, or operational defects using statistical monitoring tools and processes audits for elimination via corrective action. Empowered with the authority to halt production if quality issues warrant immediate action. Monitors implemented corrective actions for compliance.

Technical Directors. Responsible for overseeing the technical aspects of the quality assurance system as they are integrated into method applications and employed to assess analytical control on a daily basis. The Technical directors review and acknowledge the technical feasibility of proposed QA systems involving technical applications of applied methodology.

Department Managers. Responsible for applying the requirements of the Quality System in their section and assuring subordinate supervisors and staff apply all system requirements. Initiates, designs, documents, and implements corrective action for quality deficiencies.

Section Supervisors & Team Leaders. Responsible for applying the requirements of the Quality System to their operation and assuring the staff applies all system requirements. Initiates, designs, documents, and implements corrective action for quality deficiencies.

Quality Assurance Officers. Responsible for design support, implementation support, training, and monitoring support for the quality system. Conducts audits and product reviews to identify product, process, or operational defects using statistical monitoring tools and processes audits for elimination via corrective action. Provides support for implemented corrective actions for compliance. Serves as the primary alternate in the absence of the Quality Assurance Director.

Bench Analysts. Responsible for applying the requirements of the Quality System to the analyses they perform, evaluating QC data and initiating corrective action for quality control deficiencies within their control. Implements global corrective action as directed by superiors.

3.2 ***Program Authority***. Authority for program implementation originates with the Chairman who bears the ultimate responsibility for system design, implementation, and enforcement of requirements. This authority and responsibility is delegated to the Director of Quality Assurance who performs quality functions independently without the encumbrances or biases associated with operational or production responsibilities to ensure an honest, independent assessment of quality issues.

3.3 ***Data Integrity Policy***: The Accutest Data Integrity Policy reflects a comprehensive, systematic approach for assuring that data produced by the laboratory accurately reflects the outcome of the tests performed on field samples and has been produced in a bias free environment by ethical professionals. The policy includes a commitment to technical ethics, staff training in ethics and data integrity, an individual attestation to data integrity and procedures for evaluating data integrity. Senior management assumes the responsibility for assuring compliance with all technical ethics elements and operation of all data integrity procedures. The staff is responsible for compliance with the ethical code of conduct and for practicing data integrity procedures.

The Accutest Data Integrity Policy is as follows:

"Accutest Laboratories is committed to producing data that meets the data integrity requirements of the environmental regulatory community. This commitment is demonstrated through the application of a comprehensive data integrity program that includes ethics and data integrity training, data integrity evaluation procedures, staff participation and management oversight. Adherence to the specifications of the program assures that data provided to our clients is of the highest possible integrity and can be used for decision making processes with high confidence."

Data Integrity Responsibilities

Management. Senior management retains oversight responsibility for the data integrity program and retains ultimate responsibility for execution of the data integrity program elements. Senior management is responsible for providing the resources required to conduct ethics training and operate data integrity evaluation procedures. They also include responsibility for creating an environment of trust among the staff and being the lead advocate for promoting the data integrity policy and the importance of technical ethics. The Quality Assurance Director is the designated ethics officer for the Company.

Staff. The staff is responsible for adhering to the company ethics policy as they perform their duties and responsibilities associated with sample analysis and reporting. By executing this responsibility, data produced by Accutest Laboratories retains its high integrity characteristics and withstands the rigors of all data integrity checks.

The staff is also responsible for adhering to all laboratory requirements pertaining to manual data edits, data transcription and data traceability. These include the application of approved manual peak integration and documentation procedures. It also includes establishing traceability for all manual results calculations and data edits.

Ethics Statement. The Accutest ethics statement reflects the standards that are expected for businesses that provide environmental services to regulated entities and regulatory agencies on a commercial basis. The Ethics Policy is comprised of key elements that are essential to organizations that perform chemical analysis for a fee. As such, it focuses on elements related to personal, technical and business activities.

Accutest Laboratories provides analytical chemistry services on environmental matters to the regulated community. The data the company produces provides the foundation for determining the risk presented by a chemical pollutant to human health and the environment. The environmental industry is dependent upon the accurate portrayal of environmental chemistry data. This process is reliant upon a high level of scientific and personal ethics.

It is essential to the Company that each employee understands the ethical and quality standards required to work in this industry. Accordingly, Accutest has adopted a code of ethics, which each employee is expected to adhere to as follows:

- Perform chemical and microbiological analysis using accepted scientific practices and principles.
- Perform tasks in an honest, principled and incorruptible manner inspiring peers & subordinates.
- Maintain professional integrity as an individual.
- Provide services in a confidential, honest, and forthright manner.
- Produce results that are accurate and defensible.
- Report data without any considerations of self-interest.
- Comply with all pertinent laws and regulations associated with assigned tasks and responsibilities.

Data Integrity Procedures. Four key elements comprise the Accutest data integrity system. Procedures have been implemented for conducting data integrity training and for documenting that employees conform to the Accutest Data Integrity and Ethics policy.

The data integrity program consists of routine data integrity evaluation and documentation procedures to periodically monitor and document data integrity. These procedures are documented as SOPs. SOPs are approved and reviewed annually following the procedures employed for all Accutest SOPs. Documentation associated with data integrity evaluations is maintained on file and is available for review.

Data Integrity Training. Accutest employees receive technical ethics training during new employee orientation. Employees are also required to refresh their ethical conduct agreement annually, which verifies their understanding of Accutest ethics policy and their ethical responsibilities. A brochure summarizing the details of the Accutest Data Integrity Policy is distributed to all employees with the Ethical Conduct Agreement. The refreshed agreement is appended to each individual's training file.

The training focuses on the reasons for technical ethics training, explains the impact of data fraud on human health and the environment, and illustrates the consequences of criminal fraud on businesses and individual careers. Accutest ethics policy and code of ethics are reviewed and explained for each new employee.

Training on data integrity procedures are conducted by individual departments for groups involved in data operations. These include procedures for manual chromatographic peak integration, traceability for manual calculations and data transcription.

Data Integrity Training Documentation. Records of all data integrity training are maintained in individual training folders. Attendance at all training sessions is documented and maintained in the training archive.

Accutest Data Integrity and Ethical Conduct Agreement. All employees are required to sign a Data Integrity and Ethical Conduct Agreement annually. This document is archived in individual training files, which are retained for duration of employment.

The Data Integrity and Ethical Conduct Agreement are as follows:

I. *I understand the high ethical standards required of me with regard to the duties I perform and the data I report in connection with my employment at Accutest Laboratories.*

II. *I have received formal instruction on the code of ethics that has been adapted by Accutest Laboratories during my orientation and agree to comply with these requirements.*

III. *I have received formal instruction on the elements of Accutest Laboratories' Data Integrity Policy and have been informed of the following specific procedures:*

   a. *Formal procedures for the confidential reporting of data integrity issues are available, which can be used by any employee,*

   b. *A data integrity investigation is conducted when data issues are identified that may negatively impact data integrity.*

   c. *Routine data integrity monitoring is conducted on sample data, which may include an evaluation of the data I produce,*

IV. *I have read the brochure detailing Accutest Laboratories Data Integrity and Ethics Program as required.*

V. *I am aware that data fraud is a punishable crime that may include fines and/or imprisonment upon conviction.*

VI. *I also agree to the following:*

   a. *I shall not intentionally report data values, which are not the actual values observed or measured.*

   b. *I shall not intentionally modify data values unless the modification can be technically justified through a measurable analytical process.*

   c. *I shall not intentionally report dates and times of data analysis that are not the true and actual times the data analysis was conducted.*

   d. *I shall not condone any accidental or intentional reporting of inauthentic data by other employees and immediately report it's occurrence to my superiors.*

   e. *I shall immediately report any accidental reporting of inauthentic data by myself to my superiors.*

Data Integrity Monitoring. Documented procedures are employed for performing data integrity monitoring. These include regular data review procedures by supervisory and management staff (Section 12.7), supervisory review and approval of manual integrations and periodic reviews of GALP audit trails from the LIMS and all computer controlled analysis.

Data Review. All data produced by the laboratory undergoes several levels of review, which includes two levels of management review. Detected data anomalies that appear to be related to data integrity issues are isolated for further investigation. The investigation is conducted following the procedures described in this section.

Manual Peak Integration Review and Approval. Routine data review procedures for all chromatographic processes includes a review of all manual chromatographic peak integrations. This review is performed by the management staff and consists of a review of the machine integration compared to the manual integration. Manual integrations, which have been performed in accordance with Accutest manual peak integration procedures, are approved for further processing and release. Identification of samples and analytes in which manual integration had been necessary may be recorded in a report case narrative specific to a particular client and project requirement.

Manual integrations which are not performed to Accutest specifications are set aside for corrective action, which may include analyst retraining or further investigation as necessary.

GALP Audit Trail Review. Good Automated Laboratory Practice (GALP) audits are comprehensive data package audits that include a review of raw data, process logbooks, processed data reports and GALP audit trails from individual instruments and LIMS. GALP audit trails, which record all electronic data activities, are available for the majority of computerized methodology and the laboratory information management system (LIMS). These audit trails are periodically reviewed to determine if interventions performed by technical staff constitute an appropriate action. The review is performed on a recently completed job and includes interviews with the staff who performed the analysis. Findings indicative of inappropriate interventions or data integrity issues are investigated to determine the cause and the extent of the anomaly.

Confidential Reporting of Data Integrity Issues. Data integrity concerns may be raised by any individual to their supervisor. Employees with data integrity concerns should always discuss those concerns with their immediate supervisors as a first step unless the employee is concerned with the confidentiality of disclosing data integrity issues or is uncomfortable discussing the issue with their immediate supervisors. The supervisor makes an initial assessment of the situation to determine if the concern is related to a data integrity violation. Those issues that appear to be violations are documented by the supervisor and referred to the Director of Quality Assurance for investigation.

Documented procedures for the confidential reporting of data integrity issues in the laboratory are part of the data integrity policy. These procedures assure that laboratory staff can privately discuss ethical issues or report items of ethical concern without fears of repercussions with senior staff.

Employees with data integrity concerns that they consider to be confidential are directed to the Corporate Human Resources Manager in Dayton, New Jersey. The HR Manager acts as a conduit to arrange a private discussion between the employee and the Corporate QA Director or a local QA Officer.

During the employee - QA discussion, the QA representative evaluates the situation presented by the employee to determine if the issue is a data integrity concern or a legitimate practice. If the practice is legitimate, the QA representative clarifies the process for the employee to assure understanding. If the situation appears to be a data integrity concern, the QA representative initiates a Data Integrity Investigation following the procedures specified in SOP EQA059.

Data Integrity Investigations. Follow-up investigations are conducted for all reported instances of ethical concern related to data integrity. Investigations are performed in a confidential manner by senior management according to a documented procedure. The outcome of the investigation is documented and reported to the company president who has the ultimate responsibility for determining the final course of action in the matter. Investigation documentation includes corrective action records, client notification information and disciplinary action outcomes, which is archived for a period of five years.

The investigations are conducted by the senior staff and supervisory personnel from the affected area. The investigations team includes the Laboratory Director and the Quality Assurance Director. Investigations are conducted in a confidential manner until it is completed and resolved.

The investigation includes a review of the primary information in question by the investigations team. The team performs a review of associated data and similar historical data to determine if patterns exist. Interviews are conducted with key staff to determine the reasons for the observed practices.

Following data compilation, the investigations team reviews all information to formulate a consensus conclusion. The investigation results are documented along with the recommended course of action.

Corrective Action, Client Notification & Discipline. Investigations that reveal systematic data integrity issues will be referred for corrective action, resolution and disposition (Section 13). If the investigation indicates that an impact to data has occurred and the defective data has been released to clients, client notification procedures will be initiated following the steps in Section 17.6.

In all cases of data integrity violations, some level of disciplinary action will be conducted on the responsible individual. The level of discipline will be consistent with the violation and may range from retraining and/or verbal reprimand to termination. A zero tolerance policy is in effect for unethical actions.

4.0 JOB DESCRIPTIONS OF KEY STAFF

4.1 ***Requirement***: Descriptions of key positions within the organization are defined to ensure that clients and staff understand duties and the responsibilities of the management staff and the reporting relationships between positions.

Chairman. Responsible for all laboratory operations and business activities. Establishes the company mission and objectives in response to business needs. Direct supervision of each laboratory director, client services, management information systems, quality assurance and health and safety.

President/CEO. Responsible for overall process improvement for all business processes. Is also responsible for Quality Assurance, IT Development and Health and Safety. Reports directly to the Chairman/CEO.

Laboratory Director. Reports to the company President/CEO. Establishes laboratory operations strategy. Direct supervision of client services, organic chemistry, inorganic chemistry, field services, and sample management. Maintains operational responsibility for the designated regional laboratories as defined in the Accutest Laboratories Organization Chart. Assumes the responsibilities of the CEO in his absence.

Vice President, Chief Information Officer. Reports to President/CEO. Develops IT Software and hardware agenda. Provides system strategies to compliment company objectives. Maintains all software and hardware used for data handling.

Vice President, Chief Financial Officer. Reports to the company President /CEO. Responsibilities include overseeing the Financial Accounting and Human Resource Department, Corporate Purchasing, Corporate IT Help Desk, and Salary and Benefit Administration.

Director, Quality Assurance. Reports to the company President/CEO and functions independently from laboratory operations. Establishes the company quality agenda, develops quality procedures, provides assistance to operations on quality procedure implementation, coordinates all quality control activities, monitors the quality system, and provides quality system feedback to management to be used for process improvement. Assumes the responsibilities of the CEO in the absence of the CEO and the President/CEO.

Director Client Services. Reports to the Laboratory Director. Establishes and maintains communications between clients and the laboratory pertaining to client requirements which are related to sample analysis and data deliverables. Initiates client orders and supervises sample login operations.

Manager, Organics (Organics Technical Director). Reports to the laboratory director. Directs the operations of the organics group, consisting of organics preparation and instrumental analysis. Establishes daily work schedule. Supervises method implementation, application, and data production. Responsible for following Quality System requirements.

Maintains laboratory instrumentation in an operable condition. Assumes the responsibilities of the Laboratory Director in his absence.

Manager, Inorganics (Inorganics Technical Director). Reports to the laboratory director. Directs the operations of the inorganics group, consisting of wet chemistry and the metals laboratories. Establishes daily work schedule. Supervises method implementation, application, and data production. Responsible for following Quality System requirements. Maintains laboratory instrumentation in an operable condition. Assumes the responsibilities of the Laboratory Director in his absence.

Manager, Field Services. Reports to the laboratory director. Conducts field sampling and analysis of "analyze immediately" parameters in support of ongoing field projects. Responsible for proper collection, preservation, documentation and shipment of field samples. Maintains field sampling and field instrumentation required to perform primary responsibilities.

Manager, Sample Management. Reports to the laboratory director. Develops, maintains and executes all procedures required for receipt of samples, verification of preservation, and chain of custody documentation. Responsible for maintaining and documenting secure storage, delivery of samples to laboratory units on request and courier services.

Manager, Health and Safety. Reports to the President/CEO. Responsible for developing company safety program and chemical hygiene plan. Reviews and updates these plans annually. Responsible for employee training on relevant health and safety topics. Documents employee training. Manages laboratory waste management program.

Supervisor, Wet Chemistry. Reports to the inorganics manager. Executes daily analysis schedule. Supervises the analysis of samples for wet chemistry parameters using valid, documented methodology. Maintains instrumentation in an operable condition. Reviews data for compliance to quality and methodological requirements. Assumes the responsibilities of the Inorganics Manager in his absence.

Supervisor, Metals. Reports to the inorganics manager. Executes daily analysis schedule. Supervises the analysis of samples for metallic elements using valid, documented methodology. Documents all procedures and data production activities. Maintains instrumentation in an operable condition. Reviews data for compliance to quality and methodological requirements.

Supervisor, Organic Preparation. Reports to the organics manager. Executes the daily sample preparation schedule. Performs the extract of multi-media samples for organic constituents using valid, documented methodology. Prepares documentation for extracted samples. Assumes custody until transfer for analysis.

Technical Support Supervisor, Organics. Reports to the organic manager. Oversees all instrument maintenance and new equipment installation. Conducts method development and implementation tasks.

Assistant Manager, Organics. Reports to the organics manager. Expedites the analysis of samples and sample extracts. Executes daily analysis schedule. Supervises the analysis of samples for organic parameters using valid, documented methodology. Documents all data and data production activities. Maintains instrumentation in an operable condition. Reviews data for compliance to quality and methodological requirements. Assumes the responsibilities of the Organics Manager in his absence.

Supervisor, Report Generation. Reports to the organics manager. Compiles raw and processed sample data and assembles into client-ready reports. Initiates report scanning for archiving purposes. Maintains raw batch data in accessible storage. Mails completed reports to clients according to specified report turnaround schedule.

Quality Assurance Officers. Reports to the Director, Quality Assurance. Performs quality control data review for trend monitoring purposes. Conducts internal audits and prepares reports for management review. Oversees proficiency testing program. Process quality control data for statistical purposes. Assumes the responsibilities of the Quality Assurance Director in his absence.

4.2 ***Employee Screening, Orientation, and Training***.

All potential laboratory employees are screened and interviewed by human resources and technical staff prior to their hire. The pre-screen process includes a review of their qualifications including education, training and work experience to verify that they have adequate skills to perform the tasks of the job.

Newly hired employees receive orientation training beginning the first day of employment by the Company. Orientation training consists of initial health and safety training including general laboratory safety, personal protection and building evacuation. Orientation also includes quality assurance program training, data integrity training, and an overview of the Company's goals, objectives, mission, and vision.

All technical staff receives training to develop and demonstrate proficiency for the methods they perform. New analysts work under supervision until the supervisory staff is satisfied that a thorough understanding of the method is apparent and method proficiency has been demonstrated, through a precision and accuracy study that has been documented, reviewed and approved by the QA Staff. Data from the study is compared to method acceptance limits. If the data is unacceptable, additional training is required. The analyst may also demonstrate proficiency by producing acceptable data through the analysis of an independently prepared proficiency sample.

Individual proficiency is demonstrated annually for each method performed. Data from initial and continuing proficiency demonstrations are archived in the individual's training folder.

4.3 ***Training Documentation***. The human resources department prepares a training file for every new employee. All information related to qualifications, experience, external training courses, and education are placed into the file. Verification documentation for orientation, health & safety, quality assurance, and ethics training is also included in the file.

Additional training documentation is added to the file as it is developed. This includes documentation of SOP understanding, data for initial and continuing demonstrations of proficiency, performance evaluation study data and notes and attendance lists from group training sessions.

The Quality Assurance Department maintains the employee training database. This database is a comprehensive inventory of training documentation for each individual employee. The database enables supervisors to obtain current status information on training data for individual employees on a job specific basis. It also enables the management staff to identify training documentation in need of completion.

Employee specific database records are created by human resources on the date of hire. Data base fields for job specific requirements such as SOP documentation of understanding and annual demonstration of analytical capability are automatically generated when the supervisor assigns a job responsibility. Employees acknowledge that their SOP responsibilities have been satisfied using a secure electronic process which updates the database record. Reports are produced which summarize the qualifications of individual employees or departments.

5.0 SIGNATORY APPROVALS

Requirement: Procedures have been developed for establishing the traceability of data and documents. The procedure consists of a signature hierarchy, indicating levels of authorization for signature approvals of data and information within the organization. Signature authority is granted for approval of specific actions based on positional hierarchy within the organization and knowledge of the operation that requires signature approval. SOP EQA032 Signature Authority explains the process of Accutest Signature Authority and the use of electronic signatures in the laboratory. A log of signatures and initials of all employees is maintained by the HR Staff for cross-referencing purposes.

5.1 ***Signature Hierarchy***.

Chairman. Authorization for contracts and binding agreements with outside parties. Approval of final reports, quality assurance policy, SOPs, project specific QAPs, data review and approval in lieu of technical managers. Note: Contract signature authority resides with Company officers only, which include the Chairman, Chief Financial Officer and President/CEO Administration.

President/CEO. Approval of quality assurance policy in lieu of the Director, Quality Assurance. IT Development and Health and Safety purchase approvals in Lieu of IT and H & S managers.

Laboratory Director. Approval of final reports in the absence of the President. Approval of SOPs, project specific QAPs, data review and approval in lieu of technical managers. Establishes and implements technical policy.

Vice President, Chief Information Officer. Department specific supplies purchase. MIS policy.

Director, Quality Assurance. Approval of final reports and quality assurance policy in the absence of the President. Approval of SOPs, project specific QAPs, data review and approval in lieu of technical managers.

Director, Client Services. QAP and sampling and analysis plan approval. Project specific contracts, pricing, and price modification agreements. Approval and acceptance of incoming work, Client services policy.

Managers, Technical Departments. Methodology and department specific QAPs. Data review and approval, department specific supplies purchase. Technical approval of SOPs.

Manager, Sample Management. Initiation of laboratory sample custody and acceptance of all samples. Approval of department policies and procedures. Department specific supplies purchase.

Manager, Health & Safety. Approval of health and safety policy in the absence of the President and Executive Vice Presidnt. Approval of health and safety SOPs. Waste manifesting and approval.

Assistant Managers: Technical Departments. Data review approval, purchasing of expendable supplies.

Supervisor, Field Services. Sampling plan design and approval. Data review for field parameters. State form certification. Department policies and procedures. Department specific supplies purchase.

Supervisors, Technical Departments. Data review approval, purchasing of expendable supplies.

5.2 ***Signature Requirements***. All laboratory activities related to sample custody and generation or release of data must be approved using either initials, signatures or electronic, password protected procedures. The individual, who applies his signature initial or password to an activity or document, is authorized to do so within the limits assigned to them by their supervisor. All written signatures and initials must be applied in a readable format that can be cross-referenced to the signatures and initials log if necessary.

5.3 ***Signature and Initials Log***. The HR group maintains a signature and initials log. New employee signatures and initials are appended to the log on the first day of employment. Signature of individuals no longer employed by the company are retained, but annotated with their date of termination.

5.4 ***Electronic Signature Log.*** Key technical staff will sign a liability document for their signatures designating the use of their electronic signatures on an annual basis. Quality Assurance team keeps a wet copy of these signatures on form QA115.

6.0 DOCUMENTATION & DOCUMENT CONTROL

Requirement: Document control policies have been established which specify that any document used as an information source or for recording analytical or quality control information must be managed using defined document control procedures. Accordingly, policies and procedures required for the control, protection, and storage of any information related to the production of analytical data and the operation of the quality system to assure its integrity and traceability have been established and implemented in the laboratory. The system contains sufficient controls for managing, archiving and reconstructing all process steps which contributed to the generation of an analytical test result. Using this system, an audit trail for reported data can be produced, establishing complete traceability for the result.

6.1 ***Administrative Records***. Administrative (non-analytical) records are managed by the quality assurance department. These records consist of electronic documents which are retained in a limited access electronic directory or paper documents, which are released to the technical staff upon specific request.

Form Generation, Modification & Control. The quality assurance group approves and manages all forms used as either stand-alone documents or in logbooks to ensure their traceability. Forms are generated as computer files only and are maintained in a limited access master directory. The QA staff also manages and approves modifications to existing forms. Obsolete editions of modified forms are retained for seven years.

Approved forms are assigned a 5-character alphanumeric code. The first two alpha characters designate the department that uses the form; the next three digits are sequentially assigned number.

New forms must include the name Accutest Laboratories and appropriate spaces for signatures of approval and dates. Further design specifications are the responsibility of the originating department.

The technical staff is required to complete all forms to the maximum extent possible. If information for a specific item is unavailable, the analyst is required to “Z” the information block. The staff is also required to “Z” the uncompleted portions of a logbook or logbook form if the day’s analysis does not fill the entire page of the form.

Logbook Control. All laboratory logbooks are controlled documents that are comprised of approved forms used to document specific processes. New logs are numbered and issued to a specific individual who is assigned responsibility for the log. Old logs are returned to QA for entry into the document archive system where they are retained for seven (7) years. Laboratory staff may hold a maximum of two consecutively dated logbooks of the same type in the laboratory including the most recently issued book to simplify review of recently completed analysis.

Controlled Documents. Key laboratory documents that are distributed internally and externally are numbered for tracking purposes. Individuals receiving documents, who must be informed when changes occur, receive controlled copies of those documents. Controlled status simplifies document updates and retrieval of outdated documents. Control is maintained through a document numbering procedure and document control logbook which identifies the individual receiving the controlled document and the date of receipt. Key documents are also distributed as uncontrolled documents if the recipient does not require updated copies when changes occur. Key documents in uncontrolled status are numbered and tracked using the same procedures as controlled documents.

Quality Systems Manual (QSM). All QSMs are assigned a number prior to distribution. The number, date of distribution, and identity of the individual receiving the document are recorded in the document control logbook. The numbering system is restarted with each new volume, which corresponds to the annual revision of the QSM. Electronic versions are distributed as read only files that are password protected.

Standard Operating Procedures (SOPs). SOPs are maintained by pre-designating the numbers of official copies of documents that are placed into circulation within the laboratory. Official documents are copied to green paper and placed into the appropriate laboratory section as follows:

Administrative: One master copy for the administrative file.

Sample Management: One controlled green copy for the sample management file.

Organics Laboratories: Two controlled green copies, one for the affected laboratory area, and one for the organics laboratory file.

Inorganics Laboratories: Two controlled green copies, one for the affected laboratory area, and one for the inorganics laboratory file.

Field Services: One controlled green copy for each field sampling team (generally a single field technician).

The original, signed copy of the SOP is maintained in the master SOP binder by the QA staff. The QA staff collects outdated versions of SOPs as they are replaced and archived for a period of seven (7) years in the QA archives. Electronic versions of outdated SOPs are moved from the active SOP directory to the inactive directory.

6.2 ***Technical Records***. All records related to the analysis of samples and the production of an analytical result are archived in secure document storage or on electronic media and contain sufficient detail to produce an audit trail which re-creates the analytical result. These records include information related to the original client request, bottle order, sample login and custody, storage, sample preparation, analysis, data review and data reporting.

Each department involved in this process maintains controlled documents which enable them to maintain records of critical information relevant to their department's process.

6.3 ***Quality Control Support Data & Records***. All information and data related to the quality system is stored in a restricted access directory on the network server. Information on this directory is backed-up daily. Users of the quality assurance information and data have "read-only" access to the files contained in the directory. The QA staff and the laboratory director have write capability in this directory.

This directory contains all current and archived quality system manuals, SOPs, control limits, MDL studies, precision and accuracy data, official forms, internal audit reports, proficiency test scores and metrics calibration information.

The following information is retained in the directory:

Quality System Manuals
Standard Operating Procedures
ASTM & NIST Methods
Bottleware & Preservative QC Data
Certification Documentation
Change Management Data
External Audit Reports
Internal Audit Reports
Corrective Action Database
Laboratory Forms Directory
Health & Safety Manuals
Inactive Standard Operating Procedures
Method Detection Limit Data
Metrics Inventory & Calibration Data
Microbiology Reagent Data
Performance Limits
Proficiency Test Scores & Statistics
Project Specific Analytical Requirements
QC Report Reviews
Regulatory Agency Quality Documents
Staff Bios And Job Descriptions
State Specific Methods

6.4 ***Analytical Records***. All data related to the analysis of field samples are retained as either paper or electronic records that can be retrieved to compile a traceable audit trail for any reported result. All information is linked to the client job and sample number, which serves as a reference for all sample related information tracking.

Critical times in the life of the sample from collection through analysis to disposal are documented. This includes date and time of collection, receipt by the laboratory, preparation times and dates, analysis times and dates and data reporting information. Analysis times are calculated in hours for methods where holding time is specified in hours (≤72 hours).

Sample preparation information is recorded in a separate controlled logbook. It includes sample identification numbers, types of analysis, preparation and cleanup methods, sample weights and volumes, reagent lot numbers and volumes and any other information pertinent to the preparation procedure.

Information related to the identification of the instrument used for analysis is permanently attached to the electronic record. The record includes an electronic data file that indicates all instrument conditions employed for the analysis, including the type of analysis conducted. The analyst's identification is electronically attached to the record. The instrument tuning and calibration data is electronically linked to the sample or linked though paper logs which were used in the documentation of the analysis. Quality control and performance criteria are permanently linked to the paper archive or electronic file.

Paper records for the identity, receipt, preparation and evaluation of all standards and reagents used in the analysis are documented in prepared records and maintained in controlled documents or files. Lot number information linking these materials to the analysis performed is recorded in the logbooks associated with the samples in which they were used.

Manual calculations or peak integrations that were performed during the data review are retained as paper or scanned documents and included as part of the electronic archive. Signatures for data review are retained on paper or as scanned versions of the paper record for the permanent electronic file.

6.5 ***Confidential Business Information (CBI).*** Operational documents including SOPs, Quality Manuals, personnel information, internal operations statistics, and laboratory audit reports are considered confidential business information. Strict controls are placed on the release of this information to outside parties.

Release of CBI to outside parties or organizations may be authorized upon execution of a confidentiality agreement between Accutest and the receiving organization or individual. CBI information release is authorized for third party auditors and commercial clients in electronic mode as Adobe Acrobat .PDF format only.

6.6 ***Software Change Documentation & Control.*** Changes to software are documented as text within the code of the program undergoing change. Documentation includes a description of the change, reason for change and the date the change was placed into effect. Documentation indicating the adequacy of the change is prepared following the evaluation by the user who requested the change.

6.7 ***Report and Data Archiving***. Accutest Laboratories produces digital files of all raw and processed data which is maintained for a minimum period of seven (7) years. The archived files consist of all raw data files and source documents associated with the analysis of field samples and proficiency test samples. Data files and source documents associated with method calibration and project and method quality control are also archived. After seven years, the files may be discarded unless contractual arrangements exist which dictate different requirements. Client or regulatory agency specific data retention practices are employed for several government organizations such as the Department of Defense and the Massachusetts Department of Environmental Protection that require a retention period of ten (10) years. Data archiving may also be extended up to ten (10) years for specific commercial clients in response to contractual requirements.

Complete date and time stamped PDF reports are generated automatically from the laboratory information management system (LIMS) using the source documents archived on the document server. These source documents are maintained on a document server and archived to primary and clone tapes. The primary tapes remain on premises while the clone tapes are taken to a secure offsite location for permanent storage. Both the primary and clone tapes remain in storage for the remainder of the archive period.

6.8 ***Training***. The company maintains a training record for all employees that documents that they have received instruction on administrative and technical tasks that are required for the job they perform. Training records for individuals employed by the company are retained for a period of six months following their termination of employment.

Training File Origination. The Human Resources Group (HR) initiates training files. The QA staff, through the Assistant Quality Assurance officer, retains the responsibility for the maintenance and tracking of all training related documentation in the file. The file is begun on the first day of employment. Information required for the file includes a copy of the individual's most current resume, detailing work experience and a copy of any college diplomas and transcript(s). Information added on the first day includes documentation of health and safety training, quality assurance training and a signed data integrity training and ethical conduct agreement.

Training documentation, training requirements, analyst proficiency information and other training related support documentation is tracked using a customized database application (Section 4.3). Database extracts provide an itemized listing of specific training requirements by job function. Training status summaries for individual analysts portray dates of completion for job specific training requirements.

6.9 ***Technical Training***. The supervisor of each new employee is responsible for developing a training plan for each new employee. The supervisor evaluates the employees training progress at regular frequencies. Supporting documentation, including demonstration of capability and precision and accuracy studies, which demonstrate an analyst's proficiency for a specific test, are added to the training file as completed. Employees and supervisors verify documentation of understanding (DOU) for all assigned standard operating procedures in the training database. Certificates or diplomas for any off-site training are also added to the file.

7.0 REFERENCE STANDARD TRACEABILITY

Requirement: Documented procedures, which establish traceability between any measured value and a national reference standard, are established by the laboratory as required. All metric measurements are traceable to NIST reference weights or thermometers that are calibrated on a regular schedule. All chemicals used for calibration of a quantitative process are traceable to an NIST reference that is documented by the vendor using a certificate of traceability. The laboratory maintains a documentation system that establishes the traceability links. The procedures for verifying and documenting traceability are documented in standard operating procedures.

7.1 ***Traceability of Metric Measurements - Thermometers***. Accutest uses NIST thermometers to calibrate commercially purchased thermometers prior to their use in the laboratory and annually thereafter for liquid in glass thermometers or quarterly for electronic temperature measuring devices. If necessary, thermometers are assigned correction factors that are determined during their calibration using an NIST thermometer as the standard. The correction factor is documented in a thermometer calibration database and on a tag attached to the thermometer. The correction factor is applied to temperature measurements before recording the measurement in the temperature log. Calibration of each thermometer is verified and documented on a regular schedule. The NIST thermometer is checked for accuracy by an ISO 17025 approved vendor every five (5) years following the specifications for NIST thermometer calibration verification detailed in the united States Environmental Protection Agency's "Manual for the Certification of Laboratories Analyzing Drinking Water", Fifth Edition, February2005.

7.2 ***Traceability of Metric Measurements – Calibration Weights***. Accutest uses calibrated weights, which are traceable to NIST standard weights to calibrate all balances used in the laboratory. Balances are calibrated to specific tolerances within the intended use range of the balance. Calibration checks are required on each day of use. If the tolerance criteria are not achieved, corrective action specified in the balance calibration SOP is applied before the balance can be used for laboratory measurements. Recalibration of all calibration weights is conducted and documented on a biannual basis.

7.3 ***Traceability of Chemical Standards***. All chemicals, with the exception of bulk dry chemicals and acids, purchased as reference standards for use in method calibration must establish traceability to NIST referenced material through a traceability certificate. Process links are established that enable a calibration standard solution to be traced to its NIST reference certificate.
Chemical standards used for analysis must meet the purity specifications of the method. These specifications must be stated in the reagents section of the method SOP.

7.4 ***Assignment of Reagent, Bulk Chemical and Standard Expiration Dates.*** Expiration date information for all purchased standards, prepared standard solutions and selected reagents is provided to Accutest by the vendor as a condition of purchase. Neat materials, bulk chemicals including solvents, acids and inorganic reagents are not required to be purchased with expiration dates. An expiration date of five (5) years from the date of receipt shall be established. Prepared solutions are labeled with the expiration date provided by the manufacturer. In-house prepared solutions are assigned expiration dates that are consistent with the method that employs their use unless documented experience indicates that an alternate date can be applied. If alternate expiration dates are employed, their use is documented in the method SOP. Expiration dates for prepared inorganic reagents, which have not exhibited instability, are established at two years from the date of preparation for tracking purposes.

The earliest expiration date has been established as the limiting date for assigning expiration dates to prepared solutions. The assignments of expiration dates that are later than the expiration date of any derivative solution or material are prohibited.

7.5 ***Documentation of Traceability***. Traceability information is documented in individual logbooks designated for specific measurement processes. The quality assurance group maintains calibration documentation for metric references in separate logbooks.

Balance calibration verification is documented in logbooks that are assigned to each balance. The individual conducting the calibration is required to initial and date all calibration activities. Any defects that occur during calibration are also documented along with the corrective action applied and a demonstration of return to control. Annual service reports and certificates are retained on file by the QA staff.

Temperature control is documented in logbooks assigned to the equipment being monitored. A calibrated thermometer is assigned to each individual item. Uncorrected and corrected measurements are recorded along with date and initials of the individual conducting the measurement on a daily or as used basis. Corrective action, if required, is also documented including the demonstration of return to control.

Initial traceability of chemical standards is documented via a vendor-supplied certificate (not available for bulk dry chemicals and acids) that includes lot number, expiration date and certified concentration information. Solutions prepared using the vendor supplied chemical standards are documented in logbooks assigned to specific analytical processes. Alternatively, documentation may be entered into the electronic standards and reagent tracking log. The documentation includes links to the vendor's lot number, an internal lot number, and dates of preparation, expiration date, and the preparer's initials.
Accutest employs commercially prepared standard solutions whose traceability can be demonstrated through a vendor supplied certificate of analysis that includes an experimental verification of the standard's true concentration. The test value for the verification analysis must agree within 1% of the vendor's true value before it can be employed for calibration purposes. If the test value differs from the nominal value by more than 1%, then the test value is used as the true value in laboratory calibrations and calculations. Purchased standards which do not have a certificate of analysis cannot be used for calibration or calibration verification purposes and are rejected or returned to the vendor.

Supervisors conduct regular reviews of logbooks, which are verified using a signature and date.

8.0 TEST PROCEDURES, METHOD REFERENCES, AND REGULATORY PROGRAMS

Requirements: The laboratory employs client specified or regulatory agency approved methods for the analysis of environmental samples. A list of active methods is maintained, which specifies the type of analyses performed and cross-references the methods to applicable environmental regulations. Routine procedures used by the laboratory for the execution of a method are documented in standard operating procedures. Method performance and sensitivity are demonstrated annually where required. Defined procedures for the use of method sensitivity limits for data reporting purposes are established by the Director of Quality Assurance and used consistently for all data reporting purposes.

8.1 ***Method Selection & Application***. Accutest employs methods for environmental sample analysis that are consistent with the client's application, which are appropriate and applicable to the project objectives. Accutest informs the client if the method proposed is inappropriate or outdated and suggests alternative approaches.

Accutest employs documented, validated regulatory methods in the absence of a client specification and informs the client of the method selected. These methods are available to the client and other parties as determined by the client. Documented and validated in-house methods may be applied if they are appropriate to the project. The client is informed of the method selection.

8.2 ***Standard Operating Procedures***. Standard operating procedures (SOP) are prepared for routine methods executed by the laboratory, processes related to laboratory operations and sample or data handling. All SOPs are formatted to meet the specifications established by the National Environmental Laboratory Accreditation Conference, which are detailed in Chapter Five – Quality Systems of the established Standards. The procedures describe the process steps in sufficient detail to enable an individual, who is unfamiliar with the procedure to execute it successfully.

SOPs are evaluated annually and edited if necessary. Reviewed SOPs that do not require modification include an evaluation summary form indicating that an evaluation was conducted and modifications were not needed. SOPs can be edited on a more frequent basis if changes are required for any reason. These may include a change to the methodology, elimination of systematic errors that dictate a need for process changes or modifications to incorporate a new version of the method promulgated by the originating regulatory agency. Procedural modifications are indicted using a revision number. SOPs are available for client review at the Accutest facility upon request.

The complete list of the laboratories SOPs available as of the date of publication of this QSM version are detailed in Appendix II.

8.3 ***Method Validation***. Standard methods from regulatory sources are primarily used for all analysis. Standard methods do not require validation by the laboratory. Non-standard, in-house methods are validated prior to use. Validation is also performed for standard methods applied outside their intended scope of use. Validation is dependent upon the method application and may include analysis of quality control samples to develop precision and accuracy information for the intended use. A final method validation report is generated, which includes all data in the validation study. A statement of adequacy and/or equivalency is included in the report. A copy of the report is archived in the quality assurance directory of the company server.

Non-standard methods are validated prior to use. This includes the validation of modified standard methods to demonstrate comparability with existing methods. Demonstrations and validations are performed and documented prior to incorporating technological enhancements and nonstandard methods into existing laboratory methods used for general applications. The demonstration includes method specific requirements for assuring that significant performance differences do not occur when the enhancement is incorporated into the method. Validation is dependent upon method application and may include the analysis of quality control samples to develop precision and accuracy information for intended use.

The study procedures and specifications for demonstrating validation include comparable method sensitivity, calibration response, method precision; method accuracy and field sample consistency for several classes of analytical methods are detailed in this document. These procedures and specifications may vary depending upon the method and the modification.

8.4 ***Estimated Uncertainty.*** A statement of the estimated uncertainty of an analytical measurement accompanies the test result when required. Estimated uncertainty is derived from the performance limits established for spiked samples of similar matrices. The degree of uncertainty is derived from the negative or positive bias for spiked samples accompanying a specific parameter. When the uncertainty estimate is applied to a measured value, the possible quantitative range for that specific parameter at that measured concentration is defined. Well recognized regulatory methods that specify values for the major sources of uncertainty and specify the data reporting format do not require a further estimate of uncertainty.

8.5 ***Demonstration of Capability***. Confirmation testing is conducted to demonstrate that the laboratory is capable of performing the method before its application to the analysis of environmental samples. The results of the demonstration tests are compared to the quality control specifications of the method to determine if the performance is acceptable.

Capability demonstrations are conducted initially for each method on every instrument and annually on a method specific basis thereafter. Acceptable demonstrations are documented for individual training files and retained by the QA staff. New analytes, which are added to the list of analytes for an accredited method, are evaluated for applicability through a demonstration of capability similar to those performed for accredited analytes.

8.6 ***Method Detection Limit Determination***. Annual method detection limit (MDL) studies are performed as appropriate for routine methods used in the laboratory. MDL studies are also performed when there is a change to the method that affects how the method is performed or when an instrumentation change that impacts sensitivity occurs. The procedure used for determining MDLs is described in 40 CFR, Part 136, and Appendix B. Studies are performed for each method on water, soil and air matrices for every instrument that is used to perform the method. MDLs are established at the instrument level. The highest MDL of the pooled instrument data is used to establish a laboratory MDL. MDLs are experimentally verified through the analysis of spiked quality control samples at 2-4 times the concentration of the experimental MDL. The verification is performed on every instrument used to perform the analysis. The quality assurance staff manages the annual MDL determination process and is responsible for retaining MDL data on file. Approved MDLs are appended to the LIMS and used for data reporting purposes.

8.7 ***Limit of Detection (LOD).*** For the DoD ELAP the limit of detection (LOD) for each method and target analyte of concern is established for each instrument that is used to perform the method. The LOD is established by spiking a water and/or soil matrix at approximately two to three times the calculated MDL (for a single-analyte standard) or one to four times the calculated MDL (for a multi-analyte standard). The LOD undergoes all sample processing steps and is validated by the qualitative identification of the analytes of interest. The spike concentration establishes the LOD and must be verified quarterly.

8.8 ***Instrument Detection Limit Determination***. Instrument detection limits (IDLs) are determined for all inductively coupled argon plasma emission spectrophotometers and mass spectrometers. The IDL is determined for the wavelength (emission) of each element and the ion (mass spectrometry) of each element used for sample analysis. The IDL data is used to estimate instrument sensitivity in the absence of the sample matrix. IDL determinations are conducted at the frequency specified in the appropriate SOPs' for ICP and ICP/MS analysis.

8.9 ***Method Reporting Limit.*** The method reporting limit for organic methods is determined by the concentration of the lowest calibration standard in the calibration curve. This value is adjusted based on several sample preparation factors including sample volume, moisture content (soils), digestion, distillation or dilution. The low calibration standard is selected by department managers as the lowest concentration standard that can be used for calibration while continuing to meet the calibration linearity criteria of the method being used. The validity of the method reporting limits are confirmed through the analysis of a spiked quality control sample at the method reporting limit concentration. By definition, detected analytes at concentrations below the low calibration standard cannot be accurately quantitated and are qualified as estimated values.

The reporting limit for inorganics methods is defined as the concentration which is greater than the MDL where method quality control criteria has been achieved. The reporting limit for general chemistry methods employing multiple point calibrations must be greater than or equal to the concentration of the lowest standard of the calibration range.

The reporting limit established for both organic and inorganic analysis is above the calculated method detection limit where applicable.

8.10 ***Limit of Quantitation (LOQ).*** For the DoD ELAP the limit of quantitation (LOQ) for each analyte of concern is determined. The LOQ is set within the range of calibration is greater than the established LOD. Precision and bias criteria for the LOQ are established to meet client requirements and are verified quarterly.

8.11 ***Reporting of Quantitative Data.*** Analytical data for all methods is reported without qualification to the reporting limit established for each method. Data, for organic methods may be reported to the established method detection limit depending upon the client's requirements provided that all qualitative identification criteria for the detected parameter have been satisfied. All parameters reported at concentrations between the reporting limit and the method detection limit are qualified as estimated.

Data for inorganic methods are reported to the established method reporting limits. Inorganic data for specific methods may also be reported to the established method detection limit at client request. However, this data is always qualified as estimated.

Measured concentrations of detected analytes that exceed the upper limit of the calibration range are either diluted into the range and reanalyzed or qualified as an estimated value. The only exception to this applies to ICP and ICP/MS analysis, which can be reported to the upper limit of the experimentally determined linear range without qualification.

8.12 ***Precision and Accuracy Studies***. Annual precision and accuracy (P&A) studies, which demonstrate the laboratories ability to generate acceptable data, are performed for all routine methods used in the laboratory. The procedure used for generating organic P&A data is referenced in the majority of the regulatory methodology in use. The procedure requires quadruplicate analysis of a sample spiked with target analytes at a concentration in the working range of the method. This data may be compiled from a series of existing blank spikes or laboratory control samples. Accuracy (percent recovery) of the replicate analysis is averaged and compared to established method performance limits. Values within method limits indicate an acceptable performance demonstration. Precision and accuracy date is also used to annually demonstrate analytical capability for individual analysts. Annual demonstration of capability data is archived in individual training files.

8.13 ***Method Sources & References.*** The Quality Assurance Staff maintains a list of active methods used for the analysis of samples. This list includes valid method references from sources such as USEPA, ASTM or Standard Methods designations and the current version and version date.

Updated versions of approved reference methodology are placed into use as changes occur. The Quality Assurance Director informs operations management of changes in method versions as they occur. The operations management staff selects an implementation date. The operations staff is responsible for completing all method use requirements prior to the implementation date. This includes modification of SOPs, completion of MDL and precision and accuracy studies and staff training. Documentation of these activities is provided to the QA staff who retains this information on file. The updated method is placed into service on the implementation date and the old version is de-activated.

Multiple versions of selected methods may remain in use to satisfy client specific needs. In these situations, the default method version becomes the most recent version. Client specific needs are communicated to the laboratory staff using method specific analytical method codes, which clearly depict the version to be used. The old method version is maintained as an active method until the specified client no longer requires the use of the older version.

Accutest will not use methodology that represents significant departures from the reference method unless specifically directed by the client. If clients direct the laboratory to use a method modification that represents a significant departure from the reference method, the request will be documented in the project file.

8.14 ***Analytical Capabilities***. Appendix III provides a detailed listing of the methodology employed for the analysis of test samples.

9.0 SAMPLING, SAMPLE MANAGEMENT, LOGIN, CUSTODY, STORAGE AND DISPOSAL

Requirement: The laboratory must employ a system which ensures that client supplied product or supplied product (the sample) is adequately evaluated, acknowledged, and secured upon delivery to the laboratory. The system also assures that product chain of custody is maintained and that sample receipt conditions and preservation status are documented and communicated to the client and internal staff. The login procedure assigns, documents, and maps the specifications for the analysis of each unique sample to assure that the requested analysis is performed on the correct sample and enables the sample to be tracked throughout the laboratory analytical cycle. The system includes procedures for reconciling defects in sample condition or client provided data, which are identified at sample arrival. The system specifies the procedures for proper sample storage, transfer to the laboratory, and disposal after analysis. The system is also documented in standard operating procedures.

9.1 ***Order Receipt and Entry***. New orders are initiated and processed by the client services group (See Chapter 14, Procedures for Executing Client Specifications). The new order procedure includes mechanisms for providing bottles to clients, which meet the size, cleanliness, and preservation specifications for the analysis to be performed.

For new orders, the project manager prepares a bottle request form, which is submitted to sample management. This form provides critical project details to the sample management staff, which are used to prepare and assemble the sample bottles for shipment to the client prior to sampling.

The bottle order is assembled using bottles that meet USEPA specifications for contaminant free sample containers. Accutest uses a combination of commercially supplied pre-cleaned bottles and bottles that have been tested for residual contamination and verified to meet USEPA specifications prior to use. Sterile bottles for microbiological samples are purchased from commercial sources.

Bottles, which are not purchased pre-cleaned, are checked to assure that they are free of contamination from targeted analytes before being released for use. Sterile bottles are checked for contamination with each lot. The QA staff retains a copy of the documentation of in-house contamination and sterility checks and maintains the responsibility for approving and releasing bottle lots for use following a review of the check data.

Preservative solutions that are specified for the analysis requested are dispensed into the sample bottle prior to shipment. All preservative solutions are prepared in the laboratory or purchased from commercial suppliers. Each solution is checked to assure that it is free of contamination from the compounds being analyzed before being released for use.

Reagent water for trip and field blanks is poured into appropriately labeled containers. All bottles are packed into ice chests with blank chain of custody forms and the original bottle order form. Completed bottle orders are delivered to clients using Accutest couriers or commercial carriers for use in field sample collection.

9.2 ***Sampling***. Documented procedures are employed by the field staff for field sample collection and are accessible during sample collection activities. Field activities are documented in controlled notebooks which detail relevant field conditions, site data and the results of field measurements. Appropriate custody procedures for collected samples are initiated by the field staff at the time of sample collection. Samples are documented, labeled and preserved according to the specifications of the method and/or regulatory program prior to being shipped to the laboratory.

9.3 ***Sample Receipt and Custody***. Samples are delivered to the laboratory using a variety of mechanisms including Accutest couriers, commercial shippers, and client self-delivery. Documented procedures are followed for arriving samples to assure that custody and integrity are maintained and handling/ preservation requirements are documented and maintained.

Sample custody documentation is initiated when the individual collecting the sample collects field samples. Custody documentation includes all information necessary to provide an unambiguous record of sample collection, sample identification, and sample collection chronology. Initial custody documentation employs either Accutest or client generated custody forms.

Accutest generates a chain of custody in situations where the individuals who collected the sample did not generate custody documentation in the field.

Accutest defines sample custody as follows:

∴ The sample is in the actual custody or possession of the assigned responsible person,

∴ The sample is in a secure area.

The Accutest facility is defined as a secure facility. Perimeter security has been established, which limits access to authorized individuals only. Visitors enter the facility through the building lobby and must register with the receptionist prior to entering controlled areas. While in the facility, visitors are required to wear a visitor's badge and must be accompanied by their hosts at all times. After hours, building access is controlled using a computerized passkey reader system. This system limits building access to individuals with a pre-assigned authorization status. After hours visitors are not authorized to be in the building. Clients delivering samples after hours must make advanced arrangements through client services and sample management to assure that staff is available to take delivery and maintain custody.

Upon arrival at Accutest, the sample custodian reviews the chain of custody for the samples received to verify that the information on the form corresponds with the samples delivered. This includes verification that all listed samples are present and properly labeled, checks to verify that samples were transported and received at the required temperature, verification that the sample was received in proper containers, verification that sufficient volume is available to conduct the requested analysis, and a check of individual sample containers to verify test specific preservation requirements including the absence of headspace for volatile compound analysis.

Sample conditions and other observations are documented on the chain of custody by the sample custodian prior to completing acceptance of custody and in an online database that creates a permanent record of all sample login activities. The sample custodian accepts sample custody upon verification that the custody document is correct. Discrepancies or non-compliant situations are documented and communicated to the Accutest project manager, who contacts the client for resolution. The resolution is documented and communicated to sample management for execution.

The sample management staff maintains an electronic sample receipt log. This log details all sample-related information in a searchable database that is updated upon data entry and backed up daily. The log records include critical date information, numbers of samples, numbers of bottles for each parameter, descriptions of bottles for each parameter, preservation conditions, bottle refrigerator location, and bottle conditions. Data entry into the log is secured using individual passwords.

During initial login, each bottle is assigned a unique number and is labeled with a barcode corresponding to that number. A bar-coding and scanning system electronically tracks sample custody transfers between individuals within the laboratory. Internal custody documentation may be required for compliance with regulatory agency or contractual specifications. A documented, chronological record of each sample transfer identifying each individual having possession of the sample is created in the laboratory information management system, which can be printed and included in data reports to demonstrate continuous custody.

9.4 ***Laboratory Preservation of Improperly Preserved Field Samples.*** Accutest will attempt to preserve field samples that were received without proper preservation to the extent that it is feasible and supported by the methods in use. Laboratory preservation of improperly preserved or handled field samples is routinely performed for metals samples. Special handling procedures may also be applied to improperly preserved volatile organics.

Aqueous metals samples that were not nitric acid preserved to pH 2 in the field are laboratory preserved and held for twenty (24) hours to equilibrate prior to analysis. Aqueous metals samples requiring field filtration may be filtered in the laboratory within seventy-two (72) hours of receipt provided that the sample has not been acid preserved.

Unpreserved volatile organics samples may be analyzed within seven (7) days to minimize degradation of volatile organics if the laboratory is notified in advance of the failure to preserve upon collection. Laboratory preservation of unpreserved aqueous samples is not possible. A pH check of volatile organic samples prior to analysis will compromise the sample by allowing volatile organics to escape during the check. If the laboratory is not notified of the failure to field preserve an aqueous volatile organic sample, the defect will not be identified until sample analysis has been completed and the data is qualified accordingly.

9.5 ***Sample Tracking Via Status Change.*** An automated, electronic LIMS procedure records sample exchange transactions between departments and changes in analytical status. This system tracks all preparation, analytical, and data reporting procedures to which a sample is subjected while in the possession of the laboratory. Each individual receiving samples must acknowledge the change in custody and operational status in the LIMS. This step is required to maintain an accurate electronic record of sample status, dates of analytical activity, and custody throughout the laboratory.

Sample tracking is initiated at login where all chronological information related to sample collection dates and holding times are entered into the LIMS. This information is entered on an individual sample basis.

9.6 ***Sample Acceptance Policy***. Incoming samples must satisfy Accutest's sample acceptance criteria before being logged into the system. Sample acceptance is based on the premise that clients have exercised proper protocols for sample collection. This includes complete documentation, sufficient volume, proper chemical preservation, temperature preservation, sample container sealing and labeling, and appropriate shipping container packing.

The sample management staff will make every attempt to preserve improperly preserved samples upon arrival. However, if preservation is not possible, the samples may be refused unless the client authorizes analysis. No samples will be accepted if holding times have been exceeded or will be exceeded before analysis can take place unless the client authorizes analysis.

Sample acceptance criteria include proper custody and sample labeling documentation. Proper custody documentation includes an entry for all physical samples delivered to the laboratory with an identification code that matches the sample bottle and a date and signature of the individual who collected the sample and delivered them to the laboratory.

Accutest reserves the right to refuse any sample which in its sole and absolute discretion and judgment is hazardous, toxic and poses or may pose a health, safety or environmental risk during handling or processing. The company will not accept samples for analysis using methodology that is not performed by the laboratory or for methods that lab does not hold valid accreditations unless arrangements have been made to have the analysis conducted by a qualified subcontractor.

9.7 ***Assignment of Unique Sample Identification Codes***. Unique identification codes are assigned to each sample bottle to assure traceability and unambiguously identify the tests to be performed in the laboratory.

The sample identification coding process begins with the assignment of a unique alphanumeric job number. A job is defined as a group of samples received on the same day, from a specific client pertaining to a specific project. A job may consist of groups of samples received over a multi-day period. The first character of the job number is an alpha-character that identifies the laboratory facility. The next characters are numeric and sequence by one number with each new job.

Unique sample numbers are assigned to each bottle collected as a discrete entity from a designated sample point. This number begins with the job number and incorporates a second series of numbers beginning at one and continuing chronologically for each point of collection. The test to be performed is clearly identified on the bottle label. Multiple sample bottles collected for analysis of the same parameter are numbered bottle 1, 2, … etc.

Alpha suffixes may be added to the sample number to identify special designations such as subcontracted tests, in-house QC checks, or re-logs. Multiple sample bottles for a specific analysis are labeled Bottle 1, Bottle 2, etc.

9.8 ***Subcontracted Analysis***. Subcontract laboratories are employed to perform analysis not performed by Accutest. The quality assurance staff evaluates subcontract laboratories to assure their quality processes meet the standards of the environmental laboratory industry prior to engagement. Throughout the subcontract process, Accutest follows established procedures to assure that sample custody is maintained and the data produced by the subcontractor meets established quality criteria.

*Subcontracting Procedure***.** Subcontracting procedures are initiated through several mechanisms, which originate with sample management. Samples for analysis by a subcontractor are logged into the Accutest system using regular login procedures. If subcontract parameters are part of the project or sample management has received subcontracting instructions for a specific project, a copy of the chain of custody is given to the appropriate project manager with the subcontracted parameters highlighted. This procedure triggers the subcontract process at the project management level. The project manager contacts an approved subcontractor that carries accreditation in the venue of the project location to place the subcontract order. A subcontract order form (SOF) is simultaneously prepared in electronic format, by the project manager and filed with the original chain of custody. The SOF and the subcontract chain of custody are forwarded to sample management, via E-Mail, for processing. A copy is filed with the original CoC.

Sample management signs the subcontract chain of custody and ships the sample(s) to the subcontractor. The subcontract CoC is filed with the original CoC and the request for subcontract. Copies are distributed to the login department, the project manager, sample management and the client.

Clients are verbally notified of the need to subcontract analysis as soon as the need is identified by the client services staff. This may occur during the initial project setup or at the time of login if the project setup had not been initiated through the client services staff. Copies of the subcontract CoC and the original CoC, which are electronically distributed to clients, constitutes documented client notification of the laboratories intent to subcontract analysis.

Subcontractor data packages are reviewed by the QA Staff to assess completeness and quality compliance. If completeness defects are detected, the subcontractor is asked to immediately upgrade the data package. If data quality defects are detected, the QA staff retains the package for further review. The QA staff will pursue a corrective action solution before releasing defective data to the client.

Approved subcontract data is entered into the laboratory information management system (LIMS) if possible and incorporated into the final report. All subcontract data is footnoted to provide the client with a clear indication of its source. Copies of original subcontract data are included in the data report depending on the reporting level specified by the client. Applicable subcontractor accreditation information is provided with the subcontractor data.

*Subcontract Laboratory Evaluation***.** The QA staff evaluates subcontract laboratories prior to engagement. The subcontract laboratory must provide Accutest with proof of a valid certification to perform the requested analysis for the venue where they were collected and for a specific program should an approval or accreditation be required. In addition, the QA staff may require a copy of the laboratory's Quality Systems Manual, copies of SOPs used for the subcontracted analysis, a copy of the most recent performance evaluation study for the subcontracted parameter, copies of the internal data integrity policy and copies of the most recent regulatory agency or third party accreditor audit report. Certification verification must be submitted to Accutest annually. If possible, the QA staff may conduct a site visit to the laboratory to inspect the quality system. Accutest Laboratories assumes the responsibility for the performance of all subcontractors who have successfully demonstrated their qualifications and should obtain an example data deliverable package prior to initiation of subcontract work for compliance review. Qualification of a subcontract laboratory may be bypassed if the primary client directs Accutest to employ a specific subcontractor.

9.9 ***Sample Storage***. Following sample transfer to the sample custodian, samples are assigned to various secured, refrigerated storage areas depending upon the test to be performed and the matrix of the samples. The location (refrigerator and shelf) of each sample is recorded on the chain of custody adjacent to the line corresponding to each sample number and also entered into the LIMS. Samples remain in storage until the laboratory technician requests that they be transferred into the laboratory for analysis.

Second shift staff is authorized to retrieve samples from storage and initiate custody transfer. All sample request forms must be completed regardless of who performs the transfer.

Samples for volatile organics analysis are placed in storage in designated refrigerators by the sample custodian and immediately transferred to the organics group control. Sample custody is transferred to the department designee. These samples are segregated according to matrix to limit opportunities for cross contamination to occur.

Organics staff is authorized to retrieve samples from these storage areas for analysis. When analysis is complete, the samples are placed back into storage.

9.10 ***Sample Login***. Following sample custody transfer to the laboratory, the documentation that describes the clients analytical requirements are delivered to the sample login group for coding and entry to the Laboratory Information Management System (LIMS). This process translates all information related to collection time, turnaround time, sample analysis, and deliverables into a code which enables client requirements to be electronically distributed to the various departments within the laboratory for scheduling and execution.

The technical staff is alerted to client or project specific requirements through the use of a unique project code that is electronically attached to the job during login. The unique project code directs the technical staff to controlled specifications documents detailing the unique requirements.

9.11 ***Sample Retrieval for Analysis***. Individual laboratory departments prepare and submit written requests to the sample custodian to retrieve samples for analysis. The sample custodian retrieves all samples except volatile organics and delivers them to the requesting department. Retrieval priorities are established by the requesting department and submitted to the sample custodian when multiple requests are submitted. Internal custody transfers using the bar code scanning system occur whenever the samples change hands or locations.
After sample analysis has been completed, the department requests pick-up and return of the sample to the storage area. The sample custodian retrieves the sample and completes the custody transfer from the department of the transfer back to sample management or sample storage.

9.12 ***Sample Disposal***. Accutest retains all samples and sample extracts under proper storage for a minimum of 30 days following completion of the analysis report. Longer storage periods are accommodated on a client specific basis if required. Samples may also be returned to the client for disposal.
Accutest disposes of all laboratory wastes following the requirements of the Resource Conservation and Recovery Act (RCRA). The Company has obtained and maintains a waste generator identification number, NJD982533622.

Sample management generates a sample disposal dump sheet from the LIMS tracking system each week, which lists all samples whose holding period has expired. Data from each sample is compared to the hazardous waste criteria established by the New Jersey Department of Environmental Protection (NJDEP).

Samples containing constituents at concentrations above the criteria are labeled as hazardous and segregated into four general waste categories for disposal as follows:

- Waste Oil
- Soil (solids – positive and negative hazardous characteristics)
- Mixed Aqueous
- Sludges (semi-solids)
- PCB Hazardous Waste (USEPA 40 CFR 761 criteria).

Non-hazardous aqueous samples are diluted and disposed directly into the laboratory sink. All aqueous liquids pass through a neutralization system before entering the municipal system. Solid samples are emptied into consolidation drums and disposed as hazardous waste or non-hazardous wastes depending upon the results of hazardous characteristics determination. Samples classified as PCB hazardous wastes are labeled and packaged according to the requirements in 40 CFR 761.

Empty glass and plastic bottles from aqueous and solid samples are segregated for recycling. Recycled materials are collected by a commercial contractor and transferred to a county

transfer facility for separation into various materials categories. These operations are classified as secure facilities employing cameras, security guards and fiber optic security systems.
The recyclable material is transported to a recycling facility for further processing. Separated glass is transported to a processing facility where it is acid washed in two, separate wash baths, rinsed in boiling water and ground into ½ inch chunks. The chunks are transported to an end product user for re-manufacturing into a glass product.

Separated plastic is transported to a processing facility where it is acid washed to remove the labels and adhesives and boiled for sterilization. The sample containers and any remaining labels are shredded and ground resulting in complete destruction of remaining labels the ground material is sent by rail car or tractor-trailer to various end users that melt and reform the material into useful products of their industry. The recycling facility employs a Code of Ethics in which all client names are confidential and are not divulged to any individual or corporation without written permission from the client.

Laboratory wastes are collected by waste stream in designated areas throughout the laboratory. Waste streams are consolidated twice each week by the waste custodian and transferred to stream specific drums for disposal through a permitted waste management contractor. Filled, consolidated drums are tested for hazardous characteristics and scheduled for removal from the facility for appropriate disposal based on the laboratory data.

All solvent extracts and digestates are collected for disposal following the thirty-day holding period and drummed according to their specific waste stream category. Chlorinated solvent extracts are drummed as chlorinated wastes (i.e., Methylene Chloride). Non-chlorinated solvent extracts are drummed as non-chlorinated wastes (i.e., acetone, hexane, methanol, and mixed solvents). Digestates are collected for disposal following the thirty-day holding period and drummed as corrosive liquid containing metals.

10.0 LABORATORY INSTRUMENTATION AND MEASUREMENT STANDARDS

Requirement: The laboratory has established procedures, which assure that instrumentation is performing to a pre-determined operational standard prior to the analysis of any samples. In general, these procedures follow the regulatory agency requirements established in promulgated methodology. The instrumentation selected to perform specified analysis are uniquely identified and capable of providing the method specified uncertainty of measurement needed. These procedures are documented and incorporated into the standard operating procedures for the method being executed.

10.1 ***Mass Tuning – Mass Spectrometers***. The mass spectrometer tune and sensitivity is monitored to assure that the instrument is assigning masses and mass abundances correctly and that the instrument has sufficient sensitivity to detect compounds at low concentrations. This is accomplished by analyzing a specific mass tuning compound at a fixed concentration. If the sensitivity is insufficient to detect the tuning compound, corrective action must be performed prior to the analysis of standards or samples. If the mass assignments or mass abundances do not meet criteria, corrective action must be performed prior to the analysis of standards or samples.

10.2 ***Wavelength Verification – Spectrophotometers***. Spectrophotometer detectors are checked on a regular schedule to verify proper response to the wavelength of light needed for the test in use. If the detector response does not meet specifications, corrective action (detector adjustment or replacement) is performed prior to the analysis of standards or samples.

10.3 ***Inter-element Interference Checks (Metals)***. Inductively Coupled Plasma Emission Spectrophotometers (ICP) are subject to a variety of spectral interferences, which can be minimized or eliminated by applying interfering element correction factors and background correction points. Interfering element correction factors are checked on a specified frequency through the analysis of check samples containing high levels of interfering elements. Analysis of single element interferant solutions is also conducted at a specified frequency.

If the check indicates that the method criteria have not been achieved for any element in the check standard, the analysis is halted and data from the affected samples are not reported. Sample analysis is resumed after corrective action has been performed and the correction factors have been re-calculated.

New interfering element correction factors are calculated and applied whenever the checks indicate that the correction factors are no longer meeting criteria. At a minimum, correction factors are replaced once a year.

Inductively Coupled Plasma – Mass Spectrometry (ICP-MS) also is subject to isobaric elemental and polyatomic ion interferences. These interferences are corrected through the use of calculations. The accuracy of corrections is dependent on the sample matrix and instrument conditions and is verified by quality control checks on individual runs.

10.4 ***Calibration and Calibration Verification***. Many tests require calibration using a series of reference standards to establish the concentration range for performing quantitative analysis. Instrument calibration is performed using standards that are traceable to national standards. Method specific procedures for calibration are followed prior to any sample analysis. In general, if a reference method does not specify the number of calibration standards, the minimum number is two (one of which is at the reporting limit or limit of quantitation).

Calibration is performed using a linear regression calculation or calibration factors calculated from the curve. The calibration must meet method specific criteria for linearity or precision. If the criteria are not achieved, corrective action (re-calibration or instrument maintenance) is performed. The instrument must be successfully calibrated before analysis of samples can be conducted.

Initial calibration for metals analysis performed using inductively coupled plasma (ICP) employs the use of a single standard and a calibration blank to establish linearity. Inductively Coupled Plasma – Mass Spectrometry (ICP-MS) can be calibrated using either a two point or a multi-point calibration, as long as all quality control criteria for the analysis can be achieved. The calibration blank contains all reagents that are placed into the calibration standard with the exception of the target elements. Valid calibration blanks must not contain any target elements.

Initial calibrations must be verified using a single concentration calibration standard from a second source (i.e. separate lot or different provider). The continuing validity of existing calibrations must be regularly verified using a single calibration standard. The response to the standard must meet pre-established criteria that indicate the initial calibration curve remains valid. If the criteria are not achieved corrective action (re-calibration) is performed before any additional samples may be analyzed.

If continuing calibration verification results are outside established criteria, data associated with the verification may be fully useable under the following conditions:

- When the acceptance criteria for the continuing calibration verification are exceeded high, i.e., high bias, and there are associated samples that are non-detects, then those non-detects may be reported.

- When the acceptance criteria for the continuing calibration verification are exceeded low, i.e., low bias, those sample results may be reported if they exceed a maximum regulatory limit/decision level.

Calibration verification is also performed whenever it appears that the analytical system is out of calibration or no longer meets the calibration requirements. It is also performed when the time period between calibration verifications has expired.

Sample results are quantitated from the initial instrument calibration unless otherwise required by regulation, method, or program specific criteria.

10.5 ***Linear Range Verification and Calibration (ICP & ICP/MS Metals)***. Linear range verification is performed for all ICP and ICP/MS instrumentation. The regulatory program or analytical method specifies the verification frequency. A series of calibration standards are analyzed over a broad concentration range. The data from these analyses are used to determine the valid analytical range for the instrument. ICP instrument calibration is routinely performed using a single standard at a concentration within the linear range and a blank.

Some methods or analytical programs require a low concentration calibration check to verify that instrument sensitivity is sufficient to detect target elements at the reporting limit. The analytical method or regulatory program defines the criteria used to evaluate the low concentration calibration check. If the low calibration check fails criteria, corrective action is performed and verified through reanalysis of the low concentration calibration check before continuing with the field sample analysis. . ICP-MS instrument calibration is normally performed using multiple standards within the linear range and a blank, but may be done with a single standard at a concentration within the linear range and a blank.

10.6 ***Retention Time Development and Verification (GC)***. Chromatographic retention time windows are developed for all analysis performed using gas chromatographs with conventional detectors. An initial experimental study is performed, which establishes the width of the retention window for each compound. The retention time width of the window defines the time ranges for elution of specified target analytes on the primary and confirmation columns. Retention time windows are established upon initial calibration, applying the retention time range from the initial study to each target compound. Retention times are regularly confirmed through the analysis of an authentic standard during calibration verification. If the target analytes do not elute within the defined range during calibration verification, the instrument must be recalibrated and new windows defined. New studies are performed when major changes, such as column replacement are made to the chromatographic system.

10.7 ***Equipment List.*** See Appendix IV for a listing of all equipment used for measurement and/or calibration in laboratory processes.

11.0 INSTRUMENT MAINTENANCE

Requirement. Documented procedures have been established for conducting equipment maintenance. The procedure includes maintenance schedules if required or documentation of daily maintenance activities. All instrument maintenance activities are documented in instrument specific logbooks.

11.1 ***Routine, Daily Maintenance***. Routine, daily maintenance is required on an instrument specific basis and is performed each time the instrument is used. Daily maintenance includes activities to insure a continuation of good analytical performance. This may include performance checks that indicate if non-routine maintenance is needed. If performance checks indicate the need for higher level maintenance, the equipment is taken out of service until maintenance is performed. Analysis cannot be continued until all performance checks meet established criteria and a return to operational control has been demonstrated and documented. The individual assigned to the instrument is responsible for daily maintenance.

11.2 ***Non-routine Maintenance***. Non-routine maintenance is initiated for catastrophic occurrences such as instrument failure. The need for non-routine maintenance is indicated by failures in general operating systems that result in an inability to conduct required performance checks or calibration. Equipment in this category is taken out of service, tagged accordingly and repaired before attempting further analysis. Before initiating repairs, all safety procedures for safe handling of equipment during maintenance, such as lock-out/tag-out are followed. Analysis is not resumed until the instrument meets all operational performance check criteria, is capable of being calibrated and a return to operational control has been demonstrated and documented. Section supervisors are responsible for identifying non-routine maintenance episodes and initiating repair activities to bring the equipment on-line. This may include initiating telephone calls to maintenance contractors if necessary. They are responsible for documenting all details related to the occurrence and repair.

11.3 ***Scheduled Maintenance***. Modern laboratory instrumentation rarely requires regular preventative maintenance. If required, the equipment is placed on a schedule, which dictates when maintenance is needed. Examples include annual balance calibration by an independent provider or ICP preventative maintenance performed by the instrument manufacturer. Section supervisors are responsible for initiating scheduled maintenance on equipment in this category. Scheduled maintenance is documented using routine documentation practices.

11.4 ***Maintenance Documentation***. Routine and non-routine maintenance activities are documented in logbooks assigned to instruments and equipment used for analytical measurements. The logbooks contain preprinted forms, which specify the required maintenance activities. The analyst or supervisor performing or initiating the maintenance activity is required to check the activity upon its completion and initial the form. This includes documenting that the instrument has been returned to operational control following the completion of the activity. Non-routine maintenance (repairs, upgrades) is documented on the back page of the service log.

12.0 QUALITY CONTROL PARAMETERS, PROCEDURES, AND CORRECTIVE ACTION

Requirement: All procedures used for test methods incorporate quality control parameters to monitor elements that are critical to method performance. Each quality parameter includes acceptance criteria that have been established by regulatory agencies for the methods in use. Criteria may also be established through client dictates or through the accumulation and statistical evaluation of internal performance data. Data obtained for these parameters during routine analysis must be evaluated by the analyst, and compared to the method criteria in use. If the criteria are not achieved, the procedures must specify corrective action and conformation of control before proceeding with sample analysis. QC parameters, procedures, and corrective action must be documented within the standard operating procedures for each method. In the absence of client specific objectives the laboratory must define qualitative objectives for completeness and representativeness of data.

12.1 ***Procedure***. Bench analysts are responsible for methodological quality control and sample specific quality control. Each method specifies the control parameters to be employed for the method in use and the specific procedures for incorporating them into the analysis. These control parameters are analyzed and evaluated with every designated sample group (batch).

The data from each parameter provides the analyst with critical decision making information on method performance. The information is used to determine if corrective action is needed to bring the method or the analysis of a specific sample into compliance. These evaluations are conducted throughout the course of the analysis. Each control parameter is indicative of a critical control feature. Failure of a methodological control parameter is indicative of either instrument or batch failure. Failure of a sample control parameter is indicative of control difficulties with a specific sample or samples.

Sample Batch. All samples analyzed in the laboratory are assigned to a designated sample batch, which contains all required quality control samples and a defined maximum number of field samples that are prepared and/or analyzed over a defined time period. The maximum number of field samples in the batch is 20. Accutest has incorporated the NELAP batching policy as the sample-batching standard. This policy incorporates the requirement for blanks and spiked blanks as a time based function as defined by NELAP. Accordingly, the specified time period for a sample batch is 24 hours. Matrix spike/matrix spike duplicate, matrix spikes and duplicates are defined as sample frequency based functions and may be applied to several batches until the frequency requirement has been reached. A matrix spike/matrix spike duplicate, matrix spikes and/or duplicate is required every 20 samples.

Client criteria that defines a batch as a time based function which includes a matrix spike/matrix spike duplicates as a contractual specification will be honored. The typical batch contains a blank and a laboratory control sample (LCS or spiked blank). Batch documentation includes lot specifications for all reagents and standards used during preparation of the batch.

12.2 ***Methodological Control Parameters and Corrective Action***. Prior to the analysis of field samples the analyst must determine that the method is functioning properly. Specific control parameters indicate whether critical processes meet specified requirements before continuing with the analysis. Method specific control parameters must meet criteria before sample analysis can be conducted. Each of these parameters is related to processes that are under the control of the laboratory and can be adjusted if out of control.

Method Blank. A method blank is analyzed during the analysis of any field sample. The method blank is defined as a sample. It contains the same standards (internal standards, surrogates, matrix modifiers, etc.) and reagents that are added to the field sample during analysis, with the exception of the sample itself. If the method blank contains target analytes(s) at concentrations that exceed method detection limit concentrations (organics) or reporting limit concentrations (inorganics), the source of contamination is investigated and eliminated before proceeding with sample analysis. Target analyte(s) in method blanks at concentrations no greater than one-half of the reporting limit concentrations (metals) may be requested on a client or project specific basis. Systematic contamination is documented for corrective action and resolved following the established corrective action procedures.

Laboratory Control Samples (LCS or Spiked Blanks). A laboratory control sample (spiked blank or commercially prepared performance evaluation sample) is analyzed along with field samples to demonstrate that method accuracy is within acceptable limits. These spike solutions may be from different sources than the sources of the solutions used for method calibration depending upon the method requirements. All target components are included in the spike mixture over a two year period. The performance limits are derived from published method specifications or from statistical data generated from the analysis of laboratory method performance samples. Spiked blanks are blank matrices (reagent water or clean sand) spiked with target parameters and analyzed using the same methods used for samples. Accuracy data is compared to laboratory derived limits to determine if the method is in control. Laboratory control samples (LCS) are commercially prepared spiked samples in an inert matrix. Performance criteria for recovery of spiked analytes are pre-established by the commercial entity preparing the sample. The sample is analyzed in the laboratory as an external reference.

Accuracy data is compared to the applicable performance limits. If the spike accuracy exceeds the performance limits, corrective action, as specified in the SOP for the method is performed and verified before continuing with a field sample analysis. In some cases, decisions are made to continue with sample analysis if performance limits are exceeded, provided the unacceptable result has no negative impact on the sample data.

Blanks and spikes are routinely evaluated before samples are analyzed. However, in situations where sample analysis is performed using an autosampler, they may be evaluated after sample analysis has occurred. If the blanks and spikes do not meet criteria, sample analysis is repeated.

Proficiency Testing. Proficiency test samples (PTs) are single or double blind spikes, introduced to the laboratory to assess method performance. PTs may be introduced as double blinds submitted by commercial clients, single or double blinds from regulatory agencies, or internal blinds submitted by the QA group.

A minimum of two single blind studies must be performed each year for every parameter in aqueous and solid matrices for each field of testing for which the laboratory maintains accreditation. Proficiency samples must be purchased as blinds from an A2LA accredited vendor. Data from these studies are provided to the laboratory by the vendor and reported to accrediting agencies. If unsatisfactory performance is noted, corrective action is performed to identify and eliminate any sources of error. A new single blind must be analyzed if required to demonstrate continuing proficiency.

PT samples performed for accrediting agencies or clients, which do not meet performance specifications, require a written summary that documents the corrective action investigation, findings, and corrective action implementation. A copy of this summary shall be submitted to the NELAC Primary Accrediting Authority, NJDEP Office of Quality Assurance for review.

Single or double blind proficiency test samples may be employed for self-evaluation purposes. Data from these analyses are compared to established performance limits. If the data does not meet performance specifications, the system is evaluated for sources of acute or systematic error. If required, corrective action is performed and verified before initiating or continuing sample analysis.

Trend Analysis for Control Parameters. The quality assurance staff is responsible for continuous analytical improvement through quality control data trend analysis. Accuracy data for spiked parameters in the spiked blank are statistically evaluated daily for trends indicative of systematic problems. Data from LCS parameters and surrogates are pooled on a method, matrix, and instrument basis. This data is evaluated by comparison to existing control and warning limits. Trend analysis is performed automatically as follows:

- Any point outside the control limit
- Any three consecutive points between the warning and control limits
- Any eight consecutive points on the same side of the mean.
- Any six consecutive points increasing or decreasing

The results of the trend analysis are transmitted as .PDF files for supervisory evaluation prior to sample analysis. Trends that indicate the potential loss of statistical control are further evaluated to determine the impact on data quality and to determine if corrective action is necessary. If corrective action is indicated, the supervisor informs the analysts of the corrective actions to be performed. Return to control is demonstrated before analysis resumes.

12.3 ***Sample Control Parameters and Corrective Action***. The analysis of samples can be initiated following a successful demonstration that the method is operating within established controls. Additional controls are incorporated into the analysis of each sample to determine if the method is functioning within established specifications for each individual sample. Sample QC data is evaluated and compared to established performance criteria. If the criteria are not achieved the method or the SOP specifies the corrective action required to continue sample analysis. In many cases, failure to meet QC criteria is a function of sample matrix and cannot be remedied. Each parameter is designed to provide quality feedback on a defined aspect of the sampling and analysis episode.

Duplicates. Duplicate sample analysis is used to measure analytical precision. This can also be equated to laboratory precision for homogenous samples. Precision criteria are method dependent. If precision criteria are not achieved, corrective action or additional action may be required. Recommended action must be completed before sample data can be reported.

Laboratory Spikes & Spiked Duplicates. Spikes and spiked duplicates are used to measure analytical precision and accuracy for the sample matrix selected. Precision and accuracy criteria are method dependent. If precision and accuracy criteria are not achieved, corrective action or additional action may be required. Recommended action must be completed before reporting sample data. All target components are included in the spike mixture over a two year period.

Serial Dilution (Metals). Serial dilutions of metals samples are analyzed to determine if analytical matrix effects may have impacted the reported data. If the value of the serially diluted samples does not agree with the undiluted value within a method-specified range, the sample matrix may be causing interferences, which may lead to either a high or low bias. If the serial dilution criterion is not achieved, it must be flagged to indicate possible bias from matrix effects.

Post Digestion Spikes. Digested samples are spiked and analyzed to determine if matrix interferences are biasing the results when the pre-digestion spike (matrix spike) recovery falls outside the control limits. It may also be used to determine potential interferences per client's specification. The sample is spiked at the concentration specified in the method SOP. No action is necessary if the post digestion spike is outside of the method criteria, unless a preparation problem is suspected with the spike, in which case the post digestion spike should be re-prepared and reanalyzed.

Surrogate Spikes (Organics). Surrogate spikes are organic compounds that are similar in behavior to the target analytes but unlikely to be found in nature. They are added to all quality control and field samples to measure method performance for each individual sample. Surrogate accuracy limits are derived from published method specifications or from the statistical evaluation of laboratory generated surrogate accuracy data. Accuracy data is compared to the applicable performance limits. If the surrogate accuracy exceeds performance limits, corrective action, as specified in the method or SOP is performed before sample data can be reported.

Internal Standards (Organic Methods). Internal standards are retention time and instrument response markers added to every sample to be used as references for quantitation. Their response is compared to reference standards and used to evaluate instrument sensitivity on a sample specific basis. Internal standard retention time is also compared to reference standards to assure that target analytes are capable of being located by their individual relative retention time.

If internal standard response criteria are not achieved, corrective action or additional action may be required. The recommended action must be completed before sample data can be reported.

If the internal standard retention time criteria are not achieved corrective action or additional action may be required. This may include re-calibration and re-analysis. Additional action must be completed before sample data is reported.

Internal Standards (ICP and ICP/MS Metals). Internal standards are used on ICP instruments to compensate for variations in response caused by differences in sample matrices. Multiple internal standards are used for each sample on ICP/MS instruments to compensate for variations in response caused by differences in sample matrices. This adjustment is performed automatically during sample analysis. The internal standard response of replicated sample analysis is monitored to detect potential analytical problems. If analytical problems are suspected, then the field samples may be reanalyzed or reanalyzed upon dilution to minimize the interferences. A different internal standard may be employed for quantitation in situations where the field sample contains the element typically used as the internal standard.

12.4 ***Laboratory Derived Quality Control Criteria.*** Control criteria for in-house methods and client specific modifications that exceed the scope of published methodology are defined and documented prior to the use of the method. The Quality Assurance Director is responsible for identifying additional control criteria needs. Control parameters and criteria, based on best technical judgment are established using input provided by the operations staff. These control parameters and criteria are documented and incorporated into the method.

The laboratory-derived criteria are evaluated for technical soundness on spiked samples prior to the use of the method on field samples. The technical evaluation is documented and archived by the Quality Assurance Staff.

When sufficient data from the laboratory developed control parameter is accumulated, the data is statistically processed and the experimentally derived control limits are incorporated into the method.

12.5 ***Bench Review & Corrective Action***. The bench chemists are responsible for all QC parameters. Before proceeding with sample analysis, they are required to successfully meet all instrumental QC criteria. They have the authority to perform any necessary corrective action before proceeding with sample analysis. Their authority includes the responsibility for assuring that departures from documented policies and procedures do not occur.

The bench chemists are also responsible for all sample QC parameters. If the sample QC criteria are not achieved, they are authorized and required to perform the method specified corrective action before reporting sample data.

12.6 ***Data Qualifiers.*** An alpha character coding system is employed for defining use limitations for reported data. These limitations are applied to analytical data by the analyst to clarify the usefulness of the reported data for data user. Common data qualifiers and their definitions are as follows:

Organics.

J: Indicates an estimated value. Applied to calculated concentrations for tentatively identified compounds and qualitatively identified compounds whose concentration is below the reporting limit, but above the MDL.

N: Indicates qualitative evidence of a tentatively identified compound whose identification is based on a mass spectral library search and is applied to all TIC results.

C: Applied to pesticide data that has been qualitatively confirmed by GC/MS.

B: Used for analytes detected in the sample and its associated method blank.

E: Applied to compounds whose concentration exceeds the upper limit of the calibration range.

Metals and Inorganics.

B: Applied if the reported concentration value was less than the reporting limit but greater than the MDL.

U: Applied if the reading is less than the MDL (or IDL if IDL reporting is being used).

E: Estimated concentration caused by the presence of interferences, normally applied when the serial dilution is out.

N: Spike sample recovery not within control limits.

*: Duplicate or matrix spike duplicate analysis not within control limits.

12.7 ***QA Monitoring***. The QA staff conducts a spot review of completed data packages prior to client release for specified projects. This review includes an examination of QC data for compliance and trends indicative of systematic difficulties. If non-conformances are detected, the QA staff places an immediate stop on the release of the data and initiates corrective action to rectify the situation. The data package is released when the package becomes compliant with all quality requirements. If compliance is not possible, the data is qualified and an appropriate case narrative is generated for inclusion in the data package.

If the review reveals trends indicative of systematic problems, QA initiates an investigation to determine the cause. If process defects are detected, a corrective action is implemented and monitored for effectiveness.

Performance Limits. The Quality Assurance Director is responsible for compilation and maintenance of all precision and accuracy data used for performance limits. Quality control data for all test methods are accumulated and stored in the laboratory information management system (LIMS). Parameter specific QC data is extracted annually and statically processed to develop laboratory specific warning limits and control limits. The new limits are reviewed and approved by the supervisory staff prior to their use for data assessment. The new limits are used to evaluate QC data for compliance with method requirements for a period of one year. Laboratory generated limits appear on all data reports.

12.8 ***Data Package Review***. Accutest employs multiple levels of data review to assure that reported data has satisfied all quality control criteria and that client specifications and requirements have been met. Each production department has developed specific data review procedures, which must be completed before data is released to the client.

Analytical Review. The analyst conducts the primary review of all data. This review begins with a check of all instrument and method quality control and progresses through sample quality control, concluding with a check to assure that the client's requirements have been executed. Analyst checks focus on a review of qualitative determinations and checks of precision and accuracy data to verify that existing laboratory criteria have been achieved. Checks at this level may include comparisons with project specific criteria if applicable. The analyst has the authority and responsibility to perform corrective action for any out-of-control parameter or nonconformance at this stage of review.

Analysts who have met the qualification criteria for the method in use perform secondary, peer level data reviews. Analyst qualification requirements include a valid demonstration of capability and demonstrated understanding of the method SOP. Section supervisors may perform secondary review in-lieu of a peer review. Supervisors review 100% of the data produced by their department. It includes a check of all manual calculations; an accuracy check of manually transcribed data from bench sheets to the LIMS, a check of calibration and continuing calibration, all QC criteria and a comparison of the data package to client specified requirements. Also included are checks to assure the appropriate methodology was applied and that all anomalous information was properly flagged for communication in the case narrative. Supervisors have the authority to reject data and initiate re-analysis, corrective action, or reprocessing.

All laboratory data requiring manual entry into LIMS system is double-checked by the analysts performing initial data entry and the section supervisor. Verification of supervisory review is indicated on the raw data summary by the supervisor's initials and date.

Electronic data that is manually edited at the bench by the primary analyst is automatically flagged by the instrument data system indicating an override by the analyst. All manual overrides must be verified and approved by a supervisor who initials and dates all manual changes.

Hard copies of manually integrated chromatographic peaks are printed that clearly depict the manually drawn baseline. The hard copy is reviewed and approved by the section supervisor (initialed and dated) and included in the data package of all full tier reports or the archived batch records of commercial report packages.

Edits to electronic data that have already been committed to the LIMS database are controlled through the use of the Master Edit function in LIMS. Permission to access this program is limited to those approved by the upper levels of laboratory management and is controlled by the Information Technology staff. A GALP electronic audit record trail is maintained for all changes that are made and is automatically appended to the record.

The group manager performs a tertiary review on a spot check basis. This review includes an evaluation of QC data against acceptance criteria and a check of the data package contents to assure that all analytical requirements and specifications were executed.

Report Generation Review. The report generation group reviews all data and supporting information delivered by the laboratory for completeness and compliance with client specifications. Missing deliverables are identified and obtained from the laboratory. The group also reviews the completed package to verify that the delivered product complies with all client specifications. Non-analytical defects are corrected before the package is sent to the client.

Project Management/Quality Control Review. Spot-check data package reviews are performed by the project management staff. Project management reviews focus on project specifications. If the project manager identifies defects in the product prior to release, he initiates immediate corrective action to rectify the situation.

The QA staff performs a post-delivery check of completed data packages to verify completeness and compliance with established quality control procedures. Approximately 10% of Full-Deliverables data packages are reviewed. A formal checklist is used to assess data report completeness and accuracy. Detected deficiencies are documented on the checklist and corrective actions initiated as necessary. Data review checklists are electronic documents, which are archived in the QA Directory of the network server.

The QA review focuses on all elements of the deliverable including the client's specifications and requirements, analytical quality control, sample custody documentation and sample identification. QA reviews at this step in the production process are geared towards systematic process defects, which require procedural changes to effect a corrective action. However, if defects are identified that have an adverse affect on data, the client is immediately informed following standard notification procedures. QA data review is not used in lieu of a peer level review or a supervisory review.

Data Reporting. Analytical data is released to clients following a secondary review by the group supervisor. Data release at this stage of the process is limited to electronic information, which is released to clients through a secure, encrypted, password protected, Internet connection. Hard copy support data is compiled by the report generation group and assembled into the final report. The report is sent to the client following reviews by the report generation staff.

All data reports include specified information, which is required to identify the report and its contents. This information includes a title, name and address of the laboratory, a unique report number, total number of pages in the report, clients name and address, analytical method identification, arriving sample condition, sample and analysis dates, test results with units of measurement, authorized signature of data release, statement of applicability, report reproduction restrictions and NELAC requirements certification. Data reports for the Department of Defense ELAP also include the time of preparation and analysis.

12.9 ***Electronic Data Reduction.*** Raw data from sample analysis is entered into the laboratory information management system (LIMS) using automated processes or manual entry. Final data processing is performed by the LIMS using procedures developed by the Company.

All LIMS programs are tested and validated prior to use to assure that they consistently produce correct results. The Information Technology Staff performs software validation testing. The testing procedures are documented in an SOP. Software programs are not approved for use until they have demonstrated that they are capable of performing the required calculations.

12.10 ***Representativeness***. Data representativeness is based on the premise that qualitative and quantitative information developed for field samples is characteristic of the sample that was collected by the client and analyzed in the laboratory. The laboratory objective for representativeness defines data as representative if the criteria for all quality parameters associated with the analysis of the sample are achieved.

12.11 ***Comparability***. Analytical data is defined as comparable when data from a sample set analyzed by the laboratory is representatively equivalent to other sample sets analyzed separately regardless of the analytical logistics. The laboratory will achieve 100% comparability for all sample data which meets the criteria for the quality parameters associated with its analysis using the method requested by the client.

13.0 CORRECTIVE ACTION SYSTEM

Requirement. The laboratory employs polices and procedures for correcting defective processes, systematic errors, and quality defects enabling the staff to systematically improve product quality. The system includes procedures for communicating items requiring corrective action to responsible individuals, corrective action tracking procedures, corrective action documentation, monitoring of effectiveness, and reports to management. The system is fully documented in a standard operating procedure. Individual corrective actions and responses are documented in a dedicated database.

13.1 ***Procedure***. Corrective action is the step that follows the identification of a process defect. The type of defect determines the level of documentation, communication, and training necessary to prevent re-occurrence of the defect or non-conformance. The formal system is maintained by the quality assurance department. Operations management is responsible for working within the system to resolve identified deficiencies.

Routine Corrective Action. Routine corrective action is defined as the procedures used to return out of control analytical systems back to control. This level of corrective action applies to all analytical quality control parameters or analytical system specifications.

Bench analysts have full responsibility and authority for performing routine corrective action. The resolution of defects at this level does not require a procedural change or staff re-training. The analyst is free to continue work once corrective action is complete and the analytical system has been returned to control. Documentation of routine corrective actions is limited to logbook comments for the analysis being performed.

Process Changes. Corrective actions in this category require procedural modifications. They may be the result of systematic defects identified during audits, the investigation of client inquiries, failed proficiency tests, product defects identified during data review, or method updates. Resolution of defects of this magnitude requires formal identification of the defect, development and documentation of a corrective action plan, and staff training to communicate the procedural change.

Technical Corrective Action. Technical corrective action encompasses routine corrective action performed by bench analysts for out of control systems and corrective actions performed for data produced using out of control systems. Technical corrective action for routine situations is conducted using the procedures detailed above.

Non-routine corrective actions apply to situations where the bench analysts failed to perform routine corrective action before continuing analysis. Supervisors and Department Managers perform corrective action in these situations. Documentation of all non-routine corrective actions is performed using the corrective action system.

Sample re-analysis is conducted if sufficient sample and holding time remain to repeat the analysis using an in-control system. If insufficient sample or holding time remains, the data is processed and qualifiers applied that describe the out of control situation. The occurrence is further documented in the case narrative and in the corrective action response. The corrective action must include provisions for retraining the analysts who failed to perform routine corrective action.

13.2 ***Documentation & Communication***. Routine corrective actions are documented as part of the analytical record. Notations are made in the comments section of the analytical chronicle or data sheet detailing the nonconformance and corrective action. Continuation of the analysis indicates that return to control was successful.

Corrective actions for process changes are documented, tracked and monitored for effectiveness. Supervisors or senior staff members may initiate corrective actions by generating a corrective action using the corrective action database application.

The corrective action database is an Access application. The initiator generates the corrective action investigation form, which is documented, tracked, distributed to responsible parties and archived through the application. The application assigns a tracking number, initiation data and due date to each action and copies the corrective action form to the database. E-mail message containing the form is automatically distributed to the responsible parties for resolution.

The responsible party identifies the root cause of the defect, initiates the immediate fix and develops and implements the procedural change. Existing documentation such as SOPs are edited to reflect the change. The affected staff is informed of the procedural change through a formal training session. The training is documented and copies are placed into individual training files. The corrective action form is completed by the responsible party and returned to the QA staff via e-mail using the database application.

Initial and completed corrective action forms are maintained in the corrective action database. This entire database is backed up and archived daily. The corrective action tracking form is maintained as an active report in the database.

Monitoring. The QA Staff monitors the implemented corrective action until it is evident that the action has been effective and the defect has been eliminated. The corrective action database is updated by QA to reflect closure of the corrective action. The QA staff assigns an error code to the corrective action for classification of the type of errors being committed. Additional monitoring of the corrective action is conducted during routine laboratory audits.

Additional monitoring of the corrective action is conducted by adding the corrective action to a verification list by the QA staff at closure. Verification is performed by the QA Staff to assure that the corrective action has remained in effect is scheduled for six (6) months from the initial closure date.

If QA determines that the corrective action response has not effectively remedied the deficiency, the process continues with a re-initiation of the corrective action. Corrective action continues until the defect is eliminated. If another procedural change is required, it is treated as a new corrective action, which is documented and monitored using established procedures.

Client Notification. Defective processes, systematic errors, and quality defects, detected during routine audits may have negative impacts on data quality. In some cases, data that has been released to clients may be affected. If defective data has been released for use, Accutest will notify the affected clients of the defect and provide specific details regarding the magnitude of the impact to their data.

14.0 PROCEDURES FOR EXECUTING CLIENT SPECIFICATIONS

Requirement. Systems have been established for evaluating and processing client specifications for routine and non-routine analytical services. The systems enable the client services staff to identify, evaluate, and document the requested specifications to determine if adequate resources are available to perform the analysis. The system includes procedures for communicating the specifications to the laboratory staff for execution and procedures for verifying the specifications have been executed.

14.1 ***Client Specific Requirements***. The project manager is the primary contact for clients requesting laboratory services. Client specifications are communicated using several mechanisms. The primary sources of information are the client's quality assurance project plan (QAPjP) and the analytical services contract both of which detail the analytical, quality control and data reporting specifications for the project. In the absence of a QAPjP, projects specifications can also be communicated using contracts, letters of authorization, or letters of agreement, which may be limited to a brief discussion of the analytical requirements and the terms and conditions for the work. These documents may also include pricing information, liabilities and scope of work, in addition to the analytical requirements. QAPjPs include detailed analytical requirements and data quality objectives, which supersede those found in the referenced methods. This information is essential to successful project completion.

The client services staff provides additional assistance to clients who are unsure of the specifications they need to execute the sampling and analysis requirements of their project. They provide additional support to clients who require assistance in results interpretation as needed, provided they possess the expertise required to render an opinion.

The project manager is responsible for obtaining project documents, which specify the analytical requirements. Following project management review, copies are distributed to the QA Director and the appropriate departmental managers for review and comment. The original QAPjP is filed in a secure location.

14.2 ***Requirements for Non-Standard Analytical Specifications***. Client requirements that specify departures from documented policies, procedures, or standard specifications must be submitted to Accutest in writing. These requirements are reviewed and approved by the technical staff before the project is accepted. Once accepted, the non-standard requirements become analytical specifications, which follow the routine procedure for communicating client specifications. Departures from documented policies, procedures, or standard specifications that do not follow this procedure are not permitted.

14.3 ***Evaluation of Resources.*** A resource evaluation is completed prior to accepting projects submitted by clients. The evaluation is initiated by the client services staff who prepares a brief synopsis that includes the logistical requirements of the project. Logistical specifications for new projects are summarized in writing for evaluation by the affected departments. The specifications are evaluated by the department manager from a scheduling and hardware resources perspective. The project is not accepted unless the department managers have the necessary resources to execute the project according to client specifications.

14.4 ***Documentation***. New projects are initiated using a project set up form, which is completed prior to the start of the project. This form details all of the information needed to correctly enter the specifications for each client sample into the laboratory information management system (LIMS). The form includes data reporting requirements, billing information, data turnaround times, QA level, state of origin, and comments for detailing project specific requirements. The project manager is responsible for obtaining this information from the client and completing the form prior to sample arrival and login.

Sample receipt triggers project creation and the login process. The information on the set-up form is entered into the LIMS immediately prior to logging in the first sample. The set up form may be accompanied by a quotation, which details the analytical product codes and sample matrices. These details are also entered into the LIMS during login.

Special information is distributed to the laboratory supervisors and login department in electronic or hardcopy format upon project setup. All, project specific information is retained by the project manager in a secure file. The project manager maintains a personal telephone log, which details conversations with the client regarding the project.

Department managers prepare summary sheets that detail client specific analytical requirements for each test. Bench analysts use these sheets to obtain information regarding client specific analytical requirements before analyzing samples. A program code is established for each client that links the client specifications to a client project. This code is attached to a project by the project manager at login and listed on the work list for each work group conducting analysis for clients with standing requirements.

14.5 ***Communication***. A pre-project meeting is held between client services and the operations managers to discuss the specifications described in the QAPjP, contract and/or related documents. Project logistics are discussed and finalized and procedures are developed to assure proper execution of the client's analytical specifications and requirements. Questions, raised in the review meeting, are discussed with the client for resolution. Exceptions to any requirements, if accepted by the client, are documented and incorporated into the QAPjP or project documentation records.

Non-standard specifications for individual clients are documented in the LIMS at the client account level or program level. Simple specifications are documented as comments for each project. Once entered into the LIMS, these specifications become memorialized for all projects related to the client account. Complex specifications are assigned program codes that link the specification to detailed analytical specifications.

Upon sample arrival, these specifications are accessed through a terminal or printed as a hard copy and stored in a binder for individuals who require access to the specification. Specifications that are not entered into the LIMS are prohibited unless documented in an interdepartmental memo, which clearly identifies the project, client and effective duration of the specification.

14.6 ***Operational Execution***. A work schedule is prepared for each analytical department on a daily basis. Analytical specifications or program codes from recently arrived samples have now been entered into the LIMS database. The database is sorted by analytical due date and holding time, into product specific groups. Samples are scheduled for analysis by due date and holding time. The completed schedule, which is now defined as a work list, is printed. The list contains the client requested product codes, program codes and specifications required for the selected sample(s). Special requirements are communicated to the analyst using the comments section or relayed through verbal instructions provided by the supervisor. The bench analyst assumes full responsibility for performing the analysis according to the specifications printed on the work sheet.

14.7 ***Verification***. Prior to the release of data to the client, laboratory section managers and the report generation staff review the report and compare the completed product to the client specifications documentation to assure that all requirements have been met. Project managers perform a spot check of projects with unique requirements to assure that the work was executed according to specifications.

15.0 CLIENT COMPLAINT RESOLUTION PROCEDURE

Requirement. The laboratory follows a formal system for managing and reconciling client complaints. The system includes procedures for documenting the complaint and communicating it to the appropriate department for resolution. The system also includes a quality assurance evaluation to determine if the complaint is related to systematic defects requiring corrective action and process changes.

15.1 ***Procedure***. Client complaints are communicated to client services representatives, quality assurance staff, or senior management staff for resolution. The individual receiving the complaint retains the responsibility for documentation and communicating the nature of the complaint to the responsible department(s) for resolution. The responsible party addresses the complaint. The resolution is communicated to quality assurance (QA) and the originator for communication to the client. QA reviews the complaint and resolution to determine if systematic defects exist. If systematic defects are present, QA initiates a corrective action for the responsible party who develops and implements a response that eliminates the defect. If systematic defects are not present and the resolution is satisfactory, the QA Staff will close the complaint/inquiry with a no further action is necessary tag.

15.2 ***Documentation***. Client's complaints are documented by the individual receiving the complaint using the Data Query and Corrective Action Inquiry Process. This process generates an E-Mail message that contains detailed information essential to the complaint resolution. A record of the telephone conversation is maintained by client services. The message is distributed to the QA staff and the party bearing responsibility for resolution by E-Mail. The complaint resolution is documented on the message by the responsible party and returned to the originator. A copy is sent to QA for review and database archiving.

15.3 ***Corrective Action***. Responses to data queries are required from the responsible party. At a minimum, the response addresses the query and provides an explanation to the complaint. Formal corrective action may focus on the single issue expressed in the complaint. Corrective action may include reprocessing of data, editing of the initial report, and re-issue to the client. If the QA review indicates a systematic error, process modification is required. The defective process at the root of the complaint is changed. SOPs are either created or modified to reflect the change. The party responsible for the process implements process changes.

15.4 ***QA Monitoring***. Process changes, implemented to resolve systematic defects, are monitored for effectiveness by QA. If monitoring indicates that the process change has not resolved the defect, QA works with the department management to develop and implement an effective process. If monitoring indicates that the defect has been resolved, monitoring is slowly discontinued and the corrective action is closed. Continued monitoring is incorporated as an element of the annual system audit.

16.0 CONTROL OF NONCONFORMING PRODUCT

Requirement: Policies and procedures have been developed and implemented that describe the procedures employed by the laboratory when any aspect of sample analysis or data reporting do not conform to established procedures or client specifications. These procedures include steps to ensure that process defects are corrected and affected work is evaluated to assess its impact to the client.

Procedure. Nonconforming product is identified through routine internal review and audit practices or through client inquiry. The individuals who identify the nonconformance or receiving a nonconformance inquiry immediately inform the Laboratory Director and the Quality Assurance Director. The Laboratory Director initiates an evaluation of the nonconformance through the Quality Assurance Department and takes full responsibility for managing the process and identifying the course of action to take, initiating corrective action and mitigating the impact of the nonconformance to the client. Reference SOP EQA 065 Control of Non-Conforming Product and EQA 038 Complaints & Data Inquiry for specific procedures on handling non-conformances and Data Inquires.

16.1 ***Corrective Action.*** The outcome of the evaluation dictates the course of action. This includes client notification when the quality of data reported has been impacted and may also include corrective action if applicable. Immediate corrective action is performed using the procedures specified in Accutest SOP EQA011. However, additional action may be required including cessation of analysis and withholding and or recalling data reports. If the evaluation indicates that nonconforming data may have been issued to clients, the client is immediately notified and data may be recalled following the procedures specified in SOP EQA011. If work has been stopped because of a nonconformance, the Laboratory Director is the only individual authorized to direct a resumption of analysis.

Nonconformances caused by systematic process defects require retraining of the personnel involved as an element of the corrective action solution.

17.0 CONFIDENTIALITY PROTECTION PROCEDURES

Requirements: Policies and procedures have been developed to protect client data from release to unauthorized parties or accidental release of database information through accidental electronic transmission or illegal intrusion. These policies have been communicated to clients and staff. Electronic systems are regularly evaluated for effectiveness.

17.1 ***Client Anonymity***. Information related to the Company's clients is granted to employees on a "need to know" basis. An individual's position within the organization defines his "need to know". Individuals with "need to know" status are given password access to systems that contain client identity information and access to documents and document storage areas containing client reports and information. Access to client information by individuals outside of the Company is limited to the client and individuals authorized by the client.

Individuals outside of the Company may obtain client information through subpoena issued by a court of valid jurisdiction. Clients are informed when subpoenas are received ordering the release of their information.

Client information may be released directly to regulatory agencies without receiving client authorization under specified circumstances. These circumstances require that the regulatory agency have statutory authority under the regulations for laboratory certification and that Accutest's operations fall under the purview of the regulation. In these situations, Accutest will inform the client of the regulatory agencies request for information pertaining to his data and proceed with the delivery of the information to the regulatory agency.

17.2 ***Documents***. Access to client documents is restricted to employees in need to know positions. Copies of all client reports are stored in secure electronic archives with restricted access. Reports and report copies are distributed to individuals who have been authorized by the client to receive them. Data reports or data are not released to third parties without verbally expressed or written permission from the client.

17.3 ***Electronic Data***.

Database Intrusion. Direct database entry is authorized for employees of Accutest only on a need to know basis. Entry to the database is restricted through a user specific multiple password entry system. Direct access to the database outside the facility is possible through secured channels set up by accutest. A unique password is required for access to the local area network. A second unique password is required to gain access to the database. The staff receives read or write level authorization on a hierarchical privilege basis.

Internet Access. Access to client information is through an HTTP Web application only. It does not contain a mechanism that allows direct access to the database. Clients can gain access to their data only using a series of Accutest assigned client and user specific passwords. The viewable data, which is encrypted during transmission, consists of an extraction of database information only.

Client Accessibility. Accessibility to client data delivered via electronic means follows strict protocols to insure confidentiality. Clients accessing electronic data are assigned a company account. The account profile, which is established by the MIS staff, grants explicit access to specific information pertaining to the client's project activity. Passwords are assigned on an individual basis within a client account. These accounts can be activated or deactivated by the MIS staff only.

17.4 ***Information Requests***. Client specific data or information is not released to third parties without verbally expressed or written permission from the client. Written permission is required from third parties, who contact the Company directly for the release of information. Verbal requests will be honored only if they are received directly from the client. These requests must be documented in a record of communication maintained by the authorized recipient.

17.5 ***Transfer of Records***. Archived data, which has previously been reported and transmitted to clients, is the exclusive property of Accutest Laboratories. In the event of a cessation of business activities due to business failure or sale, The Company's legal staff will be directed to arrange for the final disposition of archived data.

The final disposition of archived data will be accomplished using the approach detailed in the following sequence:

1. All data will be transferred to the new owners for the duration of the required archive period as a condition of sale.

2. If the new owners will not accept the data or the business has failed, letters will be sent to clients listed on the most recent active account roster offering them the option to obtain specific reports (identified by Accutest Job Number) at their own expense.

3. A letter will be sent to the NELAC accrediting authority with organizational jurisdiction over the company offering them the option to obtain all unclaimed reports at their own expense.

4. All remaining archived data will be recycled using the most expedient means possible.

18.0 QUALITY AUDITS AND SYSTEM REVIEWS

Requirement: The quality assurance group conducts regularly scheduled audits of the laboratory to assess compliance with quality system requirements, technical requirements of applied methodology, and adherence to documentation procedures. The information gathered during these audits is used to provide feedback to senior management and perform corrective action where needed for quality improvement purposes.

18.1 ***Quality System Reviews***. Quality system reviews are performed annually by the Quality Assurance Director for the Company President. In this review, the laboratory is evaluated for compliance with the laboratory Quality Systems Manual (QSM) and the quality system standards of the National Environmental Laboratory Accreditation Conference. Findings, which indicate non-compliance or deviation from the QSM, are flagged for corrective action. Corrective actions require either a return to compliance or a plan change to reflect an improved quality process. The Quality Assurance Director is responsible for making and documenting changes to the QSM. These changes are reviewed by the Company President and The Laboratory Director prior to the approval of the revised system.

18.2 ***Quality System Audits.*** Quality system audits are conducted to evaluate the effectiveness and laboratory compliance with individual quality system elements. These audits are conducted on an established schedule. Audit findings are documented and communicated to the management staff and entered into the corrective action system for resolution. If necessary, retraining is conducted to assure complete understanding of the system requirements.

18.3 ***Test Method Assessments.*** Test Method Assessments are performed throughout the year following an established schedule. Selected analytical procedures are evaluated for compliance with standard operating procedures (SOPs) and method requirements. If non-conformances exist, the published method serves as the standard for compliance. SOPs are edited for compliance if the document does not reflect method requirements. Analysts are trained to the new requirements and the process is monitored by quality assurance. Analysts are retrained in method procedures if an evaluation of bench practices indicates non-compliance with SOP requirements.

18.4 ***Documentation Audits***. Documentation audits are conducted monthly. This audit includes a check of measurement processes that require manual documentation. It also includes checks of data archiving systems and a search to find and remove any inactive versions of SOPs that may still be present in the laboratory and being accessed by the analysts. Non-conformances are corrected on the spot. Procedural modifications are implemented if the evaluation indicates a systematic defect.

18.5 ***Corrective Action Monitoring***. Defects or non-conformances that are identified during client or internal audits are documented in the corrective action systems and corrected through process modifications and/or retraining. Once a corrective action has been designed and implemented, it is monitored for compliance on a regular basis by the QA staff. Spot corrections are performed if the staff is not following the new procedure. Monitoring of the corrective action continues until satisfactory implementation has been verified.

18.6 ***Preventive Action.*** Laboratory systems or processes, which may be faulty and pose the potential for nonconformances, errors, confusing reports or difficulties establishing traceability may be identified during internal audits. These items are highlighted for systematic change using the corrective action system and managed to resolution using the procedures for corrective action identified in EQA011.

18.7 ***Client Notification.*** Defective processes, systematic errors, and quality defects, detected during routine audits may have negative impacts on data quality. In some cases, data that has been released to clients may be affected. If defective data has been released for use, Accutest will immediately notify the affected clients of the defect and provide specific details regarding the magnitude of the impact to their data.

18.8 ***Management Reports.*** Formal reports of all audit and proficiency testing activity are prepared for the management staff and presented as they occur. Additional reports may be presented orally at regularly scheduled staff meetings

Management reports may also address the following topics:

- Status and results of internal and external audits,
- Status and results of internal and external proficiency testing,
- Identification of quality control problems in the laboratory,
- Discussion of corrective action program issues,
- Status of external certifications and approvals,
- Status of staff training and qualifications,
- Discussion of new quality system initiatives.
- Recommendations for further action on listed items are included in the report.

19.0 HEALTH AND SAFETY

Requirement. The company operates a formal health and safety program that complies with the requirements of the Occupational Health and Safety Administration. The program consists of key policies and practices that are essential to safe laboratory operation. All employees are required to receive training on the program elements. Job specific training is conducted to assure safe practices for specific tasks. All employees are required to participate in the program, receive initial and annual training, and comply with the program requirements. All plan and program requirements are detailed in the Health and Safety Program Manual.

19.1 Policy. Accutest Laboratories will provide a safe and healthy working environment for its employees and clients while protecting the public and preserving the Company's assets and property. The company will comply with all applicable government regulations pertaining to safety and health in the laboratory and the workplace.

The objective of the Accutest Health and Safety Program is to promote safe work practices that minimize the occurrence of injuries and illness to the staff through proper health and safety training, correct laboratory technique application and the use of engineering controls.

19.2 Responsibilities. The Health and Safety Program assists managers, supervisors and non-supervisory employees in control of hazards and risks to minimize the potential for employee and client injuries, damage to client's property and damage or destruction to Accutest's facility.

The Health, Safety and Facilities Manager is responsible for implementing the Program's elements and updating its contents as necessary. He also conducts periodic audits to monitor compliance and assess the program's effectiveness. The Health, Safety and Facilities Manager is also responsible for creating and administering safety training for all new and existing employees.

The employee is responsible for following all safety rules established for their protection, the protection of others and the proper use of protective devices provided by the Company. The employee is also expected to comply with the requirements of the program at all times. Department Managers and Supervisors are responsible for ensuring the requirements of the Safety Program are practiced daily. The Company President retains the ultimate responsibility for the program design and implementation.

19.3 Program Elements. The Accutest Health and Safety Program consists of key program elements that compliment the company's health and safety objective. These elements form the essence of the health and safety policy and assure that the objectives of the program are achieved.

Safety Education and Training and Communication. Training is conducted to increase the staff's awareness of laboratory hazards and their knowledge of the safety practices and procedures required to protect them from those hazards. It is also used to communicate general safety procedures required for safe operation in a chemical laboratory.

Initial health and safety training for new employees is conducted during orientation. The training focuses on the Accutest Safety and Health Program and includes specific training for the hazards that may be associated with the employees duties. Training is also conducted for all program elements focusing on general, acceptable, laboratory safety procedures. Targeted training is conducted to address hazards or safety procedures that are specific to individual employee's work assignments. All training activities are documented and archived in individual training folders, A health and safety training inventory is maintained in the training database.

Safety Committee. The safety committee provides the employee with an opportunity to express their views and concerns on safety issues in a forum where those concerns will be addressed. This committee meets monthly to assure that the interests of the company and the well being of the employee are protected. They also serve as a catalyst for elevating the level of safety awareness among their peers.

Hazard Identification and Communication. The hazard communication program enables employees to readily identify laboratory hazards and the procedures to protect themselves from those hazards. This program complies with OSHA's Hazard Communication Standard, Title 29 Code of Federal Regulations 1910.1200 that requires the company to adopt and adhere to the following key elements:

- Material Safety Data Sheets (MSDS) must be available to any employee wishing to view them,
- The Company must maintain a Hazardous Chemicals Inventory (by location), which is updated on an annual basis,
- Containers are properly labeled,
- All employees must be provided with annual Hazard Communication and Right to Know training,

The hazard communication program also complies with the requirements of the New Jersey Worker and Community Right to Know Law, NJAC 8:95.

Identification of Workplace Hazards. The workplace hazard identification procedures have been designed to assure that hazards that have the potential to cause personnel injury or destruction of property are identified, managed and/or systematically eliminated from the operation. This system eliminates hazards, limits the potential for injury and increases the overall safety of the work environment.

Employee Exposure Assessment. Employee exposure assessment is performed to identify and evaluate potential exposure hazards associated with the employees work station. The exposure assessment data is used to determine if changes or modifications to the work station are needed to limit exposure to laboratory conditions that could negatively affect an employee's existing medical conditions.

Bloodborne Pathogens. Accutest has implemented the OSHA Bloodborne Pathogen Standard, 29CFR1910.1030 to reduce occupational exposure to Hepatitis B Virus (HBV), Human Immunodeficiency Virus (HIV) and other bloodborne pathogens that employees may encounter in their workplace.

Respiratory Protection Plan. The respiratory protection plan assures that Accutest employees are protected from exposure to respiratory hazards. This program is used in situations where engineering controls and/or safe work practices do not completely control the identified hazards. In these situations, respirators and other protective equipment are used. Supplemental respiratory protection procedures are applied to specified maintenance personnel, employees who handle hazardous wastes in the hazardous waste storage area, and any employee that voluntarily elects to wear a respirator.

Chemical Hygiene Plan. The Chemical Hygiene Plan complies with the requirements of the Occupational Safety and Health Administration's Occupational Exposure to Hazardous Chemicals in the Laboratory Standard, 29 CFR 1910.1450. This plan establishes procedures, identifies safety equipment, personal protective equipment, and work practices that protect employees from the potential health hazards presented by hazardous chemicals in the laboratory if properly used and/or applied.

Chemical Spill Response Plan. The chemical spill response plan has been designed to minimize the risks from a chemical spill or accidental chemical release in the laboratory. Risk minimization is accomplished through a planned response that follows a defined procedure. The staff has been trained to execute spill response procedures according to the specifications of the plan, which identifies the appropriate action to be taken based on the size of the spill.

Emergency Action & Evacuation Plan. The Emergency Action and Evacuation Plan details the procedures used to protect and safeguard Accutest's employees and property during emergencies. Emergencies are defined as fires or explosions, gas leaks, building collapse, hazardous material spills, emergencies that immediately threaten life and health, bomb threats and natural disasters such as floods, hurricanes or tornadoes, terrorism or terrorist actions. The plan identifies and assigns responsibility for executing specific roles in situations requiring emergency action. It also describes the building security actions coinciding with the "Alert Condition", designated by the Department of Homeland Security.

Lockout/Tagout Plan. Lockout/tagout procedures have been established to assure that laboratory employees and outside contractors take steps to render equipment inoperable and/or safe before conducting maintenance activities. The plan details the procedures for conducting maintenance on equipment that has the potential to unexpectedly energize, start up, or release energy or can be operated unexpectedly or accidentally resulting in serious injury to employees. The plan ensures that employees performing maintenance render the equipment safe through lock out or tag out procedures.

Personal Protection Policy. Policies have been implemented which detail the personal protection requirements for employees. The policy includes specifications regarding engineering controls, personal protective equipment (PPE), hazardous waste, chemical exposures, working with chemicals and safe work practices. Safety requirements specific to processes or equipment are reviewed with the department supervisor or the Health and Safety Manager before beginning operations.

Visitor and Contractor Safety Program. A safety brochure is given to all visitors and contractors who visit or conduct business at the facility. The brochure is designed to inform anyone who is not an employee of Accutest Laboratories of the laboratories safety procedures. The brochure directs them to follow all safety programs and plans while on Accutest property. This program also outlines procedures for visitors and contractors in the event of an emergency. Visitors are required to acknowledge receipt and understanding of the Accutest policy annually.

Appendix I

Glossary of Terms

GLOSSARY OF TERMS

Acceptance Criteria: specified limits placed on characteristics of an item, process, or service defined in requirement documents.

Accuracy: the degree of agreement between an observed value and an accepted reference value. Accuracy includes a combination of random error (precision) and systematic error (bias) components which are due to sampling and analytical operations; a data quality indicator.

Analyst: the designated individual who performs the "hands-on" analytical methods and associated techniques and who is the one responsible for applying required laboratory practices and other pertinent quality controls to meet the required level of quality.

Audit: a systematic evaluation to determine the conformance to quantitative *and qualitative* specifications of some operational function or activity.

Batch: environmental samples that are prepared and/or analyzed together with the same process and personnel, using the same lot(s) of reagents. A preparation batch is composed of one to 20 environmental samples of the same NELAC-defined matrix, meeting the above mentioned criteria and with a maximum time between the start of processing of the first and last sample in the batch to be 24 hours. An analytical batch is composed of prepared environmental samples (extracts, digestates or concentrates) which are analyzed together as a group.

Blank: a sample that has not been exposed to the analyzed sample stream in order to monitor contamination during sampling, transport, storage or analysis. The blank is subjected to the usual analytical and measurement process to establish a zero baseline or background value and is sometimes used to adjust or correct routine analytical results.

Blind Sample: a sub-sample for analysis with a composition known to the submitter. The analyst/laboratory may know the identity of the sample but not its composition. It is used to test the analyst's or laboratory's proficiency in the execution of the measurement process.

Calibration: to determine, by measurement or comparison with a standard, the correct value of each scale reading on a meter, instrument, or other device. The levels of the applied calibration standard should bracket the range of planned or expected sample measurements.

Calibration Curve: the graphical relationship between the known values, such as concentrations of a series of calibration standards and their instrument response.

Calibration Method: a defined technical procedure for performing a calibration.

Calibration Range: the range of concentrations between the lowest and highest calibration standards of a multi-level calibration curve. For metals analysis with a singe-point calibration, the low-level calibration check standard and the high standard establish the linear calibration range, which lies within the linear dynamic range.

Calibration Standard: a substance or reference material used to calibrate an instrument.

Certified Reference Material (CRM): a reference material one or more of whose property values are certified by a technically valid procedure, accompanied by or traceable to a certificate or other documentation, which is issued by a certifying body.

Chain of Custody: an unbroken trail of accountability that ensures the physical security of samples and includes the signatures of all who handle the samples.

Confirmation: verification of the identity of a component through the use of an approach with a different scientific principle from the original method. These may include, but are not limited to second column confirmation, alternate wavelength, derivatization, mass spectral, interpretation, alternative detectors or, additional cleanup procedures.

Continuing Calibration Verification: the verification of the initial calibration that is required during the course of analysis at periodic intervals. Continuing calibration verification applies to both external standard and internal standard calibration techniques, as well as to linear and non-linear calibration models.

Corrective Action: the action taken to eliminate the causes of an existing nonconformity, defect or other undesirable situation in order to prevent recurrence.

Data Reduction: the process of transforming raw data by arithmetic or statistical calculations, standard curves, concentration factors, etc., and collation into a more useable form.

Demonstration of Capability: a procedure to establish the ability of the analyst to generate acceptable accuracy.

Document Control: the act of ensuring that documents (and revisions thereto) are proposed, reviewed for accuracy, approved for release by authorized personnel, distributed properly and controlled to ensure use of the correct version at the location where the prescribed activity is performed.

Duplicate Analyses: the analyses or measurements of the variable of interest performed identically on two sub-samples of the same sample. The results from duplicate analyses are used to evaluate analytical or measurement precision but not the precision of sampling, preservation or storage internal to the laboratory.

Field of Testing: NELAC's approach to accrediting laboratories by program, method and analyte. Laboratories requesting accreditation for a program-method-analyte combination or for an up-dated/improved method are required submit to only that portion of the accreditation process not previously addressed (see NELAC, section 1.9ff).

Laboratory Control Sample (such as laboratory fortified blank, spiked blank, or QC check sample): a sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes from a source independent of the calibration standards or a material containing known and verified amounts of analytes. It is generally used to establish intra-laboratory or analyst specific precision and bias or to assess the performance of all or a portion of the measurement system.

Limit of Detection (LOD): an estimate of the minimum amount of a substance that an analytical process can reliably detect. An LOD is analyte- and matrix-specific. DoD clarification is the smallest amount or concentration of a substance that must be present in a sample in order to be detected at a high level of confidence (99%). At the LOD, the false negative rate (Type II error) is 1%.

Limit of Quantitation (LOQ): the minimum levels, concentrations, or quantities of a target analyte that can be reported with a specified degree of confidence. DoD clarification is the lowest concentration that produces a quantitative result within specified limits of precision and bias. The LOQ shall be at or above the concentration of the lowest initial calibration standard.

Matrix: the component or substrate that contains the analyte of interest. For purposes of batch and QC requirement determinations, the following matrix distinctions shall be used:

Aqueous: any aqueous sample excluded from the definition of Drinking Water matrix or Saline/Estuarine source. Includes surface water, groundwater, effluents, and TCLP or other extracts.

Drinking Water: any aqueous sample that has been designated a potable or potential potable water source. Saline/Estuarine: any aqueous sample from an ocean or estuary, or other salt-water source such as the Great Salt Lake. Non-aqueous Liquid: any organic liquid with <15% settleable solids.

Solids: includes soils, sediments, sludges and other matrices with >15% settlable solids.

Chemical Waste: a product or by-product of an industrial process that results in a matrix not previously defined.

Air: whole gas or vapor samples including those contained in flexible or rigid wall containers and the extracted concentrated analytes of interest from a gas or vapor that are collected with a sorbent tube, impinger solution, filter, or other device.

Biota: animal or plant tissue, consisting of entire organisms, homogenates, and/or organ or structure specific subsamples.

Matrix Spike (spiked sample or fortified sample): a sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. Matrix spikes are used, for example, to determine the effect of the matrix on a method's recovery efficiency.

Matrix Spike Duplicate (spiked sample or fortified sample duplicate): a second replicate matrix spike prepared in the laboratory and analyzed to obtain a measure of the precision of the recovery for each analyte.

Method Blank: a sample of a matrix similar to the batch of associated samples (when available) that is free from the analytes of interest, which is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences are present at concentrations that impact the analytical results for sample analyses.

Method Detection Limit: the minimum concentration of a substance (an analyte) that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte.

National Environmental Laboratory Accreditation Program (NELAP): the overall National Environmental Laboratory Accreditation Program.

NELAC Standards: the plan of procedures for consistently evaluating and documenting the ability of laboratories performing environmental measurements to meet nationally defined standards established by the National Environmental Laboratory Accreditation Conference.

Performance Audit: the routine comparison of independently obtained *qualitative and quantitative* measurement system data with routinely obtained data in order to evaluate the proficiency of an analyst or laboratory.

Precision: the degree to which a set of observations or measurements of the same property, obtained under similar conditions, conform to themselves; a data quality indicator. Precision is usually expressed as standard deviation, variance or range, in either absolute or relative terms.

Preservation: refrigeration and/or reagents added at the time of sample collection (or later) to maintain the chemical and/or biological integrity of the sample.

Proficiency Testing: a means of evaluating a laboratory's performance under controlled conditions relative to a given set of criteria through analysis of unknown samples provided by an external source.

Proficiency Test Sample (PT): a sample, the composition of which is unknown to the analyst and is provided to test whether the analyst/laboratory can produce analytical results within specified acceptance criteria.

Quality Assurance: an integrated system of activities involving planning, quality control, quality assessment, reporting and quality improvement to ensure that a product or service meets defined standards of quality with a stated level of confidence.

Quality Control: the overall system of technical activities whose purpose is to measure and control the quality of a product or service so that it meets the needs of users.

Quality Manual: a document stating the management policies, objectives, principles, organizational structure and authority, responsibilities, accountability, and implementation of an agency, organization, or laboratory, to ensure the quality of its product and the utility of its product to its users.

Quality System: a structured and documented management system describing the policies, objectives, principles, organizational authority, responsibilities, accountability, and implementation plan of an organization for ensuring quality in its work processes, products (items), and services. The quality system provides the framework for planning, implementing, and assessing work performed by the organization and for carrying out required QA and QC.

Reporting Limits: the maximum or minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be quantified with the confidence level required by the data user.

Reagent Blank (method reagent blank or method blank): a sample consisting of reagent(s), without the target analyte or sample matrix, introduced into the analytical procedure at the appropriate point and carried through all subsequent steps to determine the contribution of the reagents and of the involved analytical steps.

Reference Material: a material or substance one or more properties of which are sufficiently well established to be used for the calibration of an apparatus, the assessment of a measurement method, or for assigning values to materials.

Reference Method: a method of known and documented accuracy and precision issued by an organization recognized as competent to do so.

Reference Standard: a standard, generally of the highest metrological quality available at a given location, from which measurements made at that location are derived.

Replicate Analyses: the measurements of the variable of interest performed identically on two or more sub-samples of the same sample within a short time interval.

Sample Duplicate: two samples taken from and representative of the same population and carried through all steps of the sampling and analytical procedures in an identical manner. Duplicate samples are used to assess variance of the total method including sampling and analysis.

Spike: a known mass of target analyte added to a blank sample or sub-sample; used to determine recovery efficiency or for other quality control purposes.

Standard: the document describing the elements of laboratory accreditation that has been developed and established within the consensus principles of NELAC and meets the approval requirements of NELAC procedures and policies.

Traceability: the property of a result of a measurement whereby it can be related to appropriate standards, generally international or national standards, through an unbroken chain of comparisons.

Validation: the process of substantiating specified performance criteria.

Work Cell: A defined group of analysts that together perform the method analysis. Members of the group and their specific functions within the work cell must be fully documented. A “work cell” is considered to be all those individuals who see a sample through the complete process of preparation, extraction, or analysis. The entire process is completed by a group of capable individuals; each member of the work cell demonstrates capability for each individual step in the method sequence.

Appendix II

Standard Operating Procedures Directory

Accutest Laboratories
Standard Operating Procedures

Section	Standard Operating Procedure Title	Number
Air Toxics	Air Analysis by TO-15	EAT001
Air Toxics	Summa Canister Cleaning and Certification	EAT002
Air Toxics	Air Analysis of Tedlar Bag/Summa Canister by TO-3	EAT003
Air Toxics	Laboratory Analysis of Dissolved Gases in Aqueous Samples	EAT004
Air Toxics	Air Analysis by NJDEP – SRWM Low Level USEPA TO-15	EAT005
Air Toxics	Calibration of Flow Controllers	EAT006
Air Toxics	Air Analysis by TO-15 for Minnesota Department of Health	ETA007
General Chem	Percent Solids - SM2540 G-97, ASTM D4643-00	EGN007
General Chem	Anionic Surfactants As MBAS	EGN008
General Chem	Nonionic Surfactants as CTAS	EGN009
General Chem	Total Solids, 160.3, SM2540 B-97	EGN010
General Chem	Composite Sample	EGN015
General Chem	Total Dissolved Solids (Total Filterable Residue) SM2540 C-97	EGN020
General Chem	Settlable Solids, 160.5	EGN021
General Chem	Nitrate/Nitrite & Nitrate Only By Cad. Red. Analysis	EGN026
General Chem	Total Volatile Solids, 160.4	EGN030
General Chem	Chlorine, Total Residual And Free	EGN033
General Chem	Total Alkalinity, 310.1	EGN037
General Chem	Acidity (pH 8.2)	EGN044
General Chem	Bicarbonate, Carbonate, Free Carbon Dioxide	EGN045
General Chem	Petroleum Hydrocarbons By IR	EGN062
General Chem	Viscosity	EGN067
General Chem	Total Suspended Solids (Non-Filterable Residue)	EGN087
General Chem	Chemical Oxygen Dem: Hach 8000, Aqueous Samples - Soil Modified	EGN099
General Chem	Hardness As Caco3 By Titration	EGN101
General Chem	Orthophosphate	EGN102
General Chem	Nitrogen, Nitrite -Total-Waters/Soluble-Soils	EGN103
General Chem	Turbidity, 180.1	EGN116
General Chem	Sulfide	EGN118
General Chem	Sulfite.	EGN119
General Chem	Apparent Color By Visual Comparison Method	EGN120
General Chem	Specific Conductance At 25.0 C	EGN124
General Chem	Chloride	EGN131
General Chem	Turbidity for Metals Drinking Waters	EGN132
General Chem	Odor & Odor at Elevated Temp.(Threshold Odor Test)	EGN133
General Chem	Biological Oxygen Demand (5 Day BOD)	EGN134
General Chem	Winkler Titration For DO Standardization	EGN135
General Chem	Dissolved Oxygen	EGN136
General Chem	Reactive Sulfide And Reactive Cyanide	EGN137
General Chem	Ignitability	EGN140
General Chem	TCLP - Semivolatiles/Metals Extraction	EGN141
General Chem	TCLP- Volatiles Extraction	EGN142
General Chem	Paint Filter Test	EGN143
General Chem	Cyanides Amenable To Chlorination Preparation	EGN144
General Chem	Temperature	EGN146
General Chem	Iodine, Colorimetric Analysis	EGN148
General Chem	pH by Electrode – Water	EGN151
General Chem	Salinity - SM182520B	EGN158
General Chem	pH & Corrosivity for Soils/ Solid Wastes SW486 9045	EGN200
General Chem	BTU (Gross Calorific Value)	EGN202

Accutest Laboratories
Standard Operating Procedures

Section	Standard Operating Procedure Title	Number
General Chem	Percent Sulfur	EGN203
General Chem	Bulk Density (Dry Basis)	EGN204
General Chem	Percent Ash (Dry Basis)	EGN205
General Chem	Total Organic Content	EGN206
General Chem	Cyanide (Lachat Autoanalyzer)	EGN207
General Chem	Total Chlorine ASTM D808-91	EGN208
General Chem	Total Organic Chlorine ASTM D808-91	EGN209
General Chem	Total Kjeldahl Nitrogen (Lachat Autoanalyzer)	EGN210
General Chem	Specific Gravity	EGN211
General Chem	Hexavalent Chromium (Soils)	EGN214
General Chem	Ammonia (Lachat Autoanalyzer)	EGN216
General Chem	Phenols (Lachat Autoanalyzer)	EGN217
General Chem	Total Organic Halides	EGN218
General Chem	Total Organic Halides, Solid And Oil Matrices	EGN219
General Chem	Pour Point	EGN221
General Chem	Base Sediment In Petroleum Samples	EGN222
General Chem	Water Content In Petroleum Samples	EGN223
General Chem	Ignitability, Bunsen Burner Method	EGN226
General Chem	Organic Matter (Loss on Ignition)	EGN227
General Chem	Sulfide Analysis For Reactive Sulfides	EGN228
General Chem	Hexavalent Chromium In Waters by EPA 7196a Mod.	EGN230
General Chem	Hexavalent Chromium In Waters by SM18 4500 CR D	EGN231
General Chem	Total Petroleum Hydrocarbons by IR With ASE Extract.	EGN232
General Chem	Total Organic Carbon In Soil Samples	EGN233
General Chem	Total Organic Carbon In Aqueous Samples	EGN234
General Chem	pH and Corrosivity for Aqueous and Multiphasic Wastes	EGN238
General Chem	Synthetic Precipitation Leaching Procedure for Non-Volatile Anal.	EGN239
General Chem	Synthetic Precipitation Leaching Procedure for Volatile Analytes	EGN240
General Chem	Cation Exchange Capacity Of Soils (Sodium Acetate)	EGN242
General Chem	Ferrous Iron	EGN243
General Chem	Freon-113 Recycling Procedure	EGN246
General Chem	Specific Gravity (For Sludges And Solids)	EGN247
General Chem	N-Hexane Extract. Mat. & Silica Gel Treatment by Gravimetric Anal.	EGN249
General Chem	Oil & Grease – Gravimetric Anal. (So & Sl) – Hexane Extraction	EGN250
General Chem	Neutral Leaching of Solid Waste Sam. Using Shake Extraction	EGN252
General Chem	Oxidation-Reduction Potential	EGN253
General Chem	Titrametric Method For Free Carbon Dioxide	EGN255
General Chem	Total Phosphorous EPA 365.3	EGN256
General Chem	Dissolved Silica	EGN257
General Chem	Grain Size and Sieve Testing	EGN258
General Chem	Hardness By Calculation	EGN259
General Chem	Spectrophotometer Calibration Check	EGN260
General Chem	Massachussetts Sieve Test	EGN262
General Chem	Volatile Suspended Solids	EGN264
General Chem	Unburned Combustibles (Volatile Solids)	EGN266
General Chem	Particulate Matter	EGN267
General Chem	Elutriate Preparation	EGN268
General Chem	Phosphorus, Hydrolyzable	EGN271
General Chem	Perchlorate by Ion Chromatography in Groundwater and Soil	EGN272
General Chem	Percent Lipids by Gravimetric Analysis	EGN273
General Chem	Cyanide Distillation/Aqueous Samples/Micro Method	EGN275

Accutest Laboratories
Standard Operating Procedures

Section	Standard Operating Procedure Title	Number
General Chem	Cyanide Distillation/Soil Samples/Micro Method	EGN276
General Chem	Calibration of General Chemistry Distillation Tubes	EGN277
General Chem	Phenols Distillation, Water Samples	EGN279
General Chem	Phenols Micro Distillation, Soil Samples	EGN280
General Chem	Inorganic Anions Determination by ion chromatography using IC 2000	EGN281
General Chem	Leaching of Solid Waste Samples using China Leaching Procedure	EGN283
General Chem	Ammonia Distillation, Water & Solid samples	EGN284
General Chem	Weak Acid Dissociable Cyanide / Micro-Distillation Method	EGN286
General Chem	Ferrous Iron for Hexavalent Chromium Sample Characterization	EGN288
General Chem	Calibration of Coliform Collection Bottles	EGN287
General Chem	Inorganic Carbon by Calculation	EGN289
General Chem	Procedure for Homogenization of Biota Samples	EGN290
General Chem	Hexavalent Chromium in Water by Ion Chromatography	EGN291
General Chem	Hexavalent Chromium in Soils by Ion Chromatography	EGN292
General Chem	Procedure for Wand Mixer Homogenization of Soil Samples	EGN293
General Chem	Hydrogen Sulfide	EGN294
General Chem	TCLPME-Multiple Extractions Procedure	EGN295
General Chem	Modified Elutriate Preparation	EGN296
General Chem	Procedure for Particle Size Reduction (Crushing) of Solid Matrices	EGN297
General Chem	Acid Volatile Sulfides	EGN298
General Chem	Pore Water Extraction from Soils for NVOC and Metals Analysis	EGN299
General Chem	Iodide, Colorimetric Analysis	EGN300
General Chem	Percent Solids and Moisture in Soil/Solid Matrices	EGN301
General Chem	Un-Ionized Ammonia	ENG302
General Chem	Density, ASTM Definition	EGN303
General Chem	HEM by Gravimetric Analysis Using Solid Phase Extraction	EGN304
General Chem	Hexavalent Chromium on Wipe Samples	EGN305
General Chem	Modified Mehlich Buffer pH	EGN306
General Chem	Screening Procedure to test for presence of sulfide	EGN307
General Chem	Black Carbon in Soil Samples	EGN308
General Chem	Physical Appearance (Sample Description)	EGN309
General Chem	Orthophosphate	EGN310
Facilities Maint.	Facilities Maintenance	EFM001
Field Operations	Aqueous Grab Sampling Procedures	EFP001
Field Operations	Use of Automatic Wastewater Sampler	EFP002
Field Operations	Free and Total residual Chlorine	EFP003
Field Operations	Decontamination of Sampling Equipment	EFP004
Field Operations	Dissolved Oxygen	EFP005
Field Operations	Dissolved Oxygen by Winkler Titration	EFP006
Field Operations	Metal Sample Field Filtering Procedure	EFP008
Field Operations	Sampling Procedure for Monitoring Wells	EFP013
Field Operations	Subsurface Soil Sampling Procedure	EFP016
Field Operations	Surface Soil Sampling Procedure	EFP017
Field Operations	Residential Potable Well Sampling Procedure	EFP018
Field Operations	Potable Water Line Sampling Procedure	EFP019
Field Operations	Sampling for NJ Private Well Testing Act	EFP020
Field Operations	Field Sampling CEOrdinates by GPS	EFP021
Field Operations	Sampling Drinking Water Wells for Volatile Organics	EFP022
Field Operations	Sampling Drinking Water Wells for Metals	EFP023
Field Operations	Sampling Drinking Water Wells for Nitrates & Nitrites	EFP024

Accutest Laboratories
Standard Operating Procedures

Section	Standard Operating Procedure Title	Number
Field Operations	Sampling Drinking Water Wells for Gross Alpha	EFP025
Field Operations	Sampling Drinking Water Wells for Coliform Bacteria	EFP026
Field Operations	Sampling Drinking Water Wells for pH	EFP027
Field Operations	Documentation Requirements for Field Services	EFP028
Field Operations	Field Oxidation-Reduction Potential	EFP029
Field Operations	Turbidity, Field Test	EFP030
Field Operations	Analysis for Dissolved Oxygen by DO Probe	EFP031
Field Operations	Field pH in Water by Electrode	EFP032
Field Operations	Field Measurement of Specific Conductance and Resistivity	EFP033
Health & Safety	Contamination Avoidance Procedure	EHS001
Health & Safety	Measuring Face Velocities in Laboratory Fume Hoods	EHS002
Health & Safety	Proper Handling of Compressed Gas Cylinders	EHS003
Health & Safety	Sample and Waste Disposal (Formerly ESM003)	EHS004
Health & Safety	Handling and Management of Inorganic Wastes (Formerly EGN265)	EHS005
Health & Safety	Handling, Treatment, and Disposal of Foreign Soils	EHS006
Health & Safety	Management of Industrial Product Samples	EHS007
Health & Safety	Organic Prep Air Monitoring	EHS008
Health & Safety	Laboratory Visitor Safety Procedure	EHS009
Information Tech	Information Security & Integrity Procedure	EMI001
Information Tech	Procedures for Requesting Software or Software Revisions	EMI002
Information Tech	Development, Implementation, Delivery, & Revision of EDDs	EMI003
Information Tech	Data Systems Maintenance and Information Handling	EMI006
Metals Analysis	Mercury Analysis of Non-Potable and Potable Water Samples	EMA215
Metals Analysis	Metals by ICP-MS: EPA 200.8	EMA216
Metals Analysis	Metals by ICP-MS: SW846 6020	EMA217
Metals Analysis	Metals by ICP Atomic Emission Spectrometry using Solid State ICP	EMA222
Metals Analysis	Metals by ICP Atomic Emission Spectrometry – EPA 200.7	EMA223
Metals Analysis	Low Level Mercury by EPA 1631	EMA224
Metals Analysis	Low Level Mercury by EPA 245.7	EMA225
Metals Analysis	Metals by inductively coupled plasma-Mass Spectrometry (ICP-MS)	EMA226
Metals Analysis	Metals by Inductively coupled plasma atomic emission spectrometry (ICP) using Using Solid State ICP	EMA227
Metals Analysis	Cold Vapor Analysis of Mercury For Soil Samples	EMA228
Metals Prep	Digestion of DW for ICP Analysis	EMP048
Metals Prep	Non-Potable Waters Digestion For ICP/Flame Analysis	EMP070
Metals Prep	Soil Digestion For ICP Analysis	EMP073
Metals Prep	Non-Potable Water Digestion for Flame/ICP (Total & Dissolved)	EMP081
Metals Prep	Digestion Of Non-Potable Waters For Total Recoverable Metals	EMP200
Metals Prep	Metals Spiking Solution and Standards Preparation and Use	EMP202
Metals Prep	Calibration of Metals Digestion Tubes	EMP203
Metals Prep	ICP and ICP/MS Analysis of TPPM-10 Filters	EMP207
Metals Prep	Digestion of Waters for Acid Extractable Metals	EMP208
Metals Prep	Lab Preservation Filtration of Metals Samples	EMP209

Accutest Laboratories
Standard Operating Procedures

Section	Standard Operating Procedure Title	Number
Microbiology	Microbiological Quality Control	EMB001
Microbiology	Coliform, Total By Colilert, SM18 9223 B	EMB002
Microbiology	Total Coliform: Membrane Filtration/Fecal Coliform Confirmation	EMB003
Microbiology	Total Plate Count SM18 9215B	EMB008
Microbiology	General Petroleum Degraders	EMB009
Microbiology	Calibration of Microbiology Coliform Collection Bottles	EMB010
Microbiology	Coliform, Fecal	EMB127
Organics-GC	Semi-Volatile Petroleum Products in H2O-NJOQA25	EGC101
Organics-GC	Dibromo-3-chloropropane & 1,2,3-Trichloropropane	EGC504
Organics-GC	Volatile Aromatics in Wastewater by EPA-602	EGC602
Organics-GC	Acrolein and Acrylonitrile by EPA 603	EGC603
Organics-GC	Pesticides & PCBs in Wastewater by EPA 608	EGC608
Organics-GC	Polyaromatic Hydrocarbons	EGC610
Organics-GC	1,2-DBE, 1,2-DB-3-CP & 1,2,3-TCP by Micro-extraction and GC	EGC8011
Organics-GC	Volatile Aromatics Halocarbons by SW8021	EGC8021B
Organics-GC	Pesticides Analysis by SW8081	EGC8081
Organics-GC	PCB Analysis SW8082	EGC8082
Organics-GC	PAHs by SW846-8100	EGC8100
Organics-GC	Herbicides by SW846 – 8151	EGC8151
Organics-GC	Conn. Total Semi-volatile Petroleum Hydrocarbons	EGCCTGRO
Organics-GC	Alcohols by Direct Aqueous Injection GC/FID SW 8015	EGCALDAI
Organics-GC	Analysis of Explosives by GC/ECD	EGCBUSACH-PPM
Organics-GC	Connecticut Extractable Petroleum Hydrocarbon Analysis	EGCCTETPH
Organics-GC	Petroleum Range Organics Analysis By GC/FID (Florida)	EGCFLPRO
Organics-GC	Massachusetts Extractable Petroleum Hydrocarbons	EGCMAEPH
Organics-GC	Massachusetts Volatile Petroleum Hydrocarbons	EGCMAVPH
Organics-GC	New Jersey Extractable Petroleum Hydrocarbons	EGCNJEPH
Organics-GC	Oil Identification by Gas Chromatography Fingerprint	EGCOILID
Organics-GC	Texas Total Petroleum Hydrocarbons	EGCTX1005
Organics-GC	Wisconsin Diesel Range Organics	EGCWIDRO
Organics-GC/MS	Volatile Organics in Drinking Water by EPA 524	EMS524
Organics-GC/MS	Volatile Organics in Wastewater by EPA 624	EMS624
Organics-GC/MS	Semi-Volatile Organics by EPA 625	EMS625
Organics-GC/MS	Volatile Organics by SW8260B	EMS8260B
Organics-GC/MS	Ethylene/Propylene Glycol Analysis DAI-GC/MS(SIM)	EMS8260DAI
Organics-GC/MS	Semi-Volatile Organics by SW8270	EMS8270
Organics-GC/MS	NDMA By chemical Ionization Gas Chromatography/mass spectrometry (GC/MS) With large volume injection	EMSNDMA
Organics Prep	Prep of Base Neutral/Acid Extractables: Water Matrices	EOP001
Organics Prep	Extraction of Semivolatile Organics from Solids By Sonication	EOP003
Organics Prep	Alumina Cleanup of Organic Extracts: SW3610	EOP005
Organics Prep	Continuous Liquid/Liquid Extraction Water: SW3520C	EOP007
Organics Prep	Sulfur Cleanup of Organic Extracts: SW846 3660B	EOP011

Accutest Laboratories
Standard Operating Procedures

Section	Standard Operating Procedure Title	Number
Organics Prep	Testing & Approval Of Organics Solvents	EOP013
Organics Prep	Preparation & Use of MDL Check Solution	EOP014
Organics Prep	Preparation of Petroleum Oils & Organic Wastes for PCBs by SW 8082	EOP017
Organics Prep	Removal of Sulfur from Extracts with Tetrabutylammonium Sulfite	EOP018
Organics Prep	Soxhlet Extraction of Solids For Semi-Volatile Organics	EOP020
Organics Prep	Preparation of Petroleum Products for EPA 8081	EOP021
Organics Prep	Preparation of Petroluem Products for BNA by EPA 8270C	EOP022
Organics Prep	Preparation for Aqueous DRO for Wisconsin	EOP023
Organics Prep	Solvent Extraction for Soil/Sediment DRO for Wisconsin	EOP024
Organics Prep	Pressurized Fluid Extraction (ASE)	EOP040A
Organics Prep	Microwave Extraction of Pesticides &/or PCBs from solid samples	EOP3546
Organics Prep	Calibration of Extract Vials	EOP026
Organics Prep	Alumina Column Cleanup SW3611	EOP3611
Organics Prep	Florisil Column Cleanup SW3620	EOP3620
Organics Prep	Silica Gel Cleanup SW3630	EOP3630
Organics Prep	Acid Base Partitioning SW3650	EOP3650
Organics Prep	Sulfuric Acid/Permanganate Cleanup SW3665	EOP3665
Organics Prep	Purge-And-Trap Extraction Of Aqueous Samples	EOP5030
Organics Prep	Collection/Preservation of Solids for VO Analysis: 5035	EOP5035
Organics Prep	Cleanup of Organic Extracts by Gel Permeation Chromatography	EOPGPC
Organics - LC	PAHs By HPLC Using SW-846 Method 8310	ELC8310
Project Mgmt	Procedure For The Management Of Client Projects	EPM001
Project Mgmt	Client Specific Method Modifications	EPM002
Project Mgmt	Procedure For The Notification Of DW Exceedences	EPM003
Project Mgmt	Data Entry for Sample Log-In	EPM004
Quality Assurance	Preparation, Approval, Distribution & Archiving of SOPs	EQA001
Quality Assurance	Calibration of Analytical Balances	EQA002
Quality Assurance	Calibration of Thermometers	EQA003
Quality Assurance	Calibration and Use of Auto-Pipettes	EQA004
Quality Assurance	Temperature Monitoring-	EQA005
Quality Assurance	Sample Container Cleaning & Quality Control	EQA006
Quality Assurance	Calibration of Kuderna-Danish Collection Tubes	EQA007
Quality Assurance	Preparation and Analysis of Sample Preservatives	EQA008
Quality Assurance	Personnel Training and Analyst Proficiency	EQA009
Quality Assurance	Sample Batching Procedure	EQA010
Quality Assurance	Corrective Action Procedure	EQA011
Quality Assurance	Glassware Preparation For Inorganic Lab Use	EQA012
Quality Assurance	Preparation Of Glassware For Organics Extraction	EQA013
Quality Assurance	Standards Traceability Documentation Procedure	EQA014
Quality Assurance	Template for Standard Operating Procedures	EQA016
Quality Assurance	Management/Reporting Of Proficiency Test (PT) Samples	EQA017
Quality Assurance	Creating/Distributing/Tracking Internal Chains Of Custody	EQA018
Quality Assurance	Creating New Accounts	EQA019
Quality Assurance	Creating New Projects	EQA020
Quality Assurance	Creating Product Codes	EQA021
Quality Assurance	Procedures For The Purchase Of Laboratory Supplies	EQA023
Quality Assurance	Control & Archiving Of Laboratory Documents	EQA025
Quality Assurance	Confidentiality Protection Procedures	EQA027

Accutest Laboratories
Standard Operating Procedures

Section	Standard Operating Procedure Title	Number
Quality Assurance	Quality System Review	EQA028
Quality Assurance	Contract Review	EQA029
Quality Assurance	Procedure for the Development and Application of MDLs and RLs	EQA030
Quality Assurance	Subcontracting Procedures	EQA031
Quality Assurance	Signature Authority	EQA032
Quality Assurance	Review of Inorganic Data	EQA034
Quality Assurance	Review of Organic Data	EQA035
Quality Assurance	Documentation of Equipment Maintenance	EQA036
Quality Assurance	Procedures for Accepting Departures from Laboratory Specifications	EQA037
Quality Assurance	Client Complaints Resolution Procedure	EQA038
Quality Assurance	Employee Technical Ethics Responsibilities	EQA039
Quality Assurance	Internal Audit Procedure	EQA041
Quality Assurance	Procedure for Obtaining Representative Sample Aliquots	EQA042
Quality Assurance	Procedure for Development &use of In-House Q C Criteria	EQA043
Quality Assurance	Manual Integration of Chromatographic Peaks	EQA044
Quality Assurance	Deionized Water Quality Control	EQA046
Quality Assurance	Management and Control of Change	EQA047
Quality Assurance	Laboratory Equipment Purchase and Removal From Service	EQA048
Quality Assurance	Calibration of Microliter Syringes	EQA049
Quality Assurance	Autosampler Vial Labeling Procedure (formally EOP041-01)	EQA050
Quality Assurance	pH for Volatile Samples	EQA051
Quality Assurance	Semivolatile Spike Solution Accuracy Verification	EQA053
Quality Assurance	Quality Control Review of Data Packages	EQA054
Quality Assurance	Procedures for Determining Method Comparability	EQA055
Quality Assurance	Refrigerator Storage Holding Blank Procedure	EQA056
Quality Assurance	Data Integrity Training Procedure	EQA057
Quality Assurance	Data Integrity Monitoring Procedure	EQA058
Quality Assurance	Procedure for Conducting Data Integrity Investigations	EQA059
Quality Assurance	Quality Control Requirements for Organics by GC/GCMS using EPA 500 & 600 Series, SW846 8000 Series and CLP Methodologies	EQA060
Quality Assurance	Procedure for the Confidential Reporting of Data Integrity Issues	EQA061
Quality Assurance	Calibration of Volumetric Dispensers for Volume Critical Processes	EQA062
Quality Assurance	Calibration of Volumetric Dispensers / Non-Critical Volumes Processes	EQA063
Quality Assurance	Glassware Preparation for use in VOA analysis	EQA064
Quality Assurance	Control of Non-Conforming Product	EQA065
Quality Assurance	Client Notification of Key Personnel Changes	EQA066
Quality Assurance	Review of Inorganic Notebooks	EQA067
Quality Assurance	Disposal of Spent Semi-Volatile Organic Extracts	EQA068
Quality Assurance	Compressed Gas Management	EQA069
Quality Assurance	Procedure for Tracking Quality Control Non-Conformances	EQA070
Quality Assurance	Procedure for the Development and Application of Experimental Method Detection Limits, limits of detection, and limits of quantitation for inorganic applications	EQA071
Quality Assurance	Procedure for Particle Size Reduction (Crushing)/Homogenization of solid matrices	EQA072
Quality Assurance	Compositing Samples	EQA073
Report Generation	Report Generation–Data Package	ERG002
Sample Mgmt.	Sample Storage	ESM001
Sample Mgmt.	Chain Of Custody And Log In Procedure	ESM002

Accutest Laboratories
Standard Operating Procedures

Appendix III

Analytical Capabilities

Method Capabilities by NELAC Accredited Fields of Testing

Analytes	Method Number	Program	Chemistry Field
Alkalinity	SM 2320 B	Drinking Water	Inorganic Analysis
Ammonia	SM 4500-NH_3 H	Drinking Water	Inorganic Analysis
Chloride, Fluoride, Sulfate	EPA 300.0	Drinking Water	Inorganic Analysis
Chlorine, Total Residual	SM 4500-CL F	Drinking Water	Inorganic Analysis
Color, Apparent	SM 2120 B	Drinking Water	Inorganic Analysis
Conductivity	SM 2510 B	Drinking Water	Inorganic Analysis
Cyanide	EPA 335.4	Drinking Water	Inorganic Analysis
Foaming Agents (MBAS)	SM 5540 C	Drinking Water	Inorganic Analysis
Nitrate	EPA 353.2	Drinking Water	Inorganic Analysis
Nitrite	SM 4500-NO_2 B	Drinking Water	Inorganic Analysis
Odor	SM 2150 B	Drinking Water	Inorganic Analysis
Organic Carbon, Total (TOC)	SM 5310 B	Drinking Water	Inorganic Analysis
Dissolved Organic Carbon (DOC)	5310 B, C, D	Drinking Water	Inorganic Analysis
Orthophosphate	SM 4500-P E	Drinking Water	Inorganic Analysis
Perchlorate	EPA 314.0	Drinking Water	Inorganic Analysis
pH, Hydrogen Ion	SM 4500-H^+ B	Drinking Water	Inorganic Analysis
Silica, Dissolved	SM 4500-Si D($18^{th}/19^{th}$ ed)	Drinking Water	Inorganic Analysis
Temperature	SM 2550 B	Drinking Water	Inorganic Analysis
Total Dissolved Solids	SM 2540 C	Drinking Water	Inorganic Analysis
Total Organic Halides (TOX)	SM 5320 B	Drinking Water	Inorganic Analysis
Turbidity	EPA 180.1	Drinking Water	Inorganic Analysis
Hardness, Calcium	EPA 200.7	Drinking Water	Metals Analysis
Hardness, Total	EPA 200.7	Drinking Water	Metals Analysis
Hardness, Total	SM 2340 C	Drinking Water	Metals Analysis
Mercury	EPA 245.1	Drinking Water	Metals Analysis
Metals	EPA 200.7	Drinking Water	Metals Analysis
Metals	EPA 200.8	Drinking Water	Metals Analysis
All Categories Sample Handling Procedures	Other N.J.A.C. 7:18-6&9	Drinking Water	PWTA Sampling Parameters
DBCP, EDB & TCP	EPA 504.1	Drinking Water	Organics Analysis
Volatile Organics	EPA 524.2	Drinking Water	Organics Analysis
Total Coliform/E. Coli	SM 9223 B	Drinking Water	Microbiology
Heterotrophic Bacteria	SM 9215 B	Drinking Water	Microbiology
Acidity as $CaCO_3$	SM 2310 B-11	Wastewater	Inorganic Analysis
Alkalinity as $CaCO_3$	SM 2320 B-11	Wastewater	Inorganic Analysis
Ammonia	SM20 4500-NH_3-B+H-11	Wastewater	Inorganic Analysis

Method Capabilities by NELAC Accredited Fields of Testing

Analytes	Method Number	Program	Chemistry Field
Biochemical Oxygen Demand	SM 5210 B-11	Wastewater	Inorganic Analysis
Bromide, Chloride, Fluoride, Sulfate	EPA 300.0	Wastewater	Inorganic Analysis
Carbonaceous BOD (CBOD)	SM 5210 B-11	Wastewater	Inorganic Analysis
Chemical Oxygen Demand (COD)	SM 5220 B or C-11, Hach 8000	Wastewater	Inorganic Analysis
Chloride	SM 4500-Cl C-11	Wastewater	Inorganic Analysis
Chlorine, Total Residual	SM 4500-Cl F-11	Wastewater	Inorganic Analysis
Chromium (VI)	SM 3500-Cr D	Wastewater	Inorganic Analysis
Chromium (VI)	EPA 218.6	Wastewater	Inorganic Analysis
Color, Apparent	SM 2120 B-11	Wastewater	Inorganic Analysis
Cyanide (Sample Preparation)	SM 4500-CN C+E	Wastewater	Inorganic Analysis
Cyanide (Analytical Finish)	EPA 335.4	Wastewater	Inorganic Analysis
Cyanide Amenable to Chlorine	SM 4500-CN-B or C-11+G-11	Wastewater	Inorganic Analysis
Hardness, Total as $CaCO_3$	SM 2340C-11	Wastewater	Inorganic Analysis
Iron, Ferrous	SM 4500-Fe B-11	Wastewater	Inorganic Analysis
Kjeldahl Nitrogen, Total	EPA 351.2	Wastewater	Inorganic Analysis
Nitrate/Nitrite	EPA 353.2	Wastewater	Inorganic Analysis
Nitrite	SM 4500-NO_2 B-11	Wastewater	Inorganic Analysis
Oil & Grease, HEM-LL	EPA 1664A	Wastewater	Inorganic Analysis
Oil & Grease, SGT-HEM, Non-Polar	EPA 1664A	Wastewater	Inorganic Analysis
Organic Nitrogen	SM 4500-N B+G	Wastewater	Inorganic Analysis
Orthophosphate	EPA 365.3 SM4500P E-11	Wastewater	Inorganic Analysis
Oxygen, Dissolved, Winkler	SM 4500-O C-11	Wastewater	Inorganic Analysis
Oxygen, Dissolved	SM 4500-O G-11	Wastewater	Inorganic Analysis
pH Hydrogen Ion	SM 4500-HB-11	Wastewater	Inorganic Analysis
pH Aqueous Electrometric	SW-846 9040C	Wastewater	Inorganic Analysis
Temperature Thermometric	SM 2550 B-00	Wastewater	Inorganic Analysis
Phenols	EPA 420.1+420.4	Wastewater	Inorganic Analysis
Phenols (Analytical Finish)	SW846 9066	Wastewater	Inorganic Analysis
Phosphorus (Total)	EPA 365.3	Wastewater	Inorganic Analysis
Residue, Filterable (TDS)	SM 2540 C-11	Wastewater	Inorganic Analysis
Residue, Nonfilterable (TSS)	SM 2540 D-11	Wastewater	Inorganic Analysis
Residue, Settlable	SM 2540 F	Wastewater	Inorganic Analysis
Residue, Total	SM 2540 B-11	Wastewater	Inorganic Analysis
Residue, Volatile	EPA 160.4	Wastewater	Inorganic Analysis
Total, fixed, and volatile solids (SQAR)	SM 2540 G, 18th Ed.	Wastewater	Inorganic Analysis
Salinity	SM 2520 B	Wastewater	Inorganic Analysis
Silica, Dissolved	SM 4500-Si D	Wastewater	Inorganic Analysis
Specific Conductance	SM 2510 B-11	Wastewater	Inorganic Analysis

Method Capabilities by NELAC Accredited Fields of Testing

Analytes	Method Number	Program	Chemistry Field
Specific Conductance	SW846 9050A	Wastewater	Inorganic Analysis
Sulfide (S)	SM 4500-S B,C + F-11	Wastewater	Inorganic Analysis
Sulfite (SO_3)	SM 4500-SO_3 B-11	Wastewater	Inorganic Analysis
Surfactants (Methylene Blue)	SM 5540 C-11	Wastewater	Inorganic Analysis
Temperature	SM 2550 B-00	Wastewater	Inorganic Analysis
Total Organic Carbon (TOC)	SM 5310 B-11	Wastewater	Inorganic Analysis
Total Organic Halides (TOX)	SW846 9020B	Wastewater	Inorganic Analysis
Turbidity	EPA 180.1	Wastewater	Inorganic Analysis
Metals, Total – Water	SW846 3010A	Wastewater	Metals Prep
Metals, Total – Water, Rec. + Dissolved	SW846 3005A	Wastewater	Metals Prep
Hardness, Total as $CaCO_3$	EPA 200.7	Wastewater	Metals Analysis
Hardness, Total as $CaCO_3$	SM 2340 C-11	Wastewater	Metals Analysis
Mercury	EPA 245.1	Wastewater	Metals Analysis
Metals, ICP	EPA 200.7	Wastewater	Metals Analysis
Metals, ICP/MS	EPA 200.8	Wastewater	Metals Analysis
Mercury, Low-Level	EPA 245.7	Wastewater	Metals Analysis
Mercury, Low-Level	EPA 1631E	Wastewater	Metals Analysis
Mercury, Liquid Waste	SW846 7470A	Wastewater	Metals Analysis
Separatory Funnel Extraction	SW-846 3510C	Wastewater	Semivolatile Organics
Continuous Liquid-Liquid Extraction	SW-846-3520C	Wastewater	Semivolatile Organics
Purge & Trap Aqueous	SW-846 5030B	Wastewater	Volatile Organics
Acrolein & Acrylonitrile	EPA 603	Wastewater	Organics Analysis
Base/Neutrals and Acids	EPA 625	Wastewater	Organics Analysis
Extractable Petroleum Hydrocarbons	NJDEP EPH	Wastewater	Organics Analysis
Organochlorine Pests & PCBs	EPA 608	Wastewater	Organics Analysis
Petroleum Hydrocarbons	NJ-OQA-QAM-25	Wastewater	Organics Analysis
Volatile Organics	EPA 624	Wastewater	Organics Analysis
Volatile Organics GC/MS, Extract or Dir Inj, Capillary	SW-846 8270C SW-846 8270D	Wastewater	Semivolatile Organic Analysis
Coliform, Fecal (Count per 100 mL)	SM 9222 D-97	Wastewater	Microbiology
Coliform, Total (Count per 100 mL)	SM 9222 B-97	Wastewater	Microbiology
Heterotrophic Plate Count	SM 9215 B	Wastewater	Microbiology
Acid Soluble/Insoluble Sulfides	SW846 9034	Solid/Haz. Waste	Inorganic Analysis
Bomb Calorimetry	ASTM D-240	Solid/Haz. Waste	Inorganic Analysis
Bromide, Chloride, Fluoride, Sulfate	SW846 9056	Solid/Haz. Waste	Inorganic Analysis

Method Capabilities by NELAC Accredited Fields of Testing

Analytes	Method Number	Program	Chemistry Field
Cation, Exchange Capacity	SW846 9081	Solid/Haz. Waste	Inorganic Analysis
Chromium (VI) Digestion	SW846 3060A	Solid/Haz. Waste	Inorganic Analysis
Chromium (VI)	SW846 7196A	Solid/Haz. Waste	Inorganic Analysis
Chromium (VI)	SW846 7199	Solid/Haz. Waste	Inorganic Analysis
Corrosivity/pH, >20% H2O	SW846 9040C	Solid/Haz. Waste	Inorganic Analysis
Cyanide	SW846 9010B	Solid/Haz. Waste	Inorganic Analysis
Cyanide, Amenable to Chlorine	SW846 9010B	Solid/Haz. Waste	Inorganic Analysis
Cyanide	SW846 9012B	Solid/Haz. Waste	Inorganic Analysis
Extractable Organic Halides	SW846 9023	Solid/Haz. Waste	Inorganic Analysis
Free Liquid	SW846 9095	Solid/Haz. Waste	Inorganic Analysis
Ignitability	SW846 1010A	Solid/Haz. Waste	Inorganic Analysis
Oil & Grease, HEM	EPA 1664A	Solid/Haz. Waste	Inorganic Analysis
Oil & Grease and Sludge, HEM	SW846 9071B	Solid/Haz. Waste	Inorganic Analysis
pH, Hydrogen Ion	SW846 9040C	Solid/Haz. Waste	Inorganic Analysis
pH, Hydrogen Ion, Waste, >20% Water	SW846 9040C	Solid/Haz. Waste	Inorganic Analysis
pH, Soil and Waste	SW846 9045C	Solid/Haz. Waste	Inorganic Analysis
Phenols (Sample Preparation)	SW846 9065	Solid/Haz. Waste	Inorganic Analysis
SPLP Metals/Organics	SW846 1312	Solid/Haz. Waste	Inorganic Analysis
TCLP Metals/Semi Volatile Organics	SW846 1311	Solid/Haz. Waste	Inorganic Analysis
TCLP Volatile Organics	SW846 1311	Solid/Haz. Waste	Inorganic Analysis
Total Organic Carbon (TOC)	SW846 9060 A	Solid/Haz. Waste	Inorganic Analysis
Metals, Solids	SW846 3050B	Solid/Haz. Waste	Metals Prep
Mercury, Solid Waste	SW846 7471A	Solid/Haz. Waste	Metals Analysis
Metals by ICP	SW846 6010C	Solid/Haz. Waste	Metals Analysis
Metals by ICP/MS	SW846 6020	Solid/Haz. Waste	Metals Analysis
Semivolatiles, Acid/Base Partition	SW846 3650B	Solid/Haz. Waste	Organics Prep
Semivolatiles, Alumina Cleanup	SW846 3610B	Solid/Haz. Waste	Organics Prep
Semivolatiles, Alumina Cleanup (Petro)	SW846 3611B	Solid/Haz. Waste	Organics Prep
Semivolatiles, Florisil Cleanup	SW846 3620B	Solid/Haz. Waste	Organics Prep
Semivolatiles, Gel Permeation Cleanup	SW846 3640A	Solid/Haz. Waste	Organics Prep
Semivolatiles, Silica Gel Cleanup	SW846 3630C	Solid/Haz. Waste	Organics Prep
Semivolatiles, Sulfur Cleanup	SW846 3660B	Solid/Haz. Waste	Organics Prep
Semivolatiles, Sulfuric Acid/MnO_2	SW846 3665A	Solid/Haz. Waste	Organics Prep
Semivolatile Prep, Pressurized Fluid	SW846 3545	Solid/Haz. Waste	Organics Prep
Semivolatile Prep, Waste Dilution	SW846 3580A	Solid/Haz. Waste	Organics Prep
Semivolatile Prep Solid, Sonication	SW846 3550B	Solid/Haz. Waste	Organics Prep
Semivolatile Prep Solids, Soxhlet	SW846 3540C	Solid/Haz. Waste	Organics Prep
Semivolatile Prep Water	SW846 3520C	Solid/Haz. Waste	Organics Prep

Method Capabilities by NELAC Accredited Fields of Testing

Analytes	Method Number	Program	Chemistry Field
Semivolatile Prep Water	SW846 3510C	Solid/Haz. Waste	Organics Prep
Volatile, Headspace	SW846 3810	Solid/Haz. Waste	Organics Prep
Volatile, Purge & Trap, Solids–High	SW846 5035H	Solid/Haz. Waste	Organics Prep
Volatile, Purge & Trap, Solids–Low	SW846 5035L	Solid/Haz. Waste	Organics Prep
Volatile, Purge & Trap, Water	SW846 5030B	Solid/Haz. Waste	Organics Prep
Microwave Extraction	SW846 3546	Solid/Haz. Waste	Organics Prep
Alcohols	SW846 8015B	Solid/Haz. Waste	Organics Analysis
Base/Neutrals and Acids	SW846 8270C	Solid/Haz. Waste	Organics Analysis
Chlorinated Herbicides	SW846 8151A	Solid/Haz. Waste	Organics Analysis
DBCP, EDB & TCP	SW846 8011	Solid/Haz. Waste	Organics Analysis
Diesel Range Organic	SW846 8015B	Solid/Haz. Waste	Organics Analysis
Dissolved Gas/Aqueous Media	RSK-175	Solid/Haz. Waste	Organics Analysis
Ethylene Glycol & Propylene Glycol	SW846 8260B	Solid/Haz. Waste	Organics Analysis
Extractable Petroleum Hydrocarbons	NJDEP EPH	Solid/Haz. Waste	Organics Analysis
Gasoline Range Organic	SW846 8015B	Solid/Haz. Waste	Organics Analysis
Organochlorine Pesticides	SW846 8081	Solid/Haz. Waste	Organics Analysis
PCBs	SW846 8082	Solid/Haz. Waste	Organics Analysis
Petroleum Hydrocarbons	NJ-OQA-QAM-25	Solid/Haz. Waste	Organics Analysis
Volatile Organics	SW846 8260B	Solid/Haz. Waste	Organics Analysis
Volatile Organics	EPA TO- 3	Clean Air Act	Organics Analysis
Volatile Organics	EPA TO-15	Clean Air Act	Organics Analysis

Method Capabilities—Non-NELAC Methods

Analytes	Method Number	Program	Chemistry Field
Phenols	EPA 420.4	Drinking Water	Inorganic Analysis
Carbon Dioxide	SM 4500-CO_2 C or D	Wastewater	Inorganic Analysis
Iodide	SM 4500-I B	Wastewater	Inorganic Analysis
Iodine	SM 4500-I B	Wastewater	Inorganic Analysis
Nonionic Surfactants as CTAS	SM 5540 D	Wastewater	Inorganic Analysis
Particulate Matter	EPA 160.2M	Wastewater	Inorganic Analysis
Petroleum Hydrocarbons	EPA 418.1	Wastewater	Inorganic Analysis
Phosphorus, Hydrolyzable	EPA 365.3	Wastewater	Inorganic Analysis
Redox Potential vs H^+	ASTM D1498-76	Wastewater	Inorganic Analysis
Specific Gravity	ASTM D1298-85	Wastewater	Inorganic Analysis
Total Organic Content	ASTM D2974-87	Wastewater	Inorganic Analysis
Unburned Combustibles	EPA 160.1+160.4	Wastewater	Inorganic Analysis
Viscosity	ASTM D445/6	Wastewater	Inorganic Analysis
Volatile Suspended Solids	EPA 160.2+160.4	Wastewater	Inorganic Analysis
Weak Acid Dissociable Cyanide Prep	SM 4500-CN I	Wastewater	Inorganic Analysis
Ammonia	EPA 350.1M	Solid/Haz. Waste	Inorganic Analysis
Ammonia	EPA 350.2M	Solid/Haz. Waste	Inorganic Analysis
Base Sediment	ASTM D473-81	Solid/Haz. Waste	Inorganic Analysis
Bulk Density (Dry Basis)	ASTM D2937-94M	Solid/Haz. Waste	Inorganic Analysis
Chemical Oxygen Demand	HACH 8000M	Solid/Haz. Waste	Inorganic Analysis
Chloride	EPA 325.3M	Solid/Haz. Waste	Inorganic Analysis
Combustion, Bomb Oxidation	SW846 5050	Solid/Haz. Waste	Inorganic Analysis
Grain Size & Sieve Testing	ASTM D422-63	Solid/Haz. Waste	Inorganic Analysis
Heat Content, BTU	ASTM D3286-85	Solid/Haz. Waste	Inorganic Analysis
Ignitability (Flashpoint)	ASTM D93-90/SW846 Ch 7	Solid/Haz. Waste	Inorganic Analysis
Multiple Extractions	SW846 1320	Solid/Haz. Waste	Inorganic Analysis
Neutral Leaching Procedure	ASTM D3987-85	Solid/Haz. Waste	Inorganic Analysis
Nitrate/Nitrite	EPA 353.2M	Solid/Haz. Waste	Inorganic Analysis
Organic Matter (Ignition Loss)	AASHTO T267-86M	Solid/Haz. Waste	Inorganic Analysis
Orthophosphate	EPA 365.2M	Solid/Haz. Waste	Inorganic Analysis
Percent Ash (Dry Basis)	ASTM D482-91	Solid/Haz. Waste	Inorganic Analysis
Percent Solids	ASTM D4643-00	Solid/Haz. Waste	Inorganic Analysis
Percent Sulfur	ASTM D129-61	Solid/Haz. Waste	Inorganic Analysis
Petroleum Hydrocarbons	EPA 418.1M	Solid/Haz. Waste	Inorganic Analysis
Phosphorus, Total	EPA 365.3M	Solid/Haz. Waste	Inorganic Analysis
Phosphorus, Hydrolyzable	EPA 365.3M	Solid/Haz. Waste	Inorganic Analysis
Pour Point	ASTM D97-87	Solid/Haz. Waste	Inorganic Analysis
Reactive Cyanide	SW846 7.3.3.2	Solid/Haz. Waste	Inorganic Analysis

Method Capabilities—Non-NELAC Methods

Analytes	Method Number	Program	Chemistry Field
Reactive Sulfide	SW846 7.3.4.2	Solid/Haz. Waste	Inorganic Analysis
Redox Potential vs H^+	ASTM D1498-76M	Solid/Haz. Waste	Inorganic Analysis
Specific Gravity of Solids	ASTM D1429-86M	Solid/Haz. Waste	Inorganic Analysis
Sulfide (S)	EPA 376.1 M	Solid/Haz. Waste	Inorganic Analysis
Sulfite (SO_3)	EPA 377.1M	Solid/Haz. Waste	Inorganic Analysis
Total Chlorine	ASTM D808-91	Solid/Haz. Waste	Inorganic Analysis
Total Kjeldahl Nitrogen	EPA 351.2M	Solid/Haz. Waste	Inorganic Analysis
Total Organic Carbon	CORP ENG 81	Solid/Haz. Waste	Inorganic Analysis
Total Organic Carbon	LLOYD KAHN 1988	Solid/Haz. Waste	Inorganic Analysis
Total Organic Chlorine	ASTM D808-91M	Solid/Haz. Waste	Inorganic Analysis
Total Plate Count	SM 9215BM	Solid/Haz. Waste	Inorganic Analysis
Total Volatile Solids	EPA 160.4M	Solid/Haz. Waste	Inorganic Analysis
Water Content	ASTM D95-83	Solid/Haz. Waste	Inorganic Analysis
Extractable Petroleum HCs	Massachusetts EPH	Solid/Haz. Waste	Organics Analysis
Extractable Petroleum HCs	Missouri DRO	Solid/Haz. Waste	Organics Analysis
Total Petroleum Hydrocarbons	FLDEP FL-PRO	Solid/Haz. Waste	Organics Analysis
Total Petroleum Hydrocarbons	Connecticut ETPH	Solid/Haz. Waste	Organics Analysis
Volatile Petroleum HCs	Massachusetts VPH	Solid/Haz. Waste	Organics Analysis
Volatile Petroleum HCs	Missouri GRO	Solid/Haz. Waste	Organics Analysis

Appendix IV

Laboratory Equipment

Equipment	Manufacture & Description	Serial Number	Operating System Software	Data Processing Software	Location	Purchase
GC-QR	Hewlett Packard 5890 / PID / FID / Entech AutoAir7000	3336A51044	HP Chemstation	HP Enviroquant	Air Laboratory	1993
GC-AA	GC Agilent 7890A/AutoSampler 7693	CN10361127/CN10330122	HP Chemstation	HP Enviroquant	Air Laboratory	N/A
GC-II	GC HP5890	N/A	HP Chemstation	HP Enviroquant	Air Laboratory	N/A
GCMS-2W	Agilent Technologies 5973 / 6890N AS Entech 7016CA	CN10413022 / US40646500	HP Chemstation	HP Enviroquant	Air Laboratory	2004
GCMS-3W	Agilent Technologies 5973 / 6890N Entech 7016A	CN10425086 / US41746669 / 1351	HP Chemstation	HP Enviroquant	Air Laboratory	2007
GCMS-Q	Hewlett-Packard 5890ll / 5971 MSD / Entech Air Samp 7000	3033A31092 / 3188A02934	HP Chemstation	HP Enviroquant	Air Laboratory	1993
GCMS-W	Agilent Technologies 5973 / 6890N AS Entech 7016CA	US44621451 / CN10517032 / 1119	HP Chemstation	HP Enviroquant	Air Laboratory	2005
GCMS- 4W	Agilent O-I Analytical 4660	N/A	HP Chemstation	HP Chemstation	Air Laboratory	N/A
OVEN – 10A	Barnstead / Lab Line LC	0404-4596	None	None	Air Laboratory	N/A
OVEN – 10C	Barnstead/ Lab Line LC	0404-4597	None	None	Air Laboratory	N/A
OVEN-10E	Quincy Lab Inc.	B33ER-01347	None	None	Air Laboratory	2013
OVEN-10F	Quincy Lab Inc.	B33ER-01345	None	None	Air Laboratory	2013
Test Gauge	Ashcroft (TG-1)	None	None	None	Air Laboratory	N/A
Test Gauge	Ashcroft (TG-2)	None	None	None	Air Laboratory	N/A
Test Gauge	Ashcroft (TG-3)	None	None	None	Air Laboratory	N/A
Test Gauge	Ashcroft (TG-4)	None	None	None	Air Laboratory	N/A

Equipment	Manufacture & Description	Serial Number	Operating System Software	Data Processing Software	Location	Purchase
DO Meter	YSI-51B	92A035818	None	None	Field Serv.	1998
DO Meter	YSI-55/12ft	00C0598BG	None	None	Field Serv.	2000
PH Meter-9	Orion 250A	O18019	None	None	Field Serv.	2007
PH Meter-10	YSI	JC02538	None	None	Field Serv.	2007
PH Meter-11	YSI	JC02540	None	None	Field Serv.	2010
SCON Meter	YSI-30	J0183	None	None	Field Serv.	2004
Balance-Top Load	Ohaus Adventure AV212 (B-36)	8029131104	None	None	IC Lab	2008
ASE	Dionex ASE 200	99030375	None	None	Inorganics	1999
Balance-Top Load	Sartorious B4100 (B-13)	38080035	None	None	Inorganics	Pre-2000
Balance-Top Load	Denver Inst. Co. XL500 (B-14)	B045530	None	None	Inorganics	Pre-2000
Balance-Top Load	Ohaus Navigator (B-15)	121370273	None	None	Inorganics	2002
Balance-Top Load	Ohaus Explorer (B-16)	E1581119212171	None	None	Inorganics	2001
Balance-Top Load	Ohaus Adventurer (B-21)	E1021218270448	None	None	Inorganics	2001
Balance-Top Load	Ohaus Adventurer AV412 (B-27)	8026251106	None	None	Inorganics	2005
Balance-Top Load	Sartorius TE31025 (B-32)	21950273	None	None	Inorganics	2007
Balance-Top Load	Ohaus Adventure AV212 (B-35)	8029171184	None	None	Inorganics	2008
Balance-Top Load	Ohaus Adventurer-Pro (B-38)	8030441010	None	None	Inorganics	2009

Equipment	Manufacture & Description	Serial Number	Operating System Software	Data Processing Software	Location	Purchase
Balance-Analytical	Mettler AE 160 (B-5)	C11620	None	None	Inorganics	1999
Balance-Analytical	Ohaus Adventurer (B-24)	1225032523P	None	None	Inorganics	2004
Balance-Top Load	Denver P-214 (B-39)	25450279	None	None	Inorganics	2010
Balance-Top Load	Denver P-214 (B-40)	25550445	None	None	Inorganics	2010
Calorimeter	PARR 1261EA	1499	None	None	Inorganics	1996
DO Meter	YSI 5000	07B1560	None	None	Inorganics	2008
DO Meter	YSI-50B	91L034801	None	None	Inorganics	1988
FIA Analyzer	Lachat Quikchem 8000	A83000-1402	Omnion FIA	Omnion FIA	Inorganics	1999
FIA	Lachat Quikchem 8500	13200001620	Omnion FIA	Omnion FIA	Inorganics	2013
Flashpoint	Koehler – K16200	R07002563B	None	None	Inorganics	2010
Hg Analyzer	Leeman Mercury Analyzer HYDRA II	64013	Envoy	Envoy	Inorganics	2011
Hg Analyzer	Leeman Mercury Analyzer HYDRA II	64631	Envoy	Envoy	Inorganics	2013
Hg Analyzer	Leeman Mercury Analyzer HYDRAAF Gold^{+}	9003	WIN Hg Runner	WIN Hg Runner	Inorganics	2010
IC-2	Dionex ICS2000	02090737	Dionex Chrom. Client	Dionex Chrom. Client	Inorganics	2004
IC-3	Dionex ICS2000	02110028	Dionex Chrom. Client	Dionex Chrom. Client	Inorganics	2004
IC-4	Dionex ICS2000	04060060	Dionex Chrom. Client	Dionex Chrom. Client	Inorganics	2004
IC-6	Dionex ICS3000	06040160	Dionex Chrom. Client	Dionex Chrom. Client	Inorganics	2006

Equipment	Manufacture & Description	Serial Number	Operating System Software	Data Processing Software	Location	Purchase
IC-8	Dionex IC5000	11030895	Dionex Chrom Client	Dionex Chrom Client	Inorganics	2012
IC-9	Dionex IC5000+	13120208	Dionex Chrom Client	Dionex Chrom Client	Inorganics	2013
IR Spec.	Buck Scientific HC-404	687	None	None	Inorganics	1997
PH Meter-4	Orion 710A	3978	None	None	Inorganics	1996
PH Meter-12	Thermo Orion 310	14011	None	None	Inorganics	2003
PH-EH Meter-22	Thermo Orion 4 Star	SN00742	None	None	Inorganics	2008
PH Meter-23	Thermo Orion Model 310	SN013786	None	None	Inorganics	2008
PH Meter-46	Thermo Orion 4 Star	B10299	None	None	Inorganics	2008
PH Meter-47	Thermo Orion 4 Star	B04869	None	None	Inorganics	2008
PH Meter-48	Thermo-Orion 4 Star	B05968	None	None	Inorganics	2008
PH Meter-49	Orion Star Series	B27588	None	None	Inorganics	2010
PH Meter-50	Orion Star Series	B27564	None	None	Inorganics	2010
SCON Meter	Amber Science 1056	01020851056-101	None	None	Inorganics	2001
SCON Meter	Orion 145+	78035	None	None	Inorganics	2004
Solvent Extractor	Horizon SPE-DEX 3000XL	09-1031	None	None	Inorganics	2010
Solvent Evaporator	Horizon SPEED VAP III	09-0739	None	None	Inorganics	2010
TOC-V Analyzer	Shimadzu TOC-V CSH	H52504400192NK	Shimadzu TOC Control	Shimadzu TOC Control	Inorganics	2007

Equipment	Manufacture & Description	Serial Number	Operating System Software	Data Processing Software	Location	Purchase
TOC-L Analyzer	Shimadzu TOC-L	H52516900071	Shimadzu TOC Control	Shamadzu TOC Control	Inorganics	2012
TOC-L Analyzer	Shimadzu TOC-L	H52515000114NK	Shimadzu TOC Control	Shimadzu TOC Control	Inorganics	2013
TOX Analyzer	Mitsubishi TOX-10E	75R04185	None	None	Inorganics	1996
TOX Analyzer	Mitsubishi TOX-100	A7M 42997	None	None	Inorganics	2008
UVVIS Spec C	Spectronix 20 Genesys	3SGA122034	None	None	Inorganics	2000
UVVIS Spec D	Spectronix 20 Genesys	3SGF170020	None	None	Inorganics	2007
UVVIS Spec E	Spectronix 20 Genesys	3SGD.352011	None	None	Inorganics	2007
UVVIS Spec G	Thermo Electron Corp. Genesys 20	3SGJ238001	None	None	Inorganics	2007
UVVIS Spec H	Thermo Electron Corp. Genesys 20	3SGJ306016	None	None	Inorganics	2007
UVVIS Spec F	Spectronix 20 Genesys	356329906	None	None	Microbiology	2007
UVVIS Spe I	Thermo Electron Corp. Genesys 10VIS	2D5L110005	None	None	Inorganics	2009
Autoclave	Napco Model 8000 DSE	603033111	None	None	Microbiology	2011
Incubator (BOD)	VWR	0702499	None	None	Microbiology	2011
Incubator(BOD)	ISOTEMP	317646	None	None	Microbiology	2010
Incubator (Plates)	Thelco Precision	4-D-5	None	None	Microbiology	N/A
Incubator (Plates)	Theclo Precision	11T3	None	None	Microbiology	N/A
Refrigerator	R-44	0503MCBR980W0087	None	None	Microbiology	N/A

Equipment	Manufacture & Description	Serial Number	Operating System Software	Data Processing Software	Location	Purchase
Incubator-Water Bath	INC-2	1200991	None	None	Microbiology	N/A
ICP	Thermo ICP 6500 Duo	ICP-20074909-SB	ITEVA	ITEVA	Metals Analysis	2007
ICP	Thermo ICP 6500 Duo	ICP-20072601-SA	ITEVA	ITEVA	Metals Analysis	2007
ICP	Thermo ICP 6500 Duo	20114506-SC	ITEVA	ITEVA	Metals Analysis	2012
ICP	Thermo ICP 6500 Duo	5D20122506-SD	ITEVA	ITEVA	Metals Analysis	2013
ICP	Thermo ICAP 7000	IC76DC134708	Q-Tegra	Q-Tegra	Metals Analysis	2014
ICPMS	Agilent 7700 Series	JP12412081	Mass Hunter Workstation	Mass Hunter Workstation	Metals Analysis	2014
ICP-MS	Thermo Elemental X-Series ICP-MS	X0180	Mass Hunter Workstation	Mass Hunter Workstation	Metals Analysis	2003
ICP-MS	Agilent 7700 Series	JP10340551	Mass Hunter Workstation	Mass Hunter Workstation	Metals Analysis	2010
Balance- 1 Top Load	Ohaus Adventurer AR3130 (B-26)	1240-P	None	None	Metals Prep	2004
Balance-2 Top Load	Ohaus Adventurere AV412 (B-41)	8031331120	None	None	Metals Prep	2013
Hot Block 1	Environmental Express	N/A	None	None	Metals Prep	
Hot Block 2	Environmental Express	N/A	None	None	Metals Prep	
Hot Block 4	Environmental Express	N/A	None	None	Metals Prep	
Hot Block 5	Environmental Express	N/A	None	None	Metals Prep	
Hot Block 7	Environmental Express	N/A	None	None	Mercury Prep	
Hot Block 8	Environmental Express	N/A	None	None	Mercury Prep	

Equipment	Manufacture & Description	Serial Number	Operating System Software	Data Processing Software	Location	Purchase
Balance-Top Load	Ohaus Scout II (B-20)	BJ320905	None	None	Methanol Prep	2002
Balance-Top Load	Ohaus Scout II (B-25)	BJ514770	None	None	Methanol Prep	2004
Balance-Top Load	Ohaus TS400D (B-46)	B304755401	None	None	Organic Prep	Pre-2000
Balance-Top Load	Ohaus Navigator (B-45)	B033051054	None	None	Organic Prep	2002
Balance-Top Load	Ohaus Adventurer AV412 (B-42)	B031331113	None	None	Organic Prep	2007
Balance-Top Load	Ohaus Adventure AV412 (B-49)	B318282471	None	None	Organic Prep	2008
GPC4	Waters 717	717-000152	None	None	Organic Prep	1992
Water Bath 1	Organomation	14169	None	None	Organic Prep	2014
Water Bath 2	Organomation	58421	None	None	Organic Prep	2014
Water Bath 3	Organomation	58422	None	None	Organic Prep	2014
Water Bath 4	Organomation	52652	None	Noe	Organic Prep	2014
Water Bath 5	Organomation	58379	None	None	Organic Prep	2014
Water Bath 6	Organomation	58424	None	None	Organic Prep	2014
Microwave-3	MARS 230-60 (CEM Corporation)	MD5456	None	None	Organic Prep	2012
Microwave-4	MARS 6 CEM	MJ2198	None	None	Organic Prep	2013
Microwave-5	MARS 6 CEM	MJ2197	None	None	Organic Prep	2013
TurboVap	Biotage (# 5)	TV11Z6N16677	None	None	Organic Prep	N/A

Equipment	Manufacture & Description	Serial Number	Operating System Software	Data Processing Software	Location	Purchase
TurboVap	Biotage (# 6)	TV1127N16629	None	None	Organic Prep	N/A
TurboVap	Biotage (#10)	TV1232N17271	None	None	Organic Prep	N/A
TurboVap	Biotage (#11)	TV1239N17342	None	None	Organic Prep	N/A
Sonicator	Sonics Vibracell VC 750	31800A	None	None	Organic Prep	2000
Sonicator	TEKMAR Sonicator	6916	None	None	Organic Prep	1997
Sonicator	Branson 450	--	None	None	Organic Prep	--
Centrifuge	Thermo Scientific	41394883	None	None	Organic Prep	2014
N-EVAP 1	Organomation	59301	None	None	Organic Prep	2014
N-EVAP 2	Organomation	58202	None	None	Organic Prep	2014
GC-SN	Hewlett Packard 5890 GC/5970 MSD/ OI 4551/4560	2623A08318/2637A01687/D53847 5262/1542461919	HP Chemstation	Hp Enviroquant	Organics, Screen Room	Re-Built 2012
GC-SR	Hewlett-Packard 5890 / FID / Tekmar 7000	2612A07448	HP Chemstation	HP Enviroquant	Organics; Screening	1992
GC-SV	Hewlett-Packard 5890 / FID / OI4551 / 4560	LR47-359C / N244460743 / 3336A58859	HP Chemstation	HP Enviroquant	Organics; Screening	1996
GC-QT	Agilent Technologies 6890N	US10148124	HP Chemstation	HP Enviroquant	Organics; SVOCs	2002
GC-UV	Hewlett-Packard 5890 / Dual FID / OI 4551 / 4560	2921A23322	HP Chemstation	HP Enviroquant	Organics; SVOCs	1996
GC-WW	Hewlett-Packard 6890 / Dual ECD / HP 7673 AS	US00010037	HP Chemstation	HP Enviroquant	Organics; SVOCs	1997
GC-XX	Hewlett-Packard 6890 / Dual ECD / HP 7683 AS	US00022968	HP Chemstation	HP Enviroquant	Organics; SVOCs	1998
GC-NP	Hewlett-Packard 5890 / PID / FID / Tekmar solatek 72	3336A58858	HP Chemstation	HP Enviroquant	Organics; Volatiles	1995

Equipment	Manufacture & Description	Serial Number	Operating System Software	Data Processing Software	Location	Purchase
GC-SC	Hewlett-Packard 5890 / FID / OI4551 / 4560	2443AO3797	HP Chemstation	HP Enviroquant	Organics; Volatiles	1990
GC-ST	Hewlett-Packard 5890 / FID / NPD / HP 7673 AS / Tek	314OA38871	HP Chemstation	HP Enviroquant	Organics; Volatiles	1996
GC-2Y/2Z	Agilent Technologies 6890N & N10149	CN10407032 / CN40327643 / CN40434847	HP Chemstation	HP Enviroquant	Organics; SVOCs	2004
GC-OA/OB	Agilent Technologies 6890N	US10240147	HP Chemstation	HP Enviroquant	Organics; SVOCs	2002
GC-YZ/ZZ	Hewlett-Packard 6890 / PID / FID / OI HP GC System Injector	US00011065 / US83806744	HP Chemstation	HP Enviroquant	Organics; SVOCs	1998
GCMS-B	Hewlett-Packard 5890ll+ / 5972 MSD / Agilent 7673	3336A61054 / 3524A03106	HP Chemstation	HP Enviroquant	Organics; SVOCs	1996
GC-EF	Hewlett-Packard 5890 / Dual ECD / HP 7673 AS	2541A06786	HP Chemstation	HP Enviroquant	Organics; Volatiles	1992
GC-JK	Hewlett-Packard 5890 / PID / Hall / 4552 / 4560ARCHON	3336A51043	HP Chemstation	HP Enviroquant	Organics; Volatiles	1994
GC-LM	Hewlett-Packard 6890 / PID / FID / OI 4551 / 4560 P&T	US00008927	HP Chemstation	HP Enviroquant	Organics; Volatiles	1998
GC-SY	Hewlett-Packard 5890 / FID / OI4551A / 4560	2643A10503	HP Chemstation	HP Enviroquant	Organics; Screening	1990
GC-2G (I)	Agilent Technologies 6890N / 7683	CN10450110	HP Chemstation	HP Enviroquant	Organics; SVOCs	2005
GC-3G (J)	Agilent Technologies 6890N / 7683	CN10450109	HP Chemstation	HP Enviroquant	Organics; SVOCs	2005
GC-3Y/3Z	Agilent Technologies 7890A / 7683B Dual FID	CN10735014 / CN73345070	HP Chemstation	HP Enviroquant	Organics; SVOCs	2007
GC-4G	Agilent Technologies 6890N / 7693	CN10361136 / CN10340093	HP Chemstation	HP Enviroquant	Organics; SVOCs	2010
GC-4Y/4Z	Agilent Technologies 7890A / 7683B Dual FID	CN10832133 / CN83252932	HP Chemstation	HP Enviroquant	Organics; SVOCs	2010
GC-AB	Hewlett-Packard 5890 / Dual ECD / HP 7673 AS	2750A16635	HP Chemstation	HP Enviroquant	Organics; SVOCs	1990
GC-CD	Hewlett-Packard 5890 / Dual ECD / HP 7673 AS	3336A58788	HP Chemstation	HP Enviroquant	Organics; SVOCs	1995

Equipment	Manufacture & Description	Serial Number	Operating System Software	Data Processing Software	Location	Purchase
GC-G1/1H	Agilent Technologies 6890N / 7683	US10322012 / CN23326744	HP Chemstation	HP Enviroquant	Organics; SVOCs	2003
GC-GH	Hewlett-Packard 5890 / Dual ECD / HP 7673 AS	2938A25059	HP Chemstation	HP Enviroquant	Organics; SVOCs	1990
GC-II	Hewlett-Packard 5890 Series II	3203A40375	HP Chemstation	HP Enviroquant	Organics; SVOCs	1994
GCMS-2M	Agilent Technologies 5973 / 6890N AS 4552 / 12720	CN10612028 / US60532578 / CN61031719	HP Chemstation	HP Enviroquant	Organics; SVOCs	2006
GCMS-2P	Agilent Technologies 5975C / 7890A	US10237403 / CN10241022	HP Chemstation	HP Enviroquant	Organics; SVOCs	2010
GCMS-3E	Agilent Technologies 5975 / 6890N Agilent 7683	CN10614011 / US61332852 / CN73943902	HP Chemstation	HP Enviroquant	Organics; SVOCs	2006
GCMS-3M	Agilent Technologies 5975B / 6890N / Agilent 7683B	US65125107 / CN10703029 / CN61933091	HP Chemstation	HP Enviroquant	Organics; SVOCs	2007
GCMS-3P	Agilent Technologies 5975C / 7890A	US83111119 / CN10361163	HP Chemstation	HP Enviroquant	Organics; SVOCs	2010
GCMS-4P	Agilent Technologies 6890N/5973	CN10251017/US102440773	MSD Chemstation	MSD Chemstation	Organics SVOCs	2013
GCMS-5P	Agilent Technologies 6890N/5973	US10222060/US21844818	MSD Chemstation	MSD Chemstation	Orgnaics SVOCs	2013
GCMS-4M	Agilent Technologies 5975C / 7890A Agilent 7683B	US73317574 / CN1074251 / US94209706	HP Chemstation	HP Enviroquant	Organics; SVOCs	2007
GCMS-F	Hewlett-Packard 6890 / 5973 MSD / HP 7683 AS	US00034179 / US84202752 / US01140200	HP Chemstation	HP Enviroquant	Organics; SVOCs	1998
GCMS-H	Hewlett-Packard 5890ll+ / 5972 MSD / HP 7673 AS	3336A58190 / 3501A02356	HP Chemstation	HP Enviroquant	Organics; SVOCs	1995
GCMS-M	Hewlett-Packard 6890 / 5973 MSD / HP 7683 AS	US00021813 / US802111003 / US81501001	HP Chemstation	HP Enviroquant	Organics; SVOCs	1999
GCMS-P	Agilent Technologies 5973 / 6890N AS 4552 / 4560	US10251064 / US21844596 / CN24828486	HP Chemstation	HP Enviroquant	Organics; SVOCs	2003
GCMS-R	Hewlett-Packard 6890 / 5973 MSD / HP 7683 AS	US00021820 / US81211033 / CN40334835	HP Chemstation	HP Enviroquant	Organics; SVOCs	1998
GCMS-Z	Agilent Technologies 5973 / 6890N AS 4552 / 4560	US10251028 / US21844586 / CN24828485	HP Chemstation	HP Enviroquant	Organics; SVOCs	2003

Equipment	Manufacture & Description	Serial Number	Operating System Software	Data Processing Software	Location	Purchase
Balance-Top Load	Ohaus Sport (B-28)	7124230518	None	None	Organics; Volatiles	2005
Balance-Top Load	Ohaus Adventure AV412 (B-34)	8028391117	None	None	Organics; Volatiles	2007
GC-AA	Agilent 7890A / AS 7683B	CN10832133 / US08232002	HP Chemstation	HP Enviroquant	Organics; Volatiles	2008
GC-3V	Agilent 7890A/ 5975C	CN13141045/ US13217901	MSD Chemstation	MSD Chemstation	Organics; Volatiles	2013
GC-4V	Agilent 7890A/ 5975C	CN13331029/ US13307901	MSD Chemstation	MSD Chemstation	Organics; Volatiles	2013
GCMS-1A	Agilent Technologies 5973 / 6890N AS 4551A / 4660	CN10314026 / US30945331	HP Chemstation	HP Enviroquant	Organics; Volatiles	2003
GCMS-1B	Agilent Technologies 7890A / 5975C Teledyne / Tekmar AquaTek AS	CN10845177 / US83111119	HP Chemstation	HP Enviroquant	Organics; Volatiles	2008
GCMS-1C	Agilent Technologies 5973 / 6890N AS 4551 / 4560	CN10425085 / US41746667	HP Chemstation	HP Enviroquant	Organics; Volatiles	2004
GCMS-2A	Agilent Technologies 5973 / 6890N AS Tekmar Solatek 72	CN10314028 / US30945325	HP Chemstation	HP Enviroquant	Organics; Volatiles	2003
GCMS-2B	Agilent Technologies 5973 / 6890N AS 4551A / 4660	CN10441033 / US 43146954	HP Chemstation	HP Enviroquant	Organics; Volatiles	2004
GCMS-2C	Agilent Technologies 5973 / 6890N AS 4551A / 4560	CN10441035 / US 43146953	HP Chemstation	HP Enviroquant	Organics; Volatiles	2004
GCMS-2D	Agilent Technologies 5973 / 6890N AS 4552 / 4560	CN10432038 / US43146771	HP Chemstation	HP Enviroquant	Organics; Volatiles	2004
GCMS-2E	Agilent Technologies 5975 / 6890N AS 4551A / 4660	CN10612046 / US60532596	HP Chemstation	HP Enviroquant	Organics; Volatiles	2006
GCMS-3A	Agilent Technologies 5973 / 6890N AS 4551A / 4660	CN10432042 / US43146776	HP Chemstation	HP Enviroquant	Organics; Volatiles	2004
GCMS-3B	Agilent Technologies 6890 / 5973 / OI 4551A / 4660	US10240044 / US21844015	HP Chemstation	HP Enviroquant	Organics; Volatiles	2002
GCMS-3C	Agilent Technologies 5973 / 6890N AS 45551A / 4660	CN10517038 / US44621480	HP Chemstation	HP Enviroquant	Organics; Volatiles	2005
GCMS-3D	Agilent Technologies 5975B / 6890N AS 4551A / 4660	CN10637120 / US62724193	HP Chemstation	HP Enviroquant	Organics; Volatiles	2006

Equipment	Manufacture & Description	Serial Number	Operating System Software	Data Processing Software	Location	Purchase
GCMS-4B	Agilent Technologies 5975C / 7890A	US10323601 / CN10361158	HP Chemstation	HP Enviroquant	Organics; Volatiles	2010
GCMS-4D	Agilent Technologies 5975C / 7890A	US10237301 / CN10241019	HP Chemstation	HP Enviroquant	Organics; Volatiles	2010
GCMS-A	Hewlett-Packard 6890 / 5973 MSD / OI 4552 / 4560 ARCHON	US00033272 / US94212183	HP Chemstation	HP Enviroquant	Organics; Volatiles	2000
GCMS-C	Hewlett-Packard 5890 / 5970 MSD / HP OI 4552 / 4560	2643A122671 / 2807A1146	HP Chemstation	HP Enviroquant	Organics; Volatiles	1990
GCMS-D	Hewlett-Packard 6890 / 5973 MSD / OI 4551 / 4560 P&T	US00030551 / US93122843	HP Chemstation	HP Enviroquant	Organics; Volatiles	2001
GCMS-E	Hewlett-Packard 6890 / 5973 MSD / OI 4551 / 4560 P&T	US00031161 / US93112044	HP Chemstation	HP Enviroquant	Organics; Volatiles	2001
GCMS-I	Hewlett-Packard 5890 / 5970 MSD / OI 4551 / 4560	2623A08318 / 2637A01687	HP Chemstation	HP Enviroquant	Organics; Volatiles	1986
GCMS-K	Hewlett-Packard 5890ll / 5970 MSD / OI 4551 / 4560 P&T	2750A116838 / 2905A11628	HP Chemstation	HP Enviroquant	Organics; Volatiles	1990
GCMS-L	Agilent Technologies 6890N/5975B	CN92174395 / US98003664	MSD Chemstation	MSD Chemstation	Orgnaics; Volatiles	2013
GCMS-N	Hewlett-Packard 5890 / 5970 MSD / Tekmar 2000 / 2032 P&T	2750A17088 / 2716A10218	HP Chemstation	HP Enviroquant	Organics; Volatiles	1988
GCMS-S	Hewlett-Packard 6890 / 5973 MSD / OI 4552 / 4660 ARCHON	US00024322 / US82311313	HP Chemstation	HP Enviroquant	Organics; Volatiles	2000
GCMS-T	Hewlett-Packard 6890 / 5973 MSD / OI 4551A / 4660 P&T	US00024323 / US82311482	HP Chemstation	HP Enviroquant	Organics; Volatiles	2000
GCMS-U	Hewlett-Packard 6890 / 5973 MSD / HP 4551A / 4660	US00032623 / US94212203	HP Chemstation	HP Enviroquant	Organics; Volatiles	1999
GCMS-V	Agilent Technologies 5973 / 6890N AS 4552 / 4560	US10149085 / US10441917	HP Chemstation	HP Enviroquant	Organics; Volatiles	2002
GCMS-X	Agilent Technologies 5973 / 6890N AS 4552 / 4660	US21843889 / US10239071	HP Chemstation	HP Enviroquant	Organics; Volatiles	2002
GCMS-Y	Agilent Technologies 5973 / 6890N AS 4552 / 4560	US10240013 / US21844012	HP Chemstation	HP Enviroquant	Organics; Volatiles	2002
Balance-Top Load	Ohaus Adventurer AV412 (B-29)	8026391019	None	None	QA Spare	2005

Equipment	Manufacture & Description	Serial Number	Operating System Software	Data Processing Software	Location	Purchase
PH Meter-13	VWR IS B20	5942	None	None	Sample Managament	2010
Balance-Top Load	Ohaus Adventure AV412 (B-33)	8028391184	None	None	Sample Management	2007
Balance-Top Load	Ohaus Adventurer AV412 (B-30)	8026391160	None	None	Screen	2005

APPENDIX G

Soil Management Plan

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 Final Engineering Report (FER). Soil screening will be performed during invasive work performed during the remedy and development phases prior to issuance of the Notice of Satisfaction.

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 byNew York State Department Environmental Conservation (NYSDEC). 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 Professional Engineer (PE) and Qualified Environmental Professional (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 Remedial Action Work Plan (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;
- 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 NYSDEC 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 in Section 3.8 of the RAWP. 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 Applicant 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 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 Applicant. 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 Final Engineering Report (FER).

The FER 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 FER.

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 FER. A manifest system for off-Site transportation of exported materials will be employed. Manifest information will be reported in the FER. Hazardous wastes derived from on-Site will be stored, transported, and disposed of in compliance with applicable laws and regulations.

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 the RAWP. "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 Engineering 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 shown in the RAWP.

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

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 FER; 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 FER. This demarcation will constitute the top of the site management horizon.

1.9 Import of Backfill Soil from Off-Site Sources

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 NYSDEC-approved backfill and cover soil quality objectives for this Site. The backfill and cover soil quality objectives are listed in the RAWP.

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 FER 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 FER. 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 (i.e. silt fences and barriers, and hay bale checks) will be installed, if deemed necessary, 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 NYSDEC. 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 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 NYSDEC'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 NYSDEC. Chemical analytical testing will be performed for target compound list (TCL) volatiles and semi-volatiles, pesticides/PCBs, and TAL metals, 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. NYSDEC 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 FER.

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. NYSDEC 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 Closure 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.

1.14 Import of Clean Cover

Approximately 3160 tons (2107 cubic yards) of soil is anticipated to be imported to the Site for use as clean cover. All imported soil will be uncontaminated, clean soil that meets the lesser of the appropriate NYSDEC 6 NYCRR Part 375-6.8(a) Unrestricted Use SCOs (Soil Vapor Objective) and the NYSDEC 6 NYCRR Part 375-6.8 groundwater protection SCOs.

The imported uncontaminated, clean soil cover will be from an approved source/facility and will be evaluated by the PE/QEP to ensure:

1) That a segregated stockpile for 3160 tons (2107 cubic yards) is properly maintained at the source and will not be comingled with any other material prior to importing and grading the clean soil material at the Site;
2) That the material does not include any solid waste, including construction and demolition material, as it's prohibited;
3) That screening for evidence of contamination by visual, olfactory and PID soil screening practices prior to testing at the source as well as upon importing to the Site for grading is completed; and
4) That a maximum five-part composite sample will be collected from the segregated stockpile at the source at a minimum frequency of one sample per 250 cubic yards and analyzed for the following Full List parameters:
    - VOCs by EPA Method 8260C (rev. 2006)

- SVOCs by EPA Method 8270D (rev. 2007)
- Pesticides by EPA Method 8081B (rev. 2000)
- PCBs by EPA Method 8082A (rev. 2000)
- TAL Metals by EPA Method 6010C (rev. 2007)

Upon receipt of the segregated stockpile analytical results collected at the source, a Clean Soil Sampling Report will be submitted to NYSDEC for review/approval prior to importing. The report will include the following:

1) Summary of number of samples collected and analyzed, tabulated data and comparison to the selected Site Use SCOs;
2) Analytical data sheets and chain of custody documentation;
3) Summary of 3160 tons (2107 cubic yards);
4) Photographs from the segregated stockpile at the source with sample point locations identified;
5) An affidavit from the source/facility on company letterhead stating that the segregated stockpile for 3160 tons (2107 cubic yards) has been properly maintained at the source and complies with the requirements listed above; and
6) A copy of source/facility NYSDEC permit;

A highly visible demarcation barrier (i.e. orange geo-synthetic material or equivalent) will be installed beneath the clean soil/fill surface cover. Upon importing and grading the NYSDEC approved clean soil cover for 3160 tons (2107 cubic yards) on top of a highly visible demarcation barrier, the following documentation will be presented in the Final Remedial Closure Report:

1. Copies of purchase invoices;
2. Truck transportation slips from the source to the Site;
3. Confirmation of 3160 tons (2107 cubic yards) of NYSDEC approved clean soil cover material imported and graded at the site on top of highly visible demarcation barrier;

4. Site plan depicting all areas where the NYSDEC approved clean soil cover has been placed; and
5. Photographs documenting the importing and grading of the NYSDEC approved clean soil cover across the site with the underlying highly visible demarcation barrier (i.e. orange geo-synthetic material or equivalent).

APPENDIX H

Health & Safety Plan

511 West 21st Street
New York, New York
(AKA 510 W. 22nd Street, New York, New York)
BCP # C231080

SITE SPECIFIC HEALTH & SAFETY PLAN

Prepared for:
510 West 22nd Street Partners, LLC
c/o Albanese Development Corp.
1050 Franklin Avenue
Garden City, NY 11530
FLS Project Number: 10173-002

Submitted to:
New York State Department of Environmental Conservation
1 Hunters Point Plaza
47-40 21st Street
Long Island City, NY 11101

June 2014

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ATTACHMENTS

1.0 INTRODUCTION

Fleming-Lee Shue, Inc. (FLS) prepared this Site Specific Health and Safety Plan (HASP) for use by FLS employees during remedial activities of The Former Time Warner Building (hereafter referred to as the "Site"). The Site address is 511 West 21st Street in New York, NY (Figure 1), aka 510 West 22nd Street in New York, NY. The legal address of the Site is Block 693, Lot 23 in the borough of Manhattan. The Site encompasses an L-shaped 19,750 sf lot located on the north side of West 21st Street and the south side of West 21nd Street between 10th Avenue and 11th Avenue in Manhattan, New York. The property has frontage on the north side of West 21st Street and the south side of West 21nd Street. The surrounding properties typically consist of multiple-story residential, office, and warehouse buildings.

The subject property contains a vacant 5-story parking garage building with no basement level. The site was used for manufacturing in the 1800s. The existing building was constructed in 1918/19 as a 2-story parking garage building, then was gutted to its load bearing walls and reconstructed as a 5-story building in 1989. Time Warner occupied the building from 1991 to 2008 and used the building for vehicle parking, storage, vehicle maintenance, and offices. Time Warner vacated the building in 2008 and it has remained vacant since that time.

The client plans to redevelop the site with a 10-story office building with ground-floor retail that will utilize ~25% of the existing building while demolishing the remaining ~75%.

2.0 PURPOSE

The purpose of the HASP is to identify the real and potential hazards associated with Site investigation and remediation and to stipulate appropriate health and safety procedures to protect site workers from injury while performing work at the site. The procedures and guidelines contained in this document are intended to minimize exposure to chemical, physical, and biological hazards that may be present at the Site, in soil, groundwater, or air, and to prevent accidents and injuries.

This HASP is based on the premise that accidents are preventable and that accident prevention is the responsibility of all individuals on the project team. Usually accidents are the result of dangerous actions, conditions, equipment, poor judgment, or carelessness. Therefore, the goal of this HASP is to prevent all accidents by developing a sense of safety, health awareness, and safe work habits in field and construction personnel, and by ensuring that the safety requirements of this HASP are fulfilled. FLS desires to instill a "Culture of Safety" while on the job.

As part of this HASP, a Qualitative Human Health Exposure Assessment will be completed in accordance with Appendix 3B of DER-10. Existing data will be reviewed in order to evaluate and document potential exposures. This will also include determining potential exposure pathways, who may be affected by the identified contaminants and the anticipated exposure, if any, for the future occupants of the property/building. Where required, data gaps from previous sampling events will be identified and addressed with additional sampling.

2.1 Background

The procedures in this document were developed in accordance with the provisions of Occupational Safety and Health Administration (OSHA) rule 29 CFR 1910.120 and FLS' experience with similar projects. All Site workers must review and comprehend this HASP before entering the Site. The Health and Safety Officer (HSO) or designee will ensure that personnel have reviewed the HASP and will provide an opportunity to ask health and safety questions during attendance at a pre-field safety meeting. Field personnel will sign the acknowledgment form (Attachment I) maintained on-Site at the field office by the HSO. The recommended health and safety guidelines in this document may be modified, if warranted, by additional information obtained prior to, or during Site remediation. The HSO will also maintain copies of pertinent health and safety records for all field personnel.

The Occupational Safety and Health Act (1970) requires:

- Employers shall furnish each employee with a place of employment free from recognized hazards that are causing or likely to cause death or serious physical harm.
- Employers must comply with occupational health and safety standards and rules, regulations and orders pursuant to the Act, that are applicable to company business and operations.
- All employees must comply with occupational health and safety standards and regulations

under the Act, which are applicable to their actions and situations.

- Employees are encouraged to contact their immediate superior for information that will help them understand their responsibilities under the Act.

3.0 SITE HISTORY

3.1 Site Background

The site was used for manufacturing in the 1800s. The existing building was constructed in 1918/19 as a 2-story parking garage building, then was gutted to its load bearing walls and reconstructed as a 5-story building in 1989. Time Warner occupied the building from 1991 to 2008 and used the building for vehicle parking, storage, vehicle maintenance, and offices. Time Warner vacated the building in 2008 and it has remained vacant since that time.

The Site is underlain by 13 to 17 feet of man-made fill. Native soils beneath the fill layer consist of organic silty clay of estuarine origin as well as sand and silt of glacial origin. The depth to bedrock varies from approximately 33 feet below grade at the northern end of the Site to 65 feet below grade at the southern end of the Site. Published geologic data indicates that the Site is underlain with mica schist that is known as the Manhattan Schist. The Manhattan Schist is a mass of metamorphic rock covering the deeper limestone stratum which is the firm bedrock providing the foundation for New York City's skyscrapers.

The depth to groundwater at the Site is approximately 6 to 7 feet below sidewalk grade. The previous investigations indicated that the local groundwater flow direction is to the southwest.

3.2 Previous Site Investigations

The following summarizes site environmental activities from 2007 through the present:

2007 AKRF Phase I Environmental Site Assessment

The following environmental concerns were identified in the Phase I Environmental Site Assessment (ESA):

- The subsurface conditions at the subject property have been affected by two petroleum releases from on-Site gasoline underground storage tanks (USTs). According to the New York State Department of Environmental Conservation (NYSDEC) SPILLS database, the leak associated with the UST was repaired and a small amount of soil was excavated. Subsequent subsurface investigations (including required offsite sampling) found benzene and methyl tert-butyl ether (MTBE) contamination in soil, and benzene, toluene, ethylbenzene and xylenes (BTEX) and MTBE contamination in groundwater, with the greatest concentrations located west of the gasoline dispensers and southwest of the former tank field. The NYSDEC project manager's remarks indicate that DEC required the installation of permanent monitoring wells and the development of a Remedial Action Plan under a stipulation agreement. The spill remains active.

- The subsurface conditions at the subject property may have been affected by 24 petroleum releases from many different off-Site sources. Several of the off-Site releases caused regional contamination of soils and groundwater, and resulted in significant amounts of free petroleum product in monitoring wells.

- The former Consolidated Edison West 18th Street Gas Works site caused extensive contamination of soil and groundwater from manufactured gas plant wastes and petroleum. Remediation activities started in 2004. Two voluntary cleanup program sites and three Brownfields Cleanup Program (BCP) sites are located within the boundaries of the former gas works. Coal tar and BTEX contamination of both soil and groundwater have been encountered. Because of the downgradient and cross gradient location of the former gas works, it is unlikely to have affected environmental conditions on the Site.

- The Site storage areas contained two 270-gallon aboveground storage tanks that appeared to be in good condition. Small leaks and spills from auto repair activities were captured by an oil water separator beneath the floor slab in the northern section of the building. A floor drain was located in the center of the fueling area at the southwest corner of the building.

2008 LBG UST Closure/Remedial Action Report

Leggette, Brashears and Graham, Inc. (LBG), under contract with Time Warner, removed the tanks present on the Site in 2007 along with the dispensers and piping in 2007/8 including removal of contaminated soils that could be excavated without endangering the building's structural elements. The closure report describes the conditions of the tanks and piping as sound, with no soil contamination in the shallow soils that would indicate possible piping leaks that could have caused the noted groundwater contamination. Evidence of free product was noted around the foundation footings and was removed by the use of sumps to skim the product. The soils near the foundations could not be removed without endangering the building's foundations.

After the tanks and contaminated soils were removed, LBG applied a mixture of two oxidants designed to oxidize the dissolved organic material and slowly release oxygen into the groundwater to enhance bio-remediation of the gasoline constituents. Before backfilling the excavations, the end point samples were reviewed by the NYSDEC and additional excavation to the east of the gasoline tanks was performed to remove MTBE contaminated soil above clean-up objectives, two test pits were excavated to examine soil conditions near the south foundation wall and gravel was placed at the bottom of these test pits to allow additional oxidizing chemicals to be added in the future and monitoring wells were installed at these locations.

LBG also advanced three soil borings on the Site and installed two groundwater monitoring wells to supplement the four wells previously installed on and adjacent to the Site in connection with Spill # 00-10394.

2008 AKRF Phase II ESI

AKRF conducted an investigation on July 7 and 11, 2008, which included the advancement of 10 soil borings and the collection of 18 soil and six groundwater samples for laboratory analysis. The results and conclusions were as follows:

- Elevated volatile organic compounds (VOCs) were detected in 10 of the 18 soil samples. The VOCs were present at concentrations exceeding their respective NYSDEC Technical and Administrative Guidance Memorandum No. 4046 Recommended Soil Cleanup Objectives (RSCOs). These compounds exceeding RSCOs included 1,2,4-trimethylbenzene, benzene, isopropylbenzene, methyl tert-butyl ether (MTBE, a highly water-soluble gasoline additive), n-butylbenzene and n-propylbenzene. They were detected in five soil samples, mostly at the soil-water interface. Based on the distribution and concentrations, AKRF concluded that the VOCs detected beneath the southern portion of the building appeared to be attributable to the known on-site spill of MTBE-containing gasoline. The VOCs detected in the northern portion of the site included gasoline-related compounds, but not MTBE. As noted in the Phase I ESA, historical Sanborn maps from 1951 through 1987 indicate the presence of two 1000-gallon gasoline tanks in this portion of the Site. AKRF concluded that the gasoline contamination found in this area may be the result of past releases from these tanks or associated piping, or of off-Site releases, including several closed status spills on the east-adjacent property.

- The concentrations of eight semi-volatile organic compounds (SVOCs) exceeded their RSCOs in 12 soil samples, mostly from the upper 5 feet of the soil borings. The majority of the SVOCs detected, including those that exceeded their respective RSCOs, are polycyclic aromatic hydrocarbons, which are typically detected in urban fill encountered in New York City. Therefore, it was concluded that the nature and levels of the SVOCs detected on-Site are likely attributable to the presence of urban fill beneath the Site.

- The concentrations of six metals (calcium, copper, lead, magnesium, mercury and zinc) exceeded their respective RSCOs and Eastern U.S. background levels reported in TAGM No. 4046 in six soil samples. The highest concentration of lead, 600 parts per million (ppm), was detected in sample SB-4 (3-5 feet), and the highest concentration of mercury (2.4 ppm) was identified in sample SB-5 (1-6 feet). These metals' Eastern U.S. Background Levels are 500 ppm and 0.2 ppm respectively. Based on the detected concentrations of metals, it was concluded that the exceedances may be attributable to urban fill beneath the Site, which typically contains highly variable concentrations of metals.

- VOCs were detected in the each groundwater samples at concentrations exceeding the NYSDEC Class GA Ambient Water Quality Standards (drinking water standards). The highest concentrations of VOCs were detected in samples SB-2 (GW) (25,000 parts per billion of MTBE), SB-3 (GW) (13,550 ppb of MTBE), and SB-8 (GW) (1,798 ppb of gasoline related compounds). MTBE was present below the Class GA standard in groundwater sample SB-6 (GW), and was detected at a concentration of 20 ppb, in exceedance of the Class GA standard of 10 ppb, in monitoring well Roux MW-3.

  AKRF concluded that Based on Site history, the VOC contamination in groundwater at SB-1, SB-2 and SB-3 is likely attributable to the on-Site spill of MTBE-containing gasoline. Although an active fuel oil spill was reported on the property south-adjacent to Roux MW -3, fuel oil does not contain MTBE, and the presence of this chemical in the samples indicates contamination migrating from the subject Site or the west-adjacent property, which also had an active MTBE-containing gasoline spill reported. The low levels of MTBE detected in sample SB-6 (GW) may be attributable to spills on the southern portion of the Site or the west-adjacent property. However, since MTBE was not detected in sample SB-8 (GW) or in the soil samples collected in the northern portion of the Site, the VOCs detected in this area are generally not likely to be attributable to the gasoline spill in the southern portion of the Site, and may instead be due to past to releases from the gasoline tanks formerly located in this area or from spills on the east-adjacent property.

- Bis(2-ethylhexyl)phthalate was the only SVOC detected at concentrations exceeding its Class GA standard in groundwater sample SB-3 (GW). Bis(2-ethylhexyl)phthalate, which is commonly used in plastics, was not detected in soil samples from boring SB-3 and was concluded to be a laboratory contaminant. The presence of other SVOCs, at concentrations below their respective Class GA standards was attributed to the presence of suspended soil particles in the samples, which were not filtered prior to analysis.

- Ten metals were detected at concentrations exceeding their respective Class GA standards in unfiltered groundwater samples (total metals analysis). However, in the filtered samples (dissolved metals analysis), only iron, magnesium, manganese and sodium were detected at concentrations that exceeded their respective Class GA standards. Most metals detected in the unfiltered samples were either not detected or detected at much lower levels in the filtered samples. The analytical results suggest that metals detected in the unfiltered samples are primarily due to suspended sediments in the groundwater samples.

- Overall, AKRF concluded that gasoline and MTBE contamination from on-Site Spill # 00-10394 remains in the southern portion of the Site, and may be migrating off-Site in groundwater. Additional petroleum contamination, either from historical on-site gasoline storage tanks or from off-Site spills, was discovered in the northern portion of the Site. The Site was underlain by urban fill, which may contain highly variable concentrations of SVOCs and metals.

Leggette Brashears & Graham Groundwater Monitoring Reports (2008-2011)

Quarterly groundwater monitoring at the Site by LBG began in March of 2008. The first sampling event of this series showed that VOCs associated with gasoline (BTEX) were present at concentrations exceeding the groundwater standards in each of the monitoring wells with MBTE having the most pervasive presence and highest concentrations.

The NYSDEC requested three additional wells be installed to the south and southwest of the gasoline tank area to further delineate the extent of groundwater contamination on and off site in 2010 based upon continued exceedance of the groundwater standards during quarterly monitoring. After installation of these additional wells, a comprehensive groundwater study was performed sampling all 9 available wells in June 2010. No gasoline constituents were detected at concentrations that exceeded their respective Part 375 restricted commercial standards in the soil samples taken as part of the installation of the three additional wells.

The groundwater analytical results from this sampling indicated VOCs present at concentrations exceeding the groundwater standards in samples from 6 of 9 monitoring wells. MTBE was the most common constituent which was detected at the highest concentrations in the groundwater samples. BTEX compounds were at the highest concentrations in the downgradient wells closest to the former tank area (MW-8 and GFMW-1) where the highest concentration of MTBE was also detected. The mean concentration of MTBE in all existing wells had trended lower over the 2 year period following the oxidant application with MTBE being reduced by 78 to 98 percent.

Quarterly groundwater monitoring continued in 2011, although the quarterly reports were not made available to FLS for review. The most recent groundwater monitoring report discussed in section 2.3.6 indicates that BTEX and MTBE concentrations increased in certain wells during 2011.

FLS Phase I Environmental Site Assessment (November 2011)

A Phase I ESA was prepared for the Site by FLS in November 2011 on behalf of 510 West 22nd Street Partners, LLC. The Phase I ESA identified the following recognized environmental conditions (RECs):

- The open spill case (Spill #00-10394) on the Site;
- The historical Sanborn Fire Insurance maps from 1921 to 1988 show 11 properties with underground gasoline tanks in the vicinity of the Site. Most of these sites have been converted to art galleries and/or office space, or redeveloped into a multi-story apartment buildings. The adjacent property to the west of the subject property at 521-529 West 21st Street is listed on the NYSDEC Spills Database as an active spill site for the release of gasoline and fuel oil to the soil and groundwater. This is considered a REC that could potentially impact the Site.

Although the prior uses of nearby sites and the active spill incident/case on the adjacent property to the west are RECs, FLS concluded that the ongoing remediation activities for the on-Site spill (Spill #00-10394) should address any contamination that may migrate beneath the subject property from off-site sources.

LBG Chemical Oxidation Injections and Recent Groundwater Monitoring (2011-2012)

In late 2011 and early 2012, due to rebounding concentrations of BTEX and MTBE in certain wells since mid-2010, LBG performed 2 rounds of chemical oxidation injections at the Site. A slurry mix of RegenOx® and Oxygen Release Compound Advanced® was injected into the saturated zone at and beneath the water table in the southern-central portion of the Site during each round. LBG's evaluation of the results from the 2nd quarter of 2012 groundwater monitoring states that the injections were successful in mobilizing residual VOCs into the dissolved phase. However, the evaluation also states that continued groundwater monitoring is necessary to ensure the effectiveness of the injections, and discusses the possibility of additional future injections and soil excavation, indicating that remediation of soil and groundwater at the Site is not yet completed.

4.0 POTENTIAL CHEMICAL AND PHYSICAL HAZARDS AND CONTROLS

This section discusses the potential chemical, physical, and biological hazards and controls associated with the investigation tasks above.

4.1 Potential Chemical Hazards/Controls

Based on data collected during previous investigations, this HASP focuses on the following chemicals of concern:

- VOCs
    - Benzene
    - Toluene
    - Ethylbenzene
    - Xylenes
    - Methyl-tert-butyl-ether
    - Methylene Chloride
    - 1,2,4-trimethylbenzene
    - P-isopropyltoluene
    - Naphthalene
    - Chloromethane

- Metals
    - Mercury
    - Lead

Attachment II lists the recognized and suspected health hazards, exposure limits, physical and chemical properties, recommended protection levels and symptoms of exposure for the chemicals known or suspected. Chemical hazards will be minimized by limiting exposure of personnel to soil and groundwater and by engineering control and personnel protective equipment (PPE).

4.2 Physical Hazards/Controls

Physical hazards potentially present at the Site include, but are not limited to, the following:

Hazard	Control
Slip, trip and fall (uneven terrain and slippery surfaces)	Avoid uneven terrain, walk slowly, wear sturdy/supportive shoes
Environmental (heat/cold) stress	A discussion of heat stress and cold stress and related illnesses and controls is provided in Attachment III.

Vehicular Traffic	Avoid working in high traffic areas. If necessary, use cones, reflective vests, and consider use of a flagman/additional protection.
Fire	Ensure class ABC fire extinguisher is nearby to work area when using equipment that can provide an ignition source (heavy machinery, generators, power tools)
Noise hazards	Use ear plugs and/or ear muffs during demolition and excavation activities.
Use of heavy equipment	Stay clear of heavy equipment during operation. Maintain eye contact with operator when approaching equipment.
Flying/Falling Debris	Safety glasses and hard hats will be used during all demolition and excavation activities. Be vigilant.

Anticipated Site operations do not include the need for specific operations such as lockout/tag-out, scaffolds or confined spaces; therefore these items are not addressed in this HASP. If Site activities require these operations, the HASP will be amended and properly trained, experienced and competent personnel shall be utilized.

4.3 Changing Conditions

Physical conditions change on site and it is important to recognize this situation. One type of changing condition is a growing excavation. It is important to be mindful of this condition.

Another potentially changing condition is gases and depth of excavation. As the excavation deepens below the breathing zone, it is possible for gases denser than air to accumulate. These gases must be monitored before entering the excavation of enclosure. This is especially true at the beginning of each work day after gases have had all night to accumulate.

4.4 Biological Hazards

General biological hazards present at the Site include, but not limited to, the following:

- Bites or stings from insects (particularly ticks) resulting in skin inflammation, disease, or allergic reaction
- Allergens and toxins from plants and animals, producing dermatitis, rhinitis, or asthma

5.0 HEALTH AND SAFETY PROTOCOL

5.1 Site/Work Hazard Evaluation

Upon review of contaminant levels and physical hazards, exposure routes and the nature of the remediation/excavation/construction tasks, it has been determined that Level D protection will be used during field activities with a contingency to upgrade to Level C protection if warranted. Air monitoring and action levels for the appropriate level of PPE appear in Section 8.

5.2 Project Team Organization

All personnel who participate in field activities will be required to attend a Health and Safety meeting prior to the commencement of field activities. The project team organization roles are described below.

Health and Safety Officer (HSO)

- Administers all aspects of the occupational health and safety program
- Develops programs and technical guidance to identify and remove physical, chemical, and biological hazards from facilities, operations, and sites
- Assists management and supervisors in the health and safety training of employees
- Conducts inspections to identify unhealthy or unsafe conditions or work practices. Takes immediate corrective action.
- Investigates all accidents and takes action to eliminate accident causes
- Monitors to determine the degree of hazard
- Determines the protection levels and equipment required to ensure the safety of personnel
- Evaluates on-site conditions (i.e., weather and chemical hazard information) and recommending to the project manager and/or the field coordinator, modifications to the work plan and personnel protection levels
- Monitors performance of all personnel to ensure compliance with the required safety procedures
- Ensures that all personnel have been trained in proper site-safety procedures including the use of PPE, and have read and signed the Acknowledgment Form (Attachment I)
- Conducts daily briefings as necessary

- Halts work if necessary
- Ensures strict adherence to the Site HASP
- Reviews personnel medical monitoring participation
- Records safety infractions and corrective actions in field log
- Notifies subcontractors and contractors of unsafe conditions

Project Manager

- Familiar with health and safety regulations related to area of responsibility
- Directs and coordinates health and safety activities within area of responsibility
- Ensures arrangements for prompt medical attention in case of serious injury
- Requires all employees supervised to use individual protective equipment and safety devices
- Ensures that safety equipment is available, maintained, used, and stored correctly
- Instructs and trains all persons within area of responsibility in health and safety requirements
- Conducts frequent and regular health and safety inspections of work area Directs correction of unsafe conditions
- Conducts weekly safety briefings with all supervisors and/or workers
- Requires all subcontractors and subcontractor personnel to comply with health and safety regulations

All Employees

The minimum personal qualifications for each individual participating in field activities are as follows:

- OSHA-specific medicals including, but not limited to, audiometric testing under the hearing conservation program and medical approval for the use of respirators
- Participation in the FLS Occupational Health Monitoring Program
- Successful completion of the 40-hour OSHA health and safety training for hazardous material sites (29 CFR 1910.120[e][3][i]) and valid/up-to-date 8-hour refresher training (29 CFR 1910.120[e][4])

- Additionally, it is strongly recommended that all field personnel be trained in first aid and Cardio-Pulmonary Resuscitation (CPR)
- Be familiar with and comply with proper health and safety practices
- Use the required safety devices and proper personal protective safety equipment
- Notify HSO/supervisor immediately of unsafe conditions/acts, accidents, and injuries
- No. 1 – Be alert on site and communicate unsafe conditions and safety infractions immediately!

5.3 Training

Knowledge of the safety rules supplemented by compliance, is essential to safety. New employees will be provided orientation training and will be furnished information and literature covering the company health and safety policies, rules, and procedures. This orientation training must be provided prior to the employee's visit to the Site. Employees must read the HASP and project-specific Work Plan, which contains the applicable regulations/standards for their job.

Prior to beginning work on-Site, and weekly thereafter, the HSO will lead safety-training sessions and/or "tailgate" training meetings. These meetings will be conducted to provide information and training on new equipment, new procedures, new chemicals, refresher/remedial training in specific areas, or meet annual requirements. Such training may be held in conjunction with the safety briefings/meetings addressed elsewhere in this program. If necessary, the HSO will ensure that employees are scheduled and provided specialized training as required. Examples of specified training include (but are not limited to):

- Safe handling/use of flammables, poisons, or toxics
- Confined space entry
- Respirator care/use
- Hazard communication (hazardous chemicals)
- Slip, trip and fall hazards and fall protection
- Lockout/tagout procedures
- Scaffold use, and erection/dismantling
- Blood-borne Pathogens (Non-Medical)

Specialized training will be documented in the employees' personnel records and/or in a master training record.

5.4 Contractor & Subcontractor Compliance

All contractors and subcontractors that will come in contact with contaminated soil and groundwater shall be responsible for preparing a Site-specific HASP for their work and have available a supervisor on site who understands their scope of work. The supervisor will be responsible for ensuring that their personnel comply with the HASP.

The provisions of this health and safety plan apply to contractors and subcontractors and their employees working for FLS. Failure to fulfill this requirement is a failure to meet the conditions of the contract.

5.5 Personal Hygiene

Eating, drinking and the use of tobacco products in the work area are prohibited. The use of alcohol at the work site is prohibited. Field personnel taking prescription or non-prescription medication that could impair function or cause drowsiness should alert the HSO before work begins. Beards or facial hair that could interfere with the use of a respirator (if required) are not permitted. Dermal contact with groundwater or soil should be avoided. This includes avoiding walking through puddles, pools, and mud, sitting or leaning on or against drums, equipment, or on the ground. Field personnel should wash their hands before eating, smoking, using the toilet, etc. Field personnel should wash their hands and face and shower (daily) as soon as possible after leaving the site.

5.6 Levels of Personal Protection

PPE must be worn as required for each job in all operations where there is an exposure to hazardous conditions.

5.6.1 Level D

Level D applies to work in areas where the possibility of contact with potentially contaminated media exists. The protective equipment required for Level D includes, but is not limited to, the following:

- Work clothes or coveralls (as needed)
- Safety boots, with steel toe
- Safety glasses
- Hard hat
- Reflective vest (as needed)
- Disposable nitrile gloves

- Hearing protection as needed

5.6.2 Level C

Level C is selected for working when the type of material and the concentration are known and pose a moderate level of respiratory. Level C is required when photoionization detector (PID) readings trigger respiratory action levels per Section 8. Level C protection will include, but is not limited to, the following:

- Protective clothing and other equipment required for Level D
- Full-face air purifying respirator (APR) with high efficiency /organic vapor cartridges (ultra-twin with GMCH cartridges)
- Tyvek disposable coveralls with hoods
- Boot covers

5.7 General Workplace Safety Rules

- Report unsafe conditions, accidents, injuries, or incidents to the HSO and Project Manager—immediately.
- Use eye and/or face protection where there is danger from flying objects or particles, (such as when grinding, chipping, burning and welding, etc.) or from hazardous chemical splashes.
- Dress properly. Loose clothing and jewelry shall not be worn.
- Keep all equipment in safe working condition. Never use defective tools or equipment.
- Report any defective tools or equipment to immediate supervisor.
- Properly care for and be responsible for all PPE.
- Do not leave materials in aisles, walkways, stairways, work areas, roadways, or other points of egress.
- Practice good housekeeping at all times.
- Training on equipment is required prior to unsupervised operation.
- During work, pause every few minutes and assess surrounding conditions—Be alert!
- For personal safety, be cognizant of your surroundings and ensure that equipment is properly secured.

5.8 Housekeeping

- Proper housekeeping is the foundation for a safe work environment. It definitely helps prevent accidents and fires, as well as creating a professional appearance in the work area.

- Material will be piled or stored in a stable manner so that it will not be subject to falling.
- Combustible scrap, debris, and garbage shall be removed from the work area at frequent and regular intervals.
- Stairways, walkways, exit doors, in front of electrical panels, or access to fire-fighting equipment will be kept clear of materials, supplies, trash, and debris.

5.9 Fire Prevention

- All firefighting equipment shall be conspicuously located, accessible, and inspected periodically, and maintained in operating condition. An annual service check and monthly visual inspections are required for fire extinguisher.
- All employees must know the location of fire-fighting equipment in the work area and have knowledge of its use and application.

5.10 Industrial Hygiene and Occupational Health

- Toilet facilities shall be provided as required for the number of workers.
- A first aid kit and portable eyewash station shall be kept on site.
- An adequate supply of potable water shall be provided.
- When no medical facility is reasonably accessible (time and distance) to the worksite, a person who has a valid certificate of first aid training will be available at the worksite to render first aid.
- Employees must be protected against exposure to hazardous noise levels by controlling exposure or by use of proper PPE.
- Any demolition work will be assessed for lead exposure (particularly if drywall or any painted surfaces or abrasive blasting/grinding is involved) and/or asbestos exposure.

5.11 Spill Containment Program

The cleanup of a chemical spill should only be done by knowledgeable and experienced personnel. Spill kits, consisting of absorbents and protective equipment should be available to clean up minor spills. A minor chemical spill is one that the FLS staff is capable of handling safely without the assistance of emergency personnel. All other chemical spills are considered major. For a major spill, contact the HSO.

Procedure for Responding to a Minor Chemical Spill

- Contact HSO to obtain guidance
- Alert people in immediate area of spill
- Wear PPE, minimum level D—**First assess the spill to determine whether you have sufficient protection to continue**
- Upgrade to level C to avoid breathing vapors from spill
- Confine spill to small area using absorbent, debris, soil etc.
- Absorb spill with vermiculite, dry sand, or oil-sorbent pads
- Collect residues, place in Department of Transportation (DOT)-approved containers (labeled) and dispose as chemical waste
- Clean spill area with water

6.0 INDIVIDUAL SAFETY & HEALTH PROGRAMS LISTING

OSHA standards specify various individual programs that may be applicable to work performed on construction sites. Highlights of these programs are provided below, and specific written programs or procedures may be included into this written program, attached, or developed separately.

6.1 Hazard Communication Program

If employees are exposed to or work with hazardous chemicals at the job site, this program is required. Important elements of the written program are required to include a master listing of chemicals, maintaining material safety data sheets on each chemical, and training of employees on the program, the chemicals exposed to, and material safety data sheets.

6.2 Confined Space Entry Program

If employees enter a confined space that contains or has the potential to contain an atmospheric or physical hazard, this program is required. Either the ANSI Z117.1-1989 Safety Requirements or Confined Spaces program of the OSHA General Industry Permit Require Confined Space program must be used as guidance to develop the company's program. Primary elements of the program are identification of applicable confined spaces, testing/monitoring, control or elimination of hazards, protective equipment, entry authorization, attendants, training, and rescue.

No FLS employee is authorized to enter a confined space without the specified training AND notifying the project manager or HSO.

6.3 Respiratory Protection Program

If employees are exposed to hazardous/toxic chemical, paint or other gases, vapors, fumes, dusts, or mists above the permissible exposure limit, and/or employees wear respirators, this program is required. Program elements are written program for the selection, maintenance, care, and use of respirators; fit testing, training, and employee evaluation for use.

6.4 Occupational Noise Exposure/Hearing Conservation Program

If employees are exposed to noise levels above the permissible noise exposures, protection against the effects of noise and an effective hearing conservation program are required. Such a program would include elements such as written program, noise monitoring, hearing evaluations and follow-on testing, personal protective equipment (hearing protection), and maintenance of medical records.

6.5 Lockout/Tagout Program

If employees deactivate or de-energize electrical controls, equipment, or circuits and are thus exposed to electrical energy, this program is required. Program elements include lockout when possible, tagout when lockout not possible, and the employer providing and controlling lockouts.

6.6 Assured Equipment Grounding Conductor Program

If the employer uses assured equipment grounding verses ground fault circuit interrupters to provide employee electrical grounding protection, this program is required. Program elements include the inclusion of all cord sets, receptacles and cord/plug connected equipment and tools; a written program; quarterly testing; recording of each test by logging, color coding, or other equally effective means; and designation of a competent person to run the program.

6.7 Fire Protection and Prevention

A fire protection and prevention program must be developed and followed throughout all phases of the construction and demolition work. Program elements include providing the specified firefighting equipment, periodic inspections of the same, providing fire alarm devices/system, and establishment and adherence to fire prevention practices.

6.8 Emergency Response Plan

If employees are engaged in emergency response to a hazardous substance/chemical release, an emergency response plan must be developed and implemented to handle anticipated emergencies. Program elements include a written response plan, identification and training of responding employees, medical surveillance and consultation, and post response operations.

6.9 Asbestos Control Program

If employees are exposed to asbestos fibers in the workplace, then an initial monitoring for asbestos exposure must be made. If the monitoring results are above the permissible exposure limit (PEL), this program is required. Program elements include regulated areas, exposure monitoring, medical surveillance and records maintenance, engineering controls, personal protective equipment, and training.

6.10 Lead Exposure Program

If employees are exposed to lead in the workplace, then an initial monitoring for lead exposure must be made. If the monitoring results are above the permissible exposure limit (PEL), this program is required. Program elements include regulated areas, exposure monitoring, medical surveillance and records maintenance, engineering controls, personal protective equipment, and training.

7.0 AIR MONITORING EQUIPMENT AND ACTION LEVELS

A PID will be used during all work to monitor total organic vapors. The instrument will be calibrated daily or as necessary due to field conditions and the results noted in the project field book. A background level will be established, at a minimum, on a daily basis, and recorded in the field book.

The action levels and required responses are listed in the below.

Air Monitoring, Action Levels, PPE

Instrument	Action Level	Response Action
Gas/Vapor		
PID	> 5 ppm	Temporarily halt work activities and monitor until readings decrease to below 5ppm. Level D
	>5ppm - <25ppm	Halt work activities, notify HSO; continue monitoring.
	>25ppm	Shut down work activities. Resume work when readings are less than 25 ppm.

8.0 DECONTAMINATION

8.1 Site/Work Area Organization

Site control measures shall be implemented to protect the public and FLS personnel working on-site. A typical Site work area will consist of an exclusion zone where the actual field activity will take place, a contaminant reduction zone, and a support zone located outside the contaminant reduction and exclusion zones.

Levels of personal protection in the exclusion zone will vary depending on air monitoring data, and will be specified by the Site HSO.

Fences, guardrails and access devices shall be provided and maintained by the construction contractor throughout the project activities in accordance with 29 CFR 1926. In addition, barricades, warning signs and devices, temporary lighting and other safety measures shall be provided by the construction contractor, as required, to protect site personnel.

All visitors to the Site shall report first to the Contractor field office. Visitor access shall be limited to the Support Zone and Level D operation areas only, and shall be allowed only with the prior consent of the Site Manager. No visitor shall enter a work area unescorted by a Subcontractor or Contractor representative.

8.2 Work Zones

Entry into the work zones begins once a person comes on-site. This approach reflects the dynamic nature of the operations and the need for everyone to be aware of the conditions while on-site. Using the concept of three zones for the Site, the following areas are identified:

Support Zone
This area starts at the project/property fence line and extends to the entry to where field work will be conducted. In this area all personnel shall wear Level D PPE.

Contamination Reduction Zone (CRZ)

The CRZ will be within a designated area to be determined based on where field activities will take place. Personnel shall be aware of and follow all Site control procedures with respect to entering and exiting the CRZ, to ensure that they are not exposed to contaminants and to minimize the potential for contamination of personnel and the spread of contamination outside the Exclusion Zone (EZ). These measures include having personnel follow the proper procedures for donning and doffing PPE and washing in the CRZ. The measures also address the decontamination procedures for use when moving equipment between zones. The CRZ shall consist of an area to drop off equipment, plastic bags to dispose of protective clothing, adequate soap and water for personnel and equipment decontamination and a means of capturing wash water generated during decontamination.

Exclusion Zone (EZ)

The EZ will be within a designated area to be determined based on where field activities will take place. No employee shall enter the Exclusion Zone without the required training and PPE. The employee must first exit the Exclusion Zone and follow decontamination procedures (Section 2.8.2.1) in the CRZ before engaging in any of the above actions. In the event that an employee in the EZ requires a replacement or his/her protective suit or respirator filters, the employee shall exit the EZ and utilize proper decontamination procedures in the CRZ, replace or repair the defective PPE, then re-enter the EZ.

8.3 Personnel Decontamination

Decontamination (decon) of personnel consists of physically removing soil or contaminants using the correct procedures for washing and removal of PPE. Decon will take place in the designated decontamination zone using the following steps, if applicable

- Soap and potable water wash and potable water rinse of gloves
- Tyvek removal
- Glove removal
- Field wash of hands and face

9.0 EMERGENCY AND CONTINGENCY PLAN

Emergency communications will be maintained during all on-site field activities. The emergency route to the hospital is depicted on Figure 3 and emergency contacts and their phone numbers are presented in Table 1.

A first aid kit will be available on-site at all times for any minor on-site injuries. Emergency medical assistance or ambulance can be reached by calling 911 for more severe injuries.

All OSHA recordable injuries and illnesses will be reported using OSHA Form 301 (Attachment IV).

General Emergency Response Procedures:

Any employee discovering a fire, explosion, or release of hazardous materials, which could potentially harm human health, or the environment, must immediately notify 911 to activate appropriate emergency procedures.

The following steps will be taken to expeditiously secure the appropriate assistance:

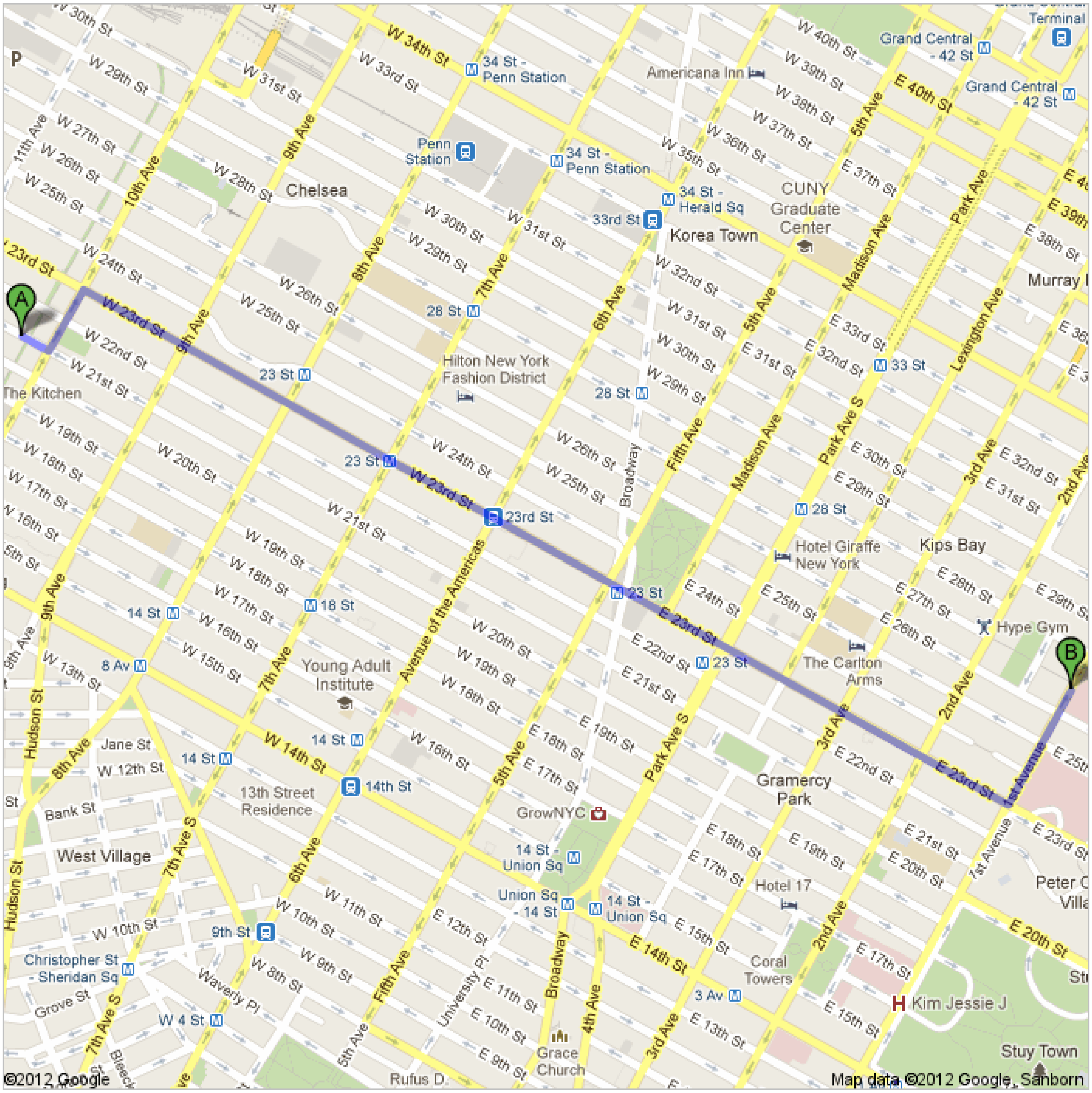
- Ascertain pertinent information (location, type of emergency condition, presence of possible victims which may be hurt or trapped nearby to the condition) and immediately contact and provide this information to 911 emergency personnel.
- Identify yourself and give the exact location first, then the type of emergency, and the presence of possible victims which may be hurt or trapped nearby to the condition. Then await the arrival of emergency response police officers, staying a safe distance from the emergency condition if warranted.
- Contact the FLS Technical Director and Project Manager and notify them of situation while waiting for emergency personnel.
- If possible, have a responsible person nearby to help flag down responding emergency services personnel as they respond.
- Emergency response personnel will assess the reported emergency and advise of the appropriate action to be taken, i.e., evacuate an area.

Unless specifically trained to handle an emergency of the type you may be reporting, please do not attempt to render assistance in handling the emergency unless ordered to do so by competent authority or emergency services personnel.

FIGURES

Site Location Map

Directions to Bellevue Hospital Center
462 1st Avenue, New York, NY 10010
1.9 mi – about **9 mins**



A 511 W 21st St, New York, NY 10011

1. Head **southeast** on **W 21st St** toward **10th Ave**	go 233 ft total 233 ft
2. Take the 1st left onto **10th Ave** About 47 secs	go 0.1 mi total 0.1 mi
3. Take the 2nd right onto **W 23rd St** About 7 mins	go 1.5 mi total 1.7 mi
4. Turn left onto **1st Avenue** Destination will be on the right About 58 secs	go 0.2 mi total 1.9 mi

B **Bellevue Hospital Center**
462 1st Avenue, New York, NY 10010

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

Directions weren't right? Please find your route on maps.google.com and click "Report a problem" at the bottom left.

TABLES

Table 1 – Emergency Contacts

Emergency	
New York City Police Department	911
New York City Fire Department	911
Emergency Medical Service (ambulance)	911
NYSDEC Spill Hotline	(800) 457-7362
National Response Center	(800) 424-8802
Bellevue Hospital Center 462 First Avenue New York, NY 10016 212-562-1000	(212) 562-1000
FLS Project Staff	
Daniel DiRocco, FLS Project Manager	(212) 675-3225 ext. 310
Raul Ramirez, Health and Safety Officer	(212) 675-3225 ext. 321
Arnold Fleming, Principal	(212) 675-3225 ext. 301
Albanese Development Corporation	
Marty Dettling, Client Representative	(516) 746-6000

ATTACHMENT I

HASP Acknowledgment Form

HASP ACKNOWLEDGMENT FORM

The following personnel have read the site-specific HASP and are familiar with its provisions.

Print Name	***Signature***	***Company***	***Function***	***Date***

ATTACHMENT II

Profiles of Chemicals of Concern/Material Safety Data Sheets

International Chemical Safety Cards

BENZENE

ICSC: 0015

National Institute for Occupational Safety and Health NIOSH

UNEP

Cyclohexatriene
Benzol
C_6H_6
Molecular mass: 78.1

ICSC # 0015
CAS # 71-43-2
RTECS # CY1400000
UN # 1114
EC # 601-020-00-8

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Highly flammable.	NO open flames, NO sparks, and NO smoking.	Powder, AFFF, foam, carbon dioxide.
EXPLOSION	Vapour/air mixtures are explosive. Risk of fire and explosion: see chemical dangers.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Do NOT use compressed air for filling, discharging, or handling. Use non-sparking handtools.	In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE		AVOID ALL CONTACT!	
•INHALATION	Dizziness. Drowsiness. Headache. Nausea. Shortness of breath. Convulsions. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN	MAY BE ABSORBED! Dry skin (further see Inhalation).	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse skin with plenty of water or shower. Refer for medical attention.
•EYES		face shield, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Abdominal pain. Sore throat. Vomiting (further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer (extra personal protection: complete protective clothing including self-contained breathing apparatus).	Fireproof. Separated from food and feedstuffs, oxidants and halogens.	Do not transport with food and feedstuffs. F symbol T symbol R: 45-11-48/23/24/25 S: 53-45 UN Hazard Class: 3 UN Packing Group: II

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0015

International Chemical Safety Cards

BENZENE

ICSC: 0015

I M P O R T A N T D A T A	**PHYSICAL STATE; APPEARANCE:** COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR. **PHYSICAL DANGERS:** The vapour is heavier than air and may travel along the ground; distant ignition possible. **CHEMICAL DANGERS:** Reacts violently with oxidants and halogens causing fire and explosion hazard. **OCCUPATIONAL EXPOSURE LIMITS:** TLV: 10 ppm; 32 mg/m^3 (as TWA) A2 (ACGIH 1991-1992). OSHA PEL: 1910.1028 TWA 1 ppm ST 5 ppm See Appendix F NIOSH REL: Ca TWA 0.1 ppm ST 1 ppm See Appendix A NIOSH IDLH: Potential occupational carcinogen 500 ppm	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation and through the skin. **INHALATION RISK:** A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20°C; on spraying or dispersion, however, much faster. **EFFECTS OF SHORT-TERM EXPOSURE:** The substance irritates the skin and the respiratory tract. Swallowing the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis. The substance may cause effects on the central nervous system. Exposure far above the occupational exposure limit may result in unconsciousness. **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** The liquid defats the skin. The substance may have effects on the blood forming organs, liver and immune system. This substance is carcinogenic to humans.

PHYSICAL PROPERTIES	Boiling point: 80°C Melting point: 6°C Relative density (water = 1): 0.9 Solubility in water, g/100 ml at 25°C: 0.18 Vapour pressure, kPa at 20°C: 10 Relative vapour density (air = 1): 2.7	Relative density of the vapour/air-mixture at 20°C (air = 1): 1.2 Flash point: (c.c.) -11°C Auto-ignition temperature: about 500°C Explosive limits, vol% in air: 1.2-8.0 Octanol/water partition coefficient as log Pow: 2.13
ENVIRONMENTAL DATA		

NOTES

Use of alcoholic beverages enhances the harmful effect. Depending on the degree of exposure, periodic medical examination is indicated. The odour warning when the exposure limit value is exceeded is insufficient.

Transport Emergency Card: TEC (R)-7
NFPA Code: H2; F3; R0;

ADDITIONAL INFORMATION

ICSC: 0015 **BENZENE**

IMPORTANT LEGAL NOTICE:	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

MSDS Number: **T3913** * * * * * *Effective Date:* ***10/05/06*** * * * * * *Supercedes:* ***08/03/04***

MSDS *Material Safety Data Sheet*

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS

J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

TOLUENE

1. Product Identification

Synonyms: Methylbenzene; Toluol; Phenylmethane
CAS No.: 108-88-3
Molecular Weight: 92.14
Chemical Formula: C_6H_5-CH_3
Product Codes:
J.T. Baker: 5375, 5812, 9336, 9351, 9364, 9456, 9457, 9459, 9460, 9462, 9466, 9472, 9476
Mallinckrodt: 4483, 8092, 8604, 8608, 8610, 8611, V560

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Toluene	108-88-3	100%	Yes

3. Hazards Identification

Emergency Overview

POISON! DANGER! HARMFUL OR FATAL IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. VAPOR HARMFUL. FLAMMABLE LIQUID AND VAPOR. MAY AFFECT LIVER, KIDNEYS, BLOOD SYSTEM, OR CENTRAL NERVOUS SYSTEM. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate (Life)
Flammability Rating: 3 - Severe (Flammable)
Reactivity Rating: 1 - Slight
Contact Rating: 3 - Severe (Life)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
Inhalation may cause irritation of the upper respiratory tract. Symptoms of overexposure may include fatigue, confusion, headache, dizziness and drowsiness. Peculiar skin sensations (e. g. pins and needles) or numbness may be produced. Very high concentrations may cause unconsciousness and death.
Ingestion:
Swallowing may cause abdominal spasms and other symptoms that parallel over-exposure from inhalation. Aspiration of material into the lungs can cause chemical pneumonitis, which may be fatal.
Skin Contact:
Causes irritation. May be absorbed through skin.
Eye Contact:
Causes severe eye irritation with redness and pain.
Chronic Exposure:
Reports of chronic poisoning describe anemia, decreased blood cell count and bone marrow hypoplasia. Liver and kidney damage may occur. Repeated or prolonged contact has a defatting action, causing drying, redness, dermatitis. Exposure to toluene may affect the developing fetus.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or impaired liver or kidney function may be more susceptible to the effects of this substance. Alcoholic beverage consumption can enhance the toxic effects of this substance.

4. First Aid Measures

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. CALL A PHYSICIAN IMMEDIATELY.
Ingestion:
Aspiration hazard. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately. If vomiting occurs, keep head below hips to prevent aspiration into lungs.
Skin Contact:
In case of contact, immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Call a physician immediately.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:
Flash point: 7C (45F) CC
Autoignition temperature: 422C (792F)
Flammable limits in air % by volume:
lel: 1.1; uel: 7.1
Flammable liquid and vapor!
Dangerous fire hazard when exposed to heat or flame. Vapors can flow along surfaces to distant ignition source and flash back.
Explosion:
Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Contact with strong oxidizers may cause fire or explosion. Sensitive to static discharge.
Fire Extinguishing Media:
Dry chemical, foam or carbon dioxide. Water may be used to flush spills away from exposures and to dilute spills to non-flammable mixtures.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full

facepiece operated in the pressure demand or other positive pressure mode. Water spray may be used to keep fire exposed containers cool.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker SOLUSORB® solvent adsorbent is recommended for spills of this product.

7. Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
Toluene:
- OSHA Permissible Exposure Limit (PEL):
200 ppm (TWA); 300 ppm (acceptable ceiling conc.); 500 ppm (maximum conc.).
- ACGIH Threshold Limit Value (TLV):
50 ppm (TWA) skin, A4 - Not Classifiable as a Human Carcinogen.

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not feasible, a half-face organic vapor respirator may be worn for up to ten times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece organic vapor respirator may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.
Odor:
Aromatic benzene-like.
Solubility:
0.05 gm/100gm water @ 20C (68F).
Specific Gravity:
0.86 @ 20C / 4 C
pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
111C (232F)
Melting Point:
-95C (-139F)
Vapor Density (Air=1):
3.14
Vapor Pressure (mm Hg):
22 @ 20C (68F)
Evaporation Rate (BuAc=1):
2.24

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Containers may burst when heated.
Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Heat, flame, strong oxidizers, nitric and sulfuric acids, chlorine, nitrogen tetraoxide; will attack some forms of plastics, rubber, coatings.
Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Toxicological Data:
Oral rat LD50: 636 mg/kg; skin rabbit LD50: 14100 uL/kg; inhalation rat LC50: 49 gm/m3/4H; Irritation data: skin rabbit, 500 mg, Moderate; eye rabbit, 2 mg/24H, Severe. Investigated as a tumorigen, mutagen, reproductive effector.
Reproductive Toxicity:
Has shown some evidence of reproductive effects in laboratory animals.

--------\Cancer Lists\--

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Toluene (108-88-3)	No	No	3

12. Ecological Information

Environmental Fate:
When released into the soil, this material may evaporate to a moderate extent. When released into the soil, this material is expected to leach into groundwater. When released into the soil, this material may biodegrade to a moderate extent. When released into water, this material may evaporate to a moderate extent. When released into water, this material may biodegrade to a moderate extent. When released into the air, this material may be moderately degraded by reaction

with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life of less than 1 day. This material is not expected to significantly bioaccumulate. This material has a log octanol-water partition coefficient of less than 3.0. Bioconcentration factor = 13.2 (eels).

Environmental Toxicity:

This material is expected to be toxic to aquatic life. The LC50/96-hour values for fish are between 10 and 100 mg/l.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: TOLUENE
Hazard Class: 3
UN/NA: UN1294
Packing Group: II
Information reported for product/size: 390LB

International (Water, I.M.O.)

Proper Shipping Name: TOLUENE
Hazard Class: 3
UN/NA: UN1294
Packing Group: II
Information reported for product/size: 390LB

15. Regulatory Information

```
--------\Chemical Inventory Status - Part 1\---------------------------------
Ingredient                                       TSCA  EC   Japan  Australia
-----------------------------------------------  ----  ---  -----  ---------
Toluene (108-88-3)                                Yes  Yes   Yes      Yes

--------\Chemical Inventory Status - Part 2\---------------------------------
                                                        --Canada--
Ingredient                                       Korea  DSL   NDSL  Phil.
-----------------------------------------------  -----  ---   ----  -----
Toluene (108-88-3)                                Yes   Yes   No     Yes

--------\Federal, State & International Regulations - Part 1\----------------
                                           -SARA 302-    ------SARA 313------
Ingredient                                 RQ    TPQ     List  Chemical Catg.
-----------------------------------------  ---   -----   ----  --------------
Toluene (108-88-3)                         No    No      Yes         No

--------\Federal, State & International Regulations - Part 2\----------------
                                                      -RCRA-    -TSCA-
Ingredient                                 CERCLA     261.33     8(d)
-----------------------------------------  ------     ------    ------
Toluene (108-88-3)                         1000       U220       No
```

```
Chemical Weapons Convention:  No     TSCA 12(b):  No     CDTA:  Yes
SARA 311/312:  Acute: Yes      Chronic: Yes  Fire: Yes Pressure: No
Reactivity: No          (Pure / Liquid)
```

WARNING:

THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

Australian Hazchem Code: 3[Y]E
Poison Schedule: S6
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

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16. Other Information

NFPA Ratings: Health: **2** Flammability: **3** Reactivity: **0**
Label Hazard Warning:
POISON! DANGER! HARMFUL OR FATAL IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. VAPOR HARMFUL. FLAMMABLE LIQUID AND VAPOR. MAY AFFECT LIVER, KIDNEYS, BLOOD SYSTEM, OR CENTRAL NERVOUS SYSTEM. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT.
Label Precautions:
Keep away from heat, sparks and flame.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Avoid breathing vapor.
Avoid contact with eyes, skin and clothing.
Label First Aid:
Aspiration hazard. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If vomiting occurs, keep head below hips to prevent aspiration into lungs. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases call a physician immediately.
Product Use:
Laboratory Reagent.
Revision Information:
MSDS Section(s) changed since last revision of document include: 5.
Disclaimer:
****

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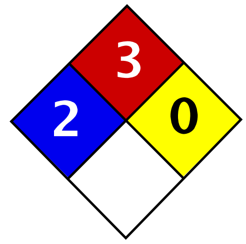
****

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)



Health	2
Fire	3
Reactivity	0
Personal Protection	H

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, CO_2).

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., Nationial 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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Last Updated: 10/09/2005 05:28 PM

MSDS Number: **X2000** * * * * * *Effective Date:* ***02/16/06*** * * * * * *Supercedes:* ***04/01/03***

MSDS *Material Safety Data Sheet*

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS

J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

XYLENES

1. Product Identification

Synonyms: Dimethyl benzene, xylol, methyltoluene
CAS No.: 1330-20-7
Molecular Weight: 106.17
Chemical Formula: C6H4(CH3)2
Product Codes:
J.T. Baker: 5377, 5813, 9483, 9489, 9490, 9493, 9494, 9499, 9516, X516
Mallinckrodt: 8664, 8668, 8671, 8672, 8802, V052

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
m-Xylene	108-38-3	40 - 65%	Yes
o-Xylene	95-47-6	15 - 20%	Yes
p-Xylene	106-42-3	< 20%	Yes
Ethyl Benzene	100-41-4	15 - 25%	Yes

3. Hazards Identification

Emergency Overview

DANGER! HARMFUL OR FATAL IF SWALLOWED. VAPOR HARMFUL. AFFECTS CENTRAL NERVOUS SYSTEM. CAUSES SEVERE EYE IRRITATION. CAUSES IRRITATION TO SKIN AND RESPIRATORY TRACT. MAY BE HARMFUL IF ABSORBED THROUGH SKIN. CHRONIC EXPOSURE CAN CAUSE ADVERSE LIVER, KIDNEY, AND BLOOD EFFECTS. FLAMMABLE LIQUID AND VAPOR.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate (Life)

Flammability Rating: 2 - Moderate
Reactivity Rating: 1 - Slight
Contact Rating: 3 - Severe
Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
Inhalation of vapors may be irritating to the nose and throat. Inhalation of high concentrations may result in nausea, vomiting, headache, ringing in the ears, and severe breathing difficulties which may be delayed in onset. Substernal pain, cough, and hoarseness are also reported. High vapor concentrations are anesthetic and central nervous system depressants.
Ingestion:
Ingestion causes burning sensation in mouth and stomach, nausea, vomiting and salivation. Minute amounts aspirated into the lungs can produce a severe hemorrhagic pneumonitis with severe pulmonary injury or death.
Skin Contact:
Skin contact results in loss of natural oils and often results in a characteristic dermatitis. May be absorbed through the skin.
Eye Contact:
Vapors cause eye irritation. Splashes cause severe irritation, possible corneal burns and eye damage.
Chronic Exposure:
Chronic inhalation can cause headache, loss of appetite, nervousness and pale skin. Repeated or prolonged skin contact may cause a skin rash. Repeated exposure of the eyes to high concentrations of vapor may cause reversible eye damage. Repeated exposure can damage bone marrow, causing low blood cell count. May damage the liver and kidneys.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or eye problems, or impaired liver, kidney, blood, or respiratory function may be more susceptible to the effects of the substance.

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4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician immediately.
Ingestion:
Aspiration hazard. If swallowed, vomiting may occur spontaneously, but DO NOT INDUCE. If vomiting occurs, keep head below hips to prevent aspiration into lungs. Never give anything by mouth to an unconscious person. Call a physician immediately.
Skin Contact:
Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

---

5. Fire Fighting Measures

Fire:
Flash point: 29C (84F) CC
Autoignition temperature: 464C (867F)
Flammable limits in air % by volume:

lel: 1.0; uel: 7.0

Explosion:

Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Contact with strong oxidizers may cause fire. Sealed containers may rupture when heated. Sensitive to static discharge.

Fire Extinguishing Media:

Dry chemical, foam or carbon dioxide. Water spray may be used to keep fire exposed containers cool, dilute spills to nonflammable mixtures, protect personnel attempting to stop leak and disperse vapors.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Vapors can flow along surfaces to distant ignition source and flash back.

---

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker SOLUSORB® solvent adsorbent is recommended for spills of this product.

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7. Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product. Do Not attempt to clean empty containers since residue is difficult to remove. Do not pressurize, cut, weld, braze, solder, drill, grind or expose such containers to heat, sparks, flame, static electricity or other sources of ignition: they may explode and cause injury or death.

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8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

-OSHA Permissible Exposure Limit (PEL):
100 ppm (TWA) xylene
100 ppm (TWA) ethylbenzene
-ACGIH Threshold Limit Value (TLV):
xylene: 100 ppm (TWA) 150 ppm (STEL), A4 - Not classifiable as a human carcinogen.
ethyl benzene: 100 ppm (TWA) 125 ppm (STEL), A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans.

Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details. Use explosion-proof equipment.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not feasible, a half-face organic vapor respirator may be worn for up to ten times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece organic vapor respirator may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres. Where respirators are required, you must have a written program covering the basic requirements in the OSHA respirator standard. These include training, fit testing, medical approval, cleaning, maintenance, cartridge change schedules, etc. See 29CFR1910.134 for details.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

---

9. Physical and Chemical Properties

The following physical data is for xylene.
Appearance:
Clear, colorless liquid.
Odor:
Characteristic odor.
Solubility:
Insoluble in water.
Specific Gravity:
0.86 @ 20C/4C
pH:
Not applicable.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
137 - 140C (279 - 284F)
Melting Point:
-25C (-13F)
Vapor Density (Air=1):
3.7
Vapor Pressure (mm Hg):
8 @ 20C (68F)
Evaporation Rate (BuAc=1):
0.7

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10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
Involvement in a fire causes formation of carbon monoxide and unidentified organic components.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Strong oxidizing agents and strong acids.
Conditions to Avoid:

Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Toxicological Data:
Xylene: oral rat LD50: 4300 mg/kg; inhalation rat LC50: 5000 ppm/4H; skin rabbit LD50: > 1700 mg/kg; Irritation eye rabbit: 87 mg mild (Std. Draize); irritation skin rabbit 500 mg/24 moderate (Std. Draize); investigated as a tumorigen, mutagen, reproductive effector.
Ethyl benzene: oral rat LD50: 3500 mg/kg; skin rabbit LD50: 17800 uL/kg; investigated as a tumorigen, mutagen, reproductive effector.
Reproductive Toxicity:
May cause teratogenic effects.

--------\Cancer Lists\--

Ingredient	---NTP Carcinogen--- Known	---NTP Carcinogen--- Anticipated	IARC Category
m-Xylene (108-38-3)	No	No	3
o-Xylene (95-47-6)	No	No	3
p-Xylene (106-42-3)	No	No	3
Ethyl Benzene (100-41-4)	No	No	2B

12. Ecological Information

Environmental Fate:
Following data for xylene: When released into the soil, this material may evaporate to a moderate extent. When released into the soil, this material is expected to leach into groundwater. When released into the soil, this material may biodegrade to a moderate extent. When released into water, this material may evaporate to a moderate extent. When released into water, this material may biodegrade to a moderate extent. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life of less than 1 day. This material is not expected to significantly bioaccumulate. (mixed xylenes: octanol / water partition coefficient 3.1 - 3.2; bioconcentration factor = 1.3, eels)
Environmental Toxicity:
For xylene: This material is expected to be slightly toxic to aquatic life. The LC50/96-hour values for fish are between 10 and 100 mg/l.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: RQ, XYLENES
Hazard Class: 3
UN/NA: UN1307
Packing Group: III
Information reported for product/size: 398LB

International (Water, I.M.O.)

Proper Shipping Name: XYLENES
Hazard Class: 3
UN/NA: UN1307
Packing Group: III
Information reported for product/size: 398LB

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\---------------------------------

Ingredient	TSCA	EC	Japan	Australia
m-Xylene (108-38-3)	Yes	Yes	Yes	Yes
o-Xylene (95-47-6)	Yes	Yes	Yes	Yes
p-Xylene (106-42-3)	Yes	Yes	Yes	Yes
Ethyl Benzene (100-41-4)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\---------------------------------

Ingredient	Korea	--Canada-- DSL	--Canada-- NDSL	Phil.
m-Xylene (108-38-3)	Yes	Yes	No	Yes
o-Xylene (95-47-6)	Yes	Yes	No	Yes
p-Xylene (106-42-3)	Yes	Yes	No	Yes
Ethyl Benzene (100-41-4)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------------

Ingredient	-SARA 302- RQ	-SARA 302- TPQ	------SARA 313------ List	------SARA 313------ Chemical Catg.
m-Xylene (108-38-3)	No	No	Yes	No
o-Xylene (95-47-6)	No	No	Yes	No
p-Xylene (106-42-3)	No	No	Yes	No
Ethyl Benzene (100-41-4)	No	No	Yes	No

--------\Federal, State & International Regulations - Part 2\----------------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
m-Xylene (108-38-3)	1000	No	No
o-Xylene (95-47-6)	1000	No	No
p-Xylene (106-42-3)	100	No	Yes
Ethyl Benzene (100-41-4)	1000	No	No

```
Chemical Weapons Convention:  No     TSCA 12(b):  Yes    CDTA:  No
SARA 311/312:  Acute: Yes      Chronic: Yes  Fire: Yes Pressure: No
Reactivity: No          (Mixture / Liquid)
```

WARNING:
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

Australian Hazchem Code: 3[Y]
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **2** Flammability: **3** Reactivity: **0**

Label Hazard Warning:
DANGER! HARMFUL OR FATAL IF SWALLOWED. VAPOR HARMFUL. AFFECTS CENTRAL NERVOUS SYSTEM. CAUSES SEVERE EYE IRRITATION. CAUSES IRRITATION TO SKIN AND RESPIRATORY TRACT. MAY BE HARMFUL IF ABSORBED THROUGH SKIN. CHRONIC EXPOSURE CAN CAUSE ADVERSE LIVER, KIDNEY, AND BLOOD EFFECTS. FLAMMABLE LIQUID AND VAPOR.
Label Precautions:
Keep away from heat, sparks and flame.
Avoid contact with eyes, skin and clothing.
Keep container closed.
Use only with adequate ventilation.
Avoid breathing vapor.
Wash thoroughly after handling.
Label First Aid:
Aspiration hazard. If swallowed, vomiting may occur spontaneously, but DO NOT INDUCE. If vomiting occurs, keep head below hips to prevent aspiration into lungs. Never give anything by mouth to an unconscious person. Call a physician immediately. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. In all cases get medical attention immediately.
Product Use:
Laboratory Reagent.
Revision Information:
No Changes.
Disclaimer:
****

****

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

Health	2
Fire	3
Reactivity	0
Personal Protection	H

Material Safety Data Sheet
Methyl tert-butyl ether MSDS

Section 1: Chemical Product and Company Identification

Product Name: Methyl tert-butyl ether

Catalog Codes: SLM2152

CAS#: 1634-04-4

RTECS: KN5250000

TSCA: TSCA 8(b) inventory: Methyl tert-butyl ether

CI#: Not available.

Synonym:

Chemical Name: Methyl tert-Butyl Ether

Chemical Formula: C5-H12-O

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
Methyl {tert-}butyl ether	1634-04-4	100

Toxicological Data on Ingredients: Methyl tert-butyl ether: ORAL (LD50): Acute: 4000 mg/kg [Rat]. 5960 mg/kg [Mouse]. VAPOR (LC50): Acute: 23576 ppm 4 hour(s) [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Extremely hazardous in case of eye contact (irritant), of ingestion. Very hazardous in case of skin contact (irritant), of inhalation. Hazardous in case of skin contact (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:
Extremely hazardous in case of eye contact (irritant), of ingestion.
Very hazardous in case of skin contact (irritant), of inhalation.
Hazardous in case of skin contact (permeator).
CARCINOGENIC EFFECTS: Not available.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.

The substance is toxic to lungs, the nervous system, 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:
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: 224°C (435.2°F)

Flash Points: CLOSED CUP: -28°C (-18.4°F).

Flammable Limits: LOWER: 2.5% UPPER: 15.1%

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.

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.

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: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Characteristic. (Strong.)

Taste: Not available.

Molecular Weight: 88.15 g/mole

Color: Clear Colorless.

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

Boiling Point: 55.2°C (131.4°F)

Melting Point: -109°C (-164.2°F)

Critical Temperature: Not available.

Specific Gravity: 0.7405 (Water = 1)

Vapor Pressure: 245 mm of Hg (@ 20°C)

Vapor Density: 3.1 (Air = 1)

Volatility: 100% (v/v).

Odor Threshold: Not available.

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.
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: 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): 4000 mg/kg [Rat].
Acute toxicity of the vapor (LC50): 23576 ppm 4 hour(s) [Rat].

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

Other Toxic Effects on Humans:
Extremely hazardous in case of ingestion.
Very hazardous in case of skin contact (irritant), of inhalation.
Hazardous in case of skin contact (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: : Methyl tert-butyl ether : UN2398 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

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

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-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R11- Highly flammable.
R38- Irritating to 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.

Created: 10/10/2005 08:23 PM

Last Updated: 10/10/2005 08:23 PM

24 VOC

Material Safety Data Sheet

WHMIS (Pictograms)	WHMIS (Classification)	Protective Clothing
	CLASS B-4: Flammable solid. Class D-2B: Material causing other toxic effects (TOXIC).	

Section 1. Product and Company Identification

Product Name / Trade name	Naphthalene	Associated Product's Item Code	NAPHTHALENE
Synonym	Refined naphthalene	CAS #	91-20-3
Chemical Family	Aromatic hydrocarbon.	DSL	CEPA DSL: Naphthalene
Chemical Formula	$C_{10}H_8$	Validation Date	5/18/2001.
Manufacturer	Recochem Inc. 850-Montee de Liesse Montreal, Quebec 514-341-3550	Print Date	5/18/2001.
Material Uses	Consumer products: Moth preventative.	In Case of Emergency	Recochem Inc. Communications and Regulatory Affairs Department (905) 791-1788

Section 2. Hazardous Ingredients

Name	CAS #	% by Weight	Exposure Limits: Canadian Values (ACGIH)	Exposure Limits: U.S. Values (OSHA)
1) Naphthalene	91-20-3	100	TWA: 10 ppm from ACGIH (Canada, 1999). Period: 8 hour(s). TWA: 52 mg/m³ from ACGIH (Canada, 1999). Period: 8 hour(s). STEL: 15 ppm from ACGIH (Canada, 1999). Period: 15 minute(s). STEL: 79 mg/m³ from ACGIH (Canada, 1999). Period: 15 minute(s).	1) Naphthalene TWA: 10 ppm from OSHA (United States, 1999). Period: 8 hour(s). TWA: 50 mg/m³ from OSHA (United States, 1999). Period: 8 hour(s).

Section 3. Emergency Overview

Hazard Overview	WARNING.! FLAMMABLE SOLID, skin sensitizer. Harmful if swallowed. Keep out of reach of children. Keep in a cool, well-ventilated place. Avoid contact with eyes, skin and clothing. DO NOT ingest. Avoid breathing dust. Wash thoroughly after handling.
Potential Acute Health Effects	Slightly hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. May cause skin sensitization.
Note to Physician	Not available.

Section 4. First Aid Measures

Eye Contact	IMMEDIATELY flush eyes with running water for at least 15 minutes, keeping eyelids open. If irritation persists, seek medical attention.
Skin Contact	After contact with skin, wash immediately with plenty of water. If irritation persists, seek medical attention.
Inhalation	Allow the victim to rest in a well ventilated area. Seek medical attention.
Ingestion	DO NOT induce vomiting. Have conscious person drink several glasses of water or milk. SEEK IMMEDIATE MEDICAL ATTENTION.

Section 5. Fire Fighting Measures

Products of Combustion	These products are carbon oxides (CO, CO_2).
Fire Fighting Media and Instructions	Flammable solid. SMALL FIRE: Use DRY chemicals, CO_2, water spray or foam. LARGE FIRE: Use water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.
Fire Hazards	Yields flammable vapors on heating above melting point.
Explosion Hazards	Vapour forms explosive mixture with air. Material in powder form, capable of creating a dust explosion.

Continued on Next Page

Section 6. Accidental Release Measures

Small Spill and Leak	Use appropriate tools to put the spilled material in a convenient waste disposal container.
Large Spill and Leak	Flammable product. Use water spray curtain to divert vapor drift. Eliminate all sources of ignition. Use appropriate equipment to put the spilled material in a waste disposal. Dispose of in accordance with regional regulations.

Section 7. Handling and Storage

Handling	Keep away from heat, sparks and flame. To avoid fire, minimize ignition sources. DO NOT ingest. Avoid breathing dust. After handling, always wash hands thoroughly with soap and water.
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). Do not store above 38°C (100.4°F).

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	*Eyes*	Safety glasses.
	Body	No special protective clothing is required.
	Respiratory	Wear appropriate respirator when ventilation is inadequate.
	Hands	Gloves (impervious).

Section 9. Physical and Chemical Properties

Physical State and Appearance	Crystalline solid. (Flakes, chips and balls.)	Odor	Characteristic.
Molecular Weight	128.19 g/mole	Taste	Not available.
pH (1% Soln/Water)	Not applicable.	Color	White.
Boiling/Condensation Point	218°C (424.4°F)	Volatility	Not available.
Melting/Freezing Point	80.2°C (176.4°F)	Evaporation Rate	<1 compared to Butyl acetate.
Specific Gravity	1.162 (Water = 1)	Odor Threshold	>0.3 ppm
Vapor Pressure	Not applicable.	Viscosity	Not available.
Vapor Density	4.42 (Air = 1)	Solubility	Insoluble in water.
VOC Content	Not available.	Other Properties	Not available.

The Product is:	Combustible.
Autoignition Temperature	526°C (978.8°F)
Flash Points	CLOSED CUP: 79°C (174.2°F).
Flammable Limits	LOWER: 0.9% UPPER: 5.9%
Fire Hazards in Presence of Various Substances	Combustible in presence of open flames and sparks. Material in powder form, capable of creating a dust explosion.

Section 10. Stability and Reactivity

Stability	The product is stable.
Conditions of Instability	No additional remark.
Incompatibility with Various Substances	Reactive with oxidizing agents, acids.

Continued on Next Page

Section 11. Toxicological Information

Routes of Entry	Inhalation. Ingestion.
Toxicity to Animals	Acute oral toxicity (LD50): >633 mg/kg [Mouse].
Acute Effects on Humans	
Eyes	Contact may cause eye irritation.
Skin	Prolonged contact can cause skin irritation.
Inhalation	Inhalation is minimal since vapours are unlikely due to physical properties. Practically non-toxic by inhalation. Inhalation may cause irritation to nose and throat.
Ingestion	Hazardous in case of ingestion.
Chronic Effects on Humans	Slightly hazardous in case of skin contact (irritant), of eye contact (irritant). CARCINOGENIC EFFECTS: Classified None by NIOSH. A4 (Not classifiable for human or animal.) by ACGIH. NTP has classified Naphthalene as a carcinogen to rats. MUTAGENIC EFFECTS: Non-mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to blood, kidneys, liver, eyes, hemolytic anemia, skin irritation. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 12. Ecological Information

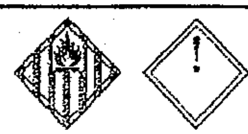
Ecotoxicity	Not available.

Section 13. Disposal Considerations

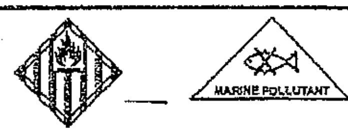
Waste Information	Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14. Transport Information

TDG Classification (Canada)	CLASS 4.1: Flammable solid. Class 9.2: Environmentally hazardous material.
PIN (Canada)	Shipping name: Naphthalene, crude or Naphthalene, refined UNNA: UN 1334 PG: III
Special Provisions for Transport (Canada)	In inner packages of 500 g capacity or less this product is classified as a "Consumer Commodity" under TDG regulations.



IMDG Classification	4.1
PIN	Shipping name: Naphthalene, refined UNNA: UN 1334 PG: III
Marine Pollutant	IMDG Class: Marine Pollutant. (Pollutant.)



DOT Classification (U.S.A)	CLASS 4.1: Flammable solid.
PIN	Naphthalene, crude or Naphthalene, refined, 4.1, UN 1334, III, Pollutant., RQ (Naphthalene)
Special Provisions for Transport (U.S.)	In inner containers of 100 lbs (45.36 kg) capacity or less this product is exempt from DOT regulations (non regulated).

Section 15. Other Regulatory Information and Pictograms

WHMIS Classification (Canada)	CLASS B-4: Flammable solid. Class D-2B: Material causing other toxic effects (TOXIC).
HCS Classification (U.S.A.)	CLASS: Flammable solid. Class: Target organ effects.
USA Regulatory Lists	TSCA Inventory: Naphthalene

Continued on Next Page

Hazardous Material Information System (U.S.A.)			National Fire Protection Association (U.S.A.)
	Health	2	Flammability: 2
	Flammability	2	Health: 2
	Reactivity	0	Reactivity: 0
	Personal Protection	E	Specific Hazard

Section 16. Other Information

Validated and verified by Product Development and Technical Coordinator on 5/18/2001.	Printed 5/18/2001.

MSDS Number: **M4420** * * * * * *Effective Date:* ***10/06/05*** * * * * * *Supercedes:* ***05/14/03***

MSDS Material Safety Data Sheet

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. And Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

J.T.Baker

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

METHYLENE CHLORIDE

1. Product Identification

Synonyms: MC; Dichloromethane (DCM); Methylene dichloride; Methylene bichloride; Methane dichloride
CAS No.: 75-09-2
Molecular Weight: 84.93
Chemical Formula: CH2Cl2
Product Codes: 9235, 9264, 9266, 9295, 9315, 9324, 9329, 9330, 9348, 9350, 9965, Q480

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Methylene Chloride	75-09-2	> 99%	Yes

3. Hazards Identification

Emergency Overview

WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER, CARDIOVASCULAR SYSTEM, AND BLOOD. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer depends on level and duration of exposure.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Cancer Causing)
Flammability Rating: 1 - Slight
Reactivity Rating: 2 - Moderate
Contact Rating: 3 - Severe
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: Blue (Health)

Potential Health Effects

Inhalation:
Causes irritation to respiratory tract. Has a strong narcotic effect with symptoms of mental confusion, light-headedness, fatigue, nausea, vomiting and headache. Causes formation of carbon monoxide in blood which affects cardiovascular system and central nervous system. Continued exposure may cause increased light-headedness, staggering, unconsciousness, and even death. Exposure may make the symptoms of angina (chest pains) worse.
Ingestion:
May cause irritation of the gastrointestinal tract with vomiting. If vomiting results in aspiration, chemical pneumonia could follow. Absorption through gastrointestinal tract may produce symptoms of central nervous system depression ranging from light headedness to unconsciousness.
Skin Contact:
Causes irritation, redness and pain. Prolonged contact can cause burns. Liquid degreases the skin. May be absorbed through skin.
Eye Contact:
Vapors can cause eye irritation. Contact can produce pain, inflammation and temporal eye damage.
Chronic Exposure:
Can cause headache, mental confusion, depression, liver effects, kidney effects, bronchitis, loss of appetite, nausea, lack of balance, and visual disturbances. Can cause dermatitis upon prolonged skin contact. Methylene chloride may cause cancer in humans.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders, eye problems, impaired liver, kidney, respiratory or cardiovascular function may be more susceptible to the effects of this substance.

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.
Ingestion:
If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Skin Contact:
Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:
Autoignition temperature: 556C (1033F)
Flammable limits in air % by volume:
lel: 12; uel: 23
Forms flammable vapor-air mixtures above 100C (212F).
Explosion:
Concentrated can be ignited by a high intensity ignition source. Vapor may form flammable mixture in atmosphere that contains a high percentage of oxygen. Sealed containers may rupture when heated.
Fire Extinguishing Media:

Dry chemical, foam or carbon dioxide. Water spray may be used to keep fire exposed containers cool.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Combustion by-products include phosgene and hydrogen chloride gases. Structural firefighters' clothing provides only limited protection to the combustion products of this material.

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6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

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7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from any source of heat or ignition. Outside or detached storage is recommended. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product. To minimize decomposition, all storage containers should be galvanized or lined with a phenolic coating. This material may corrode plastic and rubber. Wear special protective equipment (Sec. 8) for maintenance break-in or where exposures may exceed established exposure levels. Wash hands, face, forearms and neck when exiting restricted areas. Shower, dispose of outer clothing, change to clean garments at the end of the day. Avoid cross-contamination of street clothes. Wash hands before eating and do not eat, drink, or smoke in workplace. Odor Threshold: 205 - 307 ppm. The odor threshold only serves as a warning of exposure; not smelling it does not mean you are not being exposed.

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8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
Methylene Chloride (Dichloromethane):
- OSHA Permissible Exposure Limit (PEL) -
25 ppm (TWA), 125 ppm (STEL), 12.5 ppm (8-hour TWA - Action Level)
- ACGIH Threshold Limit Value (TLV) -
50 ppm (TWA), A3 - suspected human carcinogen.
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. The cartridges recommended for this material have a predicted service of less than 30 minutes at concentrations of ten times (10x) the exposure limits. Actual service life will vary considerbly, depending on concentration levels, temperature, humidity, and work rate. This substance has poor warning properties.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact. Neoprene is a recommended material for personal protective equipment. Natural rubber

and polyvinyl chloride ARE NOT recommended materials for personal protective equipment.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.
Other Control Measures:
Do not use closed circuit rebreathing system employing soda lime or other carbon dioxide absorber because of formation of toxic compounds capable of producing cranial nerve paralysis. See OSHA Standard for medical surveillance, record keeping, and reporting requirements for methylene chloride (29 CFR 1910.1052).

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.
Odor:
Chloroform-like odor.
Solubility:
1.32 gm/100 gm water @ 20C.
Specific Gravity:
1.318 @ 25C
pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
39.8C (104F)
Melting Point:
-97C (-143F)
Vapor Density (Air=1):
2.9
Vapor Pressure (mm Hg):
350 @ 20C (68F)
Evaporation Rate (BuAc=1):
27.5

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
Emits highly toxic fumes of phosgene when heated to decomposition. Decomposes in a flame or hot surface to form toxic gas phosgene and corrosive mists of hydrochloric acid. Carbon dioxide and carbon monoxide may form when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Strong oxidizers, strong caustics, plastics, rubber, nitric acid, water + heat, and chemically active metals, such as aluminum and magnesium powder, sodium, potassium, and lithium. Avoid contact with open flames and electrical arcs. Liquid methylene chloride will attack some forms of plastics, rubber, and coatings.
Conditions to Avoid:
Moisture, heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Toxicological Data:
Dichloromethane: Oral rat LD50: 1600 mg/kg; inhalation rat LC50: 52 gm/m3; investigated as a tumorigen, mutagen, reproductive effector.
Reproductive Toxicity:
Dichloromethane has been linked to spontaneous abortions in humans.

--------\Cancer Lists\--

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Methylene Chloride (75-09-2)	No	Yes	2B

12. Ecological Information

Environmental Fate:
When released into the soil, this material may leach into groundwater. When released into the soil, this material is expected to quickly evaporate. When released into water, this material may biodegrade to a moderate extent. When released to water, this material is expected to quickly evaporate. This material has a log octanol-water partition coefficient of less than 3.0. This material is not expected to significantly bioaccumulate. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life of greater than 30 days. When released into the air, this material may be removed from the atmosphere to a moderate extent by wet deposition.
Environmental Toxicity:
The LC50/96-hour values for fish are over 100 mg/l. This material is not expected to be toxic to aquatic life.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: DICHLOROMETHANE
Hazard Class: 6.1
UN/NA: UN1593
Packing Group: III
Information reported for product/size: 52L

International (Water, I.M.O.)

Proper Shipping Name: DICHLOROMETHANE
Hazard Class: 6.1
UN/NA: UN1593
Packing Group: III
Information reported for product/size: 52L

International (Air, I.C.A.O.)

Proper Shipping Name: DICHLOROMETHANE
Hazard Class: 6.1

UN/NA: UN1593
Packing Group: III
Information reported for product/size: 52L

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\---------------------------------

Ingredient	TSCA	EC	Japan	Australia
Methylene Chloride (75-09-2)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\---------------------------------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Methylene Chloride (75-09-2)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Methylene Chloride (75-09-2)	No	No	Yes	No

--------\Federal, State & International Regulations - Part 2\----------------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Methylene Chloride (75-09-2)	1000	U080	No

```
Chemical Weapons Convention:  No     TSCA 12(b):  No     CDTA:  No
SARA 311/312:  Acute: Yes      Chronic: Yes  Fire: No  Pressure: No
Reactivity: No          (Pure / Liquid)
```

WARNING:
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

Australian Hazchem Code: 2Z
Poison Schedule: S5
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **2** Flammability: **1** Reactivity: **0**
Label Hazard Warning:
WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER, CARDIOVASCULAR SYSTEM, AND BLOOD. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer depends on level and duration of exposure.
Label Precautions:
Do not breathe vapor.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Keep away from heat and flame.
Do not get in eyes, on skin, or on clothing.
Label First Aid:
If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is

difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. In all cases, get medical attention.

Product Use:

Laboratory Reagent.

Revision Information:

MSDS Section(s) changed since last revision of document include: 14.

Disclaimer:

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

METAL

MATERIAL SAFETY DATA SHEET

ALDON CORPORATION
221 Rochester Street
Avon, New York 14414-9409
(585) 226-6177

MSDS No.: LL0070 LL0079 LL0080 LL0081 LL0082 LL0085 LL0086
Effective Date: March 29, 2005

SECTION I NAME

Product	Lead Metal
Chemical Synonyms	N/A
Formula	Pb
Unit Size	up to 2.5 Kg.
C.A.S. No.	7439-92-1

24 HOUR EMERGENCY ASSISTANCE

CHEMTREC 800-424-9300
Day 585-226-6177

NFPA

HMIS *	
Health	3
Fire	0
Reactivity	0

HAZARD RATING

MINIMAL	SLIGHT	MODERATE	SERIOUS	SEVERE
0	1	2	3	4

SECTION II INGREDIENTS OF MIXTURES

Principal Component(s)	%	TLV Units
Lead metal, shot, granular, sheet, foil	99+%	See Section V.
CAUTION! MAY BE HARMFUL OR FATAL IF SWALLOWED		
OR INHALED AS FUMES OR DUST.		

SECTION III PHYSICAL DATA

Melting Point (°F)	Approx. 327.4°C (621°F)	Specific Gravity (H_2O = 1)	11.34 (20/4°C)
Boiling Point (°F)	1753°C (3187°F)	Percent Volatile by Volume (%)	0% at ambient temp.
Vapor Pressure (mm Hg)	N/A	Evaporation Rate (=1)	Non-volatile (N/A).
Vapor Density (Air=1)	N/A		
Solubility in Water	Insoluble.		
Appearance & Odor	Bluish, silvery, gray soft metal, granular, shot, sheet, foil; no odor.		

SECTION IV FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used)	Flammable Limits in Air % by Volume	Lower	Upper
Non-flammable (N/A).	N/A	--------	--------

Extinguisher Media Dry chemical or carbon dioxide should be used on surrounding fire. Do not use water on fires where molten metal is present.

SPECIAL FIREFIGHTING PROCEDURES

In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective clothing.

UNUSUAL FIRE AND EXPLOSION HAZARDS

When heated emits toxic fumes of lead which can react vigorously with oxidizing materials.

D.O.T. Non Regulated.

Approved by U.S. Department of Labor "essentially similar" to form OSHA-20

SECTION V HEALTH HAZARD DATA LL0070

Threshold Limited Value Lead as inorganic compounds, as Pb: TWA 0.05 mg/m^3 (ACGIH 2001).

Effects of Overexposure **SKIN:** Not absorbed through skin. **EYES:** No specific hazard known. Contact may cause transient irritation. **INGESTION:** May produce anorexia, vomiting, malaise, convulsions due to increased intracranial pressure. **INHALATION:** Of dust or fumes can cause lead poisoning. Target organs: Lungs, kidneys.

Emergency and First Aid Procedures **INGESTION:** Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person. **EYES:** Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention. **SKIN:** Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention. **INHALATION:** Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

SECTION VI REACTIVITY DATA

Stability			Conditions to Avoid
	Unstable		High temperatures to produce fumes.
	Stable	X	

Incompatibility (Materials to Avoid) Strong oxidizing materials.

Hazardous Decomposition Products When heated, emits toxic fumes of lead.

Hazardous Polymerization		Conditions to Avoid
May Occur	Will Not Occur	Not applicable.
	X	

SECTION VII SPILL OR LEAK PROCEDURES

Steps to be taken in case material is released or spilled Carefully sweep up without producing dust and recycle for use or place in a suitable container for disposal.

Waste Disposal Method Discharge, treatment, or disposal may be subject to Federal, State or Local laws. These disposal guidelines are intended for the disposal of catalog-size quantities only.

Dispose of in an approved chemical landfill or contract with a licensed waste disposal service.

SECTION VIII SPECIAL PROTECTION INFORMATION

Respiration Protection (Specify Type) None should be needed in normal laboratory use at room temperature. If dusty conditions prevail, work in ventilation hood or wear a NIOSH/MSHA-approved dust mask or respirator.

Ventilation				
	Local Exhaust	None needed.	Special	No.
	Mechanical (General)	None needed.	Other	No.

Protective Gloves Recommended - leather. **Eye Protection** Chemical safety glasses.

Other Protective Equipment Smock, apron, eye wash station, lab coat, ventilation hood.

SECTION IX SPECIAL PRECAUTIONS

Precautions to be Taken in Handling & Storing Store in a cool, dry place away from fire hazards. Wash thoroughly after handling. Remove and wash contaminated clothing.

Keep container tightly closed when not in use.

Other Precautions Read label on container before using. Do not wear contact lenses when working with chemicals. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.

Lead can react violently with oxidizing materials. Water may become trapped within surface cracks which may cause an explosion when the metal is molten.

Revision No. 9	Date 03/29/05	Approved Michael Raszeja	Chemical Safety Coordinator MR

8 M

METAL

10 M

Material Safety Data Sheet
Mercury

ACC# 14020

Section 1 - Chemical Product and Company Identification

MSDS Name: Mercury
Catalog Numbers: S40672B, S41542, S41599, S41599B, S41599E, S41599G, S41599J, S41599K, S41599M, S41600P, S41600S, S41600W, S41630A, S41630B, S41630C, S41631, S41631A, S41631B, S41631C, S41645, S45245, S46981, S50443, S71966, S71967, S71968, S78777, 13501, M139-1LB, M139-5LB, M140-14LB, M140-1LB, M140-5LB, M141-1LB, M141-6LB, NC9534278
Synonyms: Colloidal mercury; Hydrargyrum; Metallic mercury; Quick silver; Liquid silver.
Company Identification:
Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410
For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
7439-97-6	Mercury	100	231-106-7

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: silver liquid.
Danger! Corrosive. Harmful if inhaled. May be absorbed through intact skin. Causes eye and skin irritation and possible burns. May cause severe respiratory tract irritation with possible burns. May cause severe digestive tract irritation with possible burns. May cause central nervous system effects. Inhalation of fumes may cause metal-fume fever. May cause liver and kidney damage. Possible sensitizer. This substance has caused adverse reproductive and fetal effects in animals.
Target Organs: Blood, kidneys, central nervous system, liver, brain.

Potential Health Effects
Eye: Exposure to mercury or mercury compounds can cause discoloration on the front surface of the lens, which does not interfere with vision. Causes eye irritation and possible burns. Contact with mercury or mercury compounds can cause ulceration of the conjunctiva and cornea.
Skin: May be absorbed through the skin in harmful amounts. May cause skin sensitization, an allergic reaction, which becomes evident upon re-exposure to this material. Causes skin irritation and possible burns. May cause skin rash (in milder cases), and cold and clammy skin with cyanosis or pale color.
Ingestion: May cause severe and permanent damage to the digestive tract. May cause perforation

of the digestive tract. May cause effects similar to those for inhalation exposure. May cause systemic effects.
Inhalation: Causes chemical burns to the respiratory tract. Inhalation of fumes may cause metal fume fever, which is characterized by flu-like symptoms with metallic taste, fever, chills, cough, weakness, chest pain, muscle pain and increased white blood cell count. May cause central nervous system effects including vertigo, anxiety, depression, muscle incoordination, and emotional instability. Aspiration may lead to pulmonary edema. May cause systemic effects. May cause respiratory sensitization.
Chronic: May cause liver and kidney damage. May cause reproductive and fetal effects. Effects may be delayed. Chronic exposure to mercury may cause permanent central nervous system damage, fatigue, weight loss, tremors, personality changes. Chronic ingestion may cause accumulation of mercury in body tissues. Prolonged or repeated exposure may cause inflammation of the mouth and gums, excessive salivation, and loosening of the teeth.

Section 4 - First Aid Measures

Eyes: Get medical aid immediately. Do NOT allow victim to rub eyes or keep eyes closed. Extensive irrigation with water is required (at least 30 minutes).
Skin: Get medical aid immediately. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Destroy contaminated shoes.
Ingestion: Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately. Wash mouth out with water.
Inhalation: Get medical aid immediately. Remove from exposure and move to fresh air immediately. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.
Notes to Physician: The concentration of mercury in whole blood is a reasonable measure of the body-burden of mercury and thus is used for monitoring purposes. Treat symptomatically and supportively. Persons with kidney disease, chronic respiratory disease, liver disease, or skin disease may be at increased risk from exposure to this substance.
Antidote: The use of d-Penicillamine as a chelating agent should be determined by qualified medical personnel. The use of Dimercaprol or BAL (British Anti-Lewisite) as a chelating agent should be determined by qualified medical personnel.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Water runoff can cause environmental damage. Dike and collect water used to fight fire. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.
Extinguishing Media: Substance is nonflammable; use agent most appropriate to extinguish surrounding fire. Use water spray, dry chemical, carbon dioxide, or appropriate foam.
Flash Point: Not applicable.
Autoignition Temperature: Not applicable.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 3; Flammability: 0; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Minimize dust generation and accumulation. Keep container tightly closed. Do not get on skin or in eyes. Do not ingest or inhale. Use only in a chemical fume hood. Discard contaminated shoes. Do not breathe vapor.
Storage: Keep container closed when not in use. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from metals. Store protected from azides.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use only under a chemical fume hood.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Mercury	0.025 mg/m3 TWA; Skin - potential significant contribution to overall exposure by the cutaneous r oute	0.05 mg/m3 TWA (vapor) 10 mg/m3 IDLH	0.1 mg/m3 Ceiling (vapor)

OSHA Vacated PELs: Mercury: 0.05 mg/m3 TWA (vapor)
Personal Protective Equipment
Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: silver
Odor: odorless
pH: Not available.

Vapor Pressure: 0.002 mm Hg @ 25C
Vapor Density: 7.0
Evaporation Rate: Not available.
Viscosity: 15.5 mP @ 25 deg C
Boiling Point: 356.72 deg C
Freezing/Melting Point:-38.87 deg C
Decomposition Temperature: Not available.
Solubility: Insoluble.
Specific Gravity/Density:13.59 (water=1)
Molecular Formula: Hg
Molecular Weight:200.59

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: High temperatures, incompatible materials.
Incompatibilities with Other Materials: Oxygen, sulfur, acetylene, ammonia, chlorine dioxide, azides, chlorates, nitrates, sulfuric acid, halogens, rubidium, calcium, 3-bromopropyne, ethylene oxide, lithium, methylsilane + oxygen, peroxyformic acid, tetracarbonylnickel + oxygen, copper, copper alloys, boron diiodophosphide, metals, nitromethane, sodium carbide, aluminum, lead, iron, metal oxides.
Hazardous Decomposition Products: Mercury/mercury oxides.
Hazardous Polymerization: Will not occur.

Section 11 - Toxicological Information

RTECS#:
CAS# 7439-97-6: OV4550000
LD50/LC50:
Not available.

Carcinogenicity:
CAS# 7439-97-6: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: Intraperitoneal, rat: TDLo = 400 mg/kg/14D-I (Tumorigenic - equivocal tumorigenic agent by RTECS criteria - tumors at site of application).
Teratogenicity: Inhalation, rat: TCLo = 1 mg/m3/24H (female 1-20 day(s) after conception) Effects on Embryo or Fetus - fetotoxicity (except death, e.g., stunted fetus).
Reproductive Effects: Inhalation, rat: TCLo = 890 ng/m3/24H (male 16 week(s) pre-mating) Paternal Effects - spermatogenesis (incl. genetic material, sperm morphology, motility, and count).; Inhalation, rat: TCLo = 7440 ng/m3/24H (male 16 week(s) pre-mating) Fertility - post-implantation mortality (e.g. dead and/or resorbed implants per total number of implants).
Mutagenicity: Cytogenetic Analysis: Unreported, man = 150 ug/m3.
Neurotoxicity: The brain is the critical organ in humans for chronic vapor exposure; in severe cases, spontaneous degeneration of the brain cortex can occur as a late sequela to past exposure.
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: Fish: Rainbow trout: LC50 = 0.16-0.90 mg/L; 96 Hr; UnspecifiedFish: Bluegill/Sunfish: LC50 = 0.16-0.90 mg/L; 96 Hr; UnspecifiedFish: Channel catfish: LC50 = 0.35 mg/L; 96 Hr; UnspecifiedWater flea Daphnia: EC50 = 0.01 mg/L; 48 Hr; Unspecified In aquatic systems, mercury appears to bind to dissolved matter or fine particulates, while the transport of mercury bound to dust particles in the atmosphere or bed sediment particles in rivers and lakes is generally less substantial. The conversion, in aquatic environments, of inorganic mercury cmpd to methyl mercury implies that recycling of mercury from sediment to water to air and back could be a rapid process.
Environmental: Mercury bioaccumulates and concentrates in food chain (concentration may be as much as 10,000 times that of water). Bioconcentration factors of 63,000 for freshwater fish and 10,000 for salt water fish have been found. Much of the mercury deposited on land, appears to revaporize within a day or two, at least in areas substantially heated by sunlight.
Physical: All forms of mercury (Hg) (metal, vapor, inorganic, or organic) are converted to methyl mercury. Inorganic forms are converted by microbial action in the atmosphere to methyl mercury.
Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series:
CAS# 7439-97-6: waste number U151.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	MERCURY	MERCURY
Hazard Class:	8	8
UN Number:	UN2809	UN2809
Packing Group:	III	III

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 7439-97-6 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA Hazardous Substances and corresponding RQs

CAS# 7439-97-6: 1 lb final RQ; 0.454 kg final RQ

SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

SARA Codes

CAS # 7439-97-6: acute, chronic.

Section 313

This material contains Mercury (CAS# 7439-97-6, 100%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:

CAS# 7439-97-6 (listed as Mercury compounds) is listed as a hazardous air pollutant (HAP).

This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.
CAS# 7439-97-6 is listed as a Priority Pollutant under the Clean Water Act. CAS# 7439-97-6 is listed as a Toxic Pollutant under the Clean Water Act.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 7439-97-6 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65

WARNING: This product contains Mercury, a chemical known to the state of California to cause developmental reproductive toxicity.
California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

T N

Risk Phrases:

R 23 Toxic by inhalation.
R 33 Danger of cumulative effects.
R 50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:

S 1/2 Keep locked up and out of reach of children.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 7 Keep container tightly closed.
S 60 This material and its container must be disposed of as hazardous waste.
S 61 Avoid release to the environment. Refer to special instructions/safety data sheets.

WGK (Water Danger/Protection)

CAS# 7439-97-6: 3

Canada - DSL/NDSL

CAS# 7439-97-6 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of D2A, E.

Canadian Ingredient Disclosure List

CAS# 7439-97-6 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 6/15/1999
Revision #7 Date: 1/20/2005

ATTACHMENT III

Heat Stress/Cold Stress and Related Illnesses

Attachment III – Heat Stress / Cold Stress

1.0 HEAT STRESS

Excessive exposure to a hot environment can bring about a variety of heat-induced disorders. The four main types of heat stress related illnesses: heat rash, heat cramps, heat exhaustion, and heat stroke, are discussed below.

1.1 Heat Rash

Heat rash also know as prickly heat, is likely to occur in hot, humid environments where sweat is not readily removed from the surface of the skin by evaporation and the skin remains wet most of the time. The sweat ducts become plugged, and a skin rash soon appears. When the rash is extensive or when it is complicated by an infection, prickly heat can be very uncomfortable and may reduce a worker's performance. The worker can prevent this condition by resting in a cool place part of each day and by regularly bathing and drying the skin.

1.2 Heat Cramps

Heat cramps are painful spasms of the muscles that occur among those who sweat profusely in heat, drink large quantities of water, but do not adequately replace the body's salt loss. Drinking large quantities of water tends to dilute the body's fluids, while the body continues to lose salt. Shortly thereafter, the low salt level in the muscles causes painful cramps. The affected muscles may be part of the arms, legs or abdomen, but tired muscles (those used to perform the work) are usually the ones most susceptible to cramps. Cramps may occur during or after work hours and may be relieved by taking salted liquids by mouth, such as the variety of sports drinks on the market.

Caution Should Be Exercised By People With Heart Problems Or Those On Low Sodium Diets Who Work In Hot Environments. These People Should Consult A Physician About What To Do Under These Conditions.

1.3 Heat Exhaustion

Heat exhaustion includes several clinical disorders having symptoms that may resemble the early symptoms of heat stroke. Heat exhaustion is caused by the loss of large amounts of fluid by sweating, sometimes with excessive loss of salt. A worker suffering from this condition still sweats but experiences extreme weakness or fatigue, giddiness, nausea, or headache. In more serious cases, the victim may vomit or lose consciousness. The skin is clammy and moist, the complexion is pale or flushed, and the body temperature is normal or only slightly elevated.

A summary of the key symptoms of heat exhaustion is as follows:

- Clammy skin
- Confusion
- Dizziness
- Fainting
- Fatigue
- Heat Rash
- Light-headedness
- Nausea
- Profuse sweating
- Slurred Speech
- Weak Pulse

In most cases, treatment involves having the victim rest in a cool place and drink plenty of fluids. Victims with mild cases of heat exhaustion usually recover spontaneously with this treatment. Those with severe cases may require extended care for several days. There are no known permanent effects.

As With Heat Cramps, Certain Persons Should Consult With Their Physician About What To Do Under These Conditions.

1.4 Heat Stroke

This is the most serious of health problems associated with working in hot environments. It occurs when the body's temperature regulatory system fails and sweating becomes inadequate.

The body's only effective means of removing excess heat is compromised with little warning to the victim that a crisis stage has been reached.

A heat stroke victim's skin is hot, usually dry, red or spotted. Body temperature is usually 105^{o}F or higher, and the victim is mentally confused, delirious, perhaps in convulsions, or unconscious. Unless the victim receives quick and appropriate treatment, death can occur.

A summary of the key symptoms of heatstroke is as follows:

- Confusion
- Convulsions
- Incoherent Speech
- Staggering Gait
- Unconsciousness
- Sweating stops
- Hot skin, high temperature (yet extremities may feel chilled)

Any person with signs or symptoms of heat stroke requires immediate hospitalization. However, first aid should be immediately administered. This includes moving the victim to a cool area, thoroughly soaking the clothing with water, and vigorously fanning the body to increase cooling. Further treatment at a medical facility should include continuation of the cooling process and the monitoring of complications that often accompany the heat stroke. Early recognition and treatment of heat stroke are the only means of preventing permanent brain damage or death.

1.5 Preparing for the Heat

Humans, to a large extent, are capable of adjusting to heat. This acclimation to heat, under normal circumstances, usually takes about 5 to 7 days, during which time the body will undergo a series of changes that will make continued exposure to heat more tolerable.

On the first day of exposure, body temperature, pulse rate, and general discomfort will be higher. With each succeeding day of exposure, all of these responses will gradually decrease, while the sweat rate will increase. When the body does become acclimated to the heat, the worker will find it possible to perform work with less strain and distress.

A gradual exposure to heat gives the body time to become accustomed to higher temperatures, such as those encountered in chemical protective clothing.

1.6 Protecting Against Heat Stress

There are several methods that can be used to reduce heat stress:

- Limit duration of work periods
- Use protective clothing with cooling devices
- Enforce the use of the "Buddy System"
- Consume electrolyte solutions prior to suiting up
- Monitor workers for pulse recovery rates, body fluid loss, body weight loss, and excess fatigue
- Screen for heat stress susceptible candidates in your medical surveillance program
- Have all personnel know the signs and symptoms of heat stress

2.0 COLD STRESS

Persons working outdoors in temperatures at or below freezing may be frostbitten. Extreme cold for a short time may cause severe injury to the surface of the body, or result in profound generalized cooling, causing death. Areas of the body that have high surface-area-to-volume ratio such as fingers, toes, and ears, are the most susceptible. Two factors influence the development of a cold injury, ambient temperature and the velocity of the wind. Wind chill is used to describe the chilling effect of moving air in combination with low temperature. For instance, 10 degrees Fahrenheit with a wind of 15 miles per hour (mph) is equivalent in chilling effect to still air at minus 18 degrees Fahrenheit.

As a general rule, the greatest incremental increase in wind chill occurs when a wind of 5 mph increases to 10 mph. Additionally, water conducts heat 240 times faster than air. Thus, the body cools suddenly when chemical-protective equipment is removed if the clothing underneath is perspiration soaked.

2.1 Frostbite

Local injury resulting from cold is included in the generic term frostbite. There are several degrees of damage. Frostbite of the extremities can be categorized into:

- Frost Nip or Initial Frostbite: characterized by suddenly blanching or whitening of skin.
- Superficial Frostbite: skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient.
- Deep Frostbite: tissues are cold, pale, and solid; extremely serious injury.

2.2 Hypothermia

Systemic hypothermia is caused by exposure to freezing or rapidly dropping temperature. Its symptoms are usually exhibited in five stages:

- Shivering
- Apathy, listlessness, sleepiness, and (sometimes rapid cooling of the body to less than 95°F)
- Unconsciousness, glassy stage, slow pulse, and slow respiratory rate
- Freezing of the extremities
- Death

Thermal socks, long cotton or thermal underwear, hard hat liners and other cold weather gear can aid in the prevention of hypothermia. Blankets and warm drinks (other than caffeinated coffee) are also recommended.

Measures shall be taken to keep workers from getting wet, such as issuance of rain gear. Workers whose cloths become wet shall be given the opportunity to dry off and change clothes.

ATTACHMENT IV

OSHA Illness and Incident Report Form

OSHA's Form 301
Injury and Illness Incident Report

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.

U.S. Department of Labor
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

This *Injury and Illness Incident Report* is one of the first forms you must fill out when a recordable work-related injury or illness has occurred. Together with the *Log of Work-Related Injuries and Illnesses* and the accompanying *Summary*, these forms help the employer and OSHA develop a picture of the extent and severity of work-related incidents.

Within 7 calendar days after you receive information that a recordable work-related injury or illness has occurred, you must fill out this form or an equivalent. Some state workers' compensation, insurance, or other reports may be acceptable substitutes. To be considered an equivalent form, any substitute must contain all the information asked for on this form.

According to Public Law 91-596 and 29 CFR 1904, OSHA's recordkeeping rule, you must keep this form on file for 5 years following the year to which it pertains.

If you need additional copies of this form, you may photocopy and use as many as you need.

Completed by ____________________

Title ____________________

Phone (_______)________--___________ **Date** ____/ ____/ ____

Information about the employee

1) **Full name** ____________________

2) **Street** ____________________

City ____________________ **State** ________ **ZIP** __________

3) **Date of birth** _____ / _____ / _____

4) **Date hired** _____ / _____ / _____

5) ❒ **Male**
❒ **Female**

Information about the physician or other health care professional

6) **Name of physician or other health care professional** ____________________

____

7) **If treatment was given away from the worksite, where was it given?**

Facility ____________________

Street ____________________

City ____________________ **State** ________ **ZIP** __________

8) **Was employee treated in an emergency room?**
❒ **Yes**
❒ **No**

9) **Was employee hospitalized overnight as an in-patient?**
❒ **Yes**
❒ **No**

Information about the case

10) **Case number from the *Log*** ____________________ *(Transfer the case number from the Log after you record the case.)*

11) **Date of injury or illness** _____ / _____ / _____

12) **Time employee began work** ____________________ **AM / PM**

13) **Time of event** ____________________ **AM / PM** ❒ **Check if time cannot be determined**

14) ***What was the employee doing just before the incident occurred?*** **Describe the activity, as well as the tools, equipment, or material the employee was using. Be specific. *Examples:* "climbing a ladder while carrying roofing materials"; "spraying chlorine from hand sprayer"; "daily computer key-entry."**

15) ***What happened?*** **Tell us how the injury occurred. *Examples:* "When ladder slipped on wet floor, worker fell 20 feet"; "Worker was sprayed with chlorine when gasket broke during replacement"; "Worker developed soreness in wrist over time."**

16) ***What was the injury or illness?*** **Tell us the part of the body that was affected and how it was affected; be more specific than "hurt," "pain," or sore." *Examples:* "strained back"; "chemical burn, hand"; "carpal tunnel syndrome."**

17) ***What object or substance directly harmed the employee?*** ***Examples:*** **"concrete floor"; "chlorine"; "radial arm saw." *If this question does not apply to the incident, leave it blank.***

18) ***If the employee died, when did death occur?*** **Date of death** _____ / _____ / _____

APPENDIX I

Community Health and Safety Plan

Community Health and Safety Plan

511 W. 21st St, New York, New York

This Community Health and Safety Plan (HASP) has been developed to outline measures that will be implemented to protect the general public during remedial activities at the Site.

Site Access and Site Security

Site access will be controlled through locked doorways and other access points. During the remedial activities, all personnel will be required to sign in/out when entering or leaving the building. Provisions will be made for the care and maintenance of public thoroughfares. Sidewalks will be kept clean and free of ice, snow and debris. If equipment is temporarily staged on the sidewalk or street prior to mobilization into the building an operator will be present at all times and traffic cones or caution tape will be placed around the equipment. There will be no staging of drums or soils on the sidewalks. During removal of drums and soils the area will be cordoned off until all items are securely on the truck for off-site transportation.

Air Monitoring

If remedial tasks are conducted outside of the building, real-time air monitoring for 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 exterior non-intrusive activities, such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. Depending upon the proximity of potentially exposed individuals, continuous monitoring may be performed during sampling activities.

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

Particulate Monitoring and Actions

During exterior activities, particulate concentrations will be monitored continuously at the 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 airborne dust is observed leaving the work area, then dust suppression measures, such as wetting the material with water, will be employed. Work will continue with dust suppression techniques provided that no visible dust is migrating from the work area. If, after implementation of dust suppression techniques, visible dust is still migrating from the work area, work will be stopped and re-evaluation of activities initiated. Work will resume provided that dust suppression measures and other controls are successful in preventing visible dust migration.

Fleming Lee Shue

Environmental Management & Consulting

Daniel DiRocco
Project Manager

Education

- Bachelor of Arts (BA), Environmental Science (Geology), Minor economics, Hobart College, Geneva, NY

Awards / Certifications / Training

- OSHA 40-HAZWOPER Training

General Expertise

Bill Maniquez is a Project Manager with 13 years of experience in environmental site investigation and remediation, regulatory compliance, brownfields redevelopment and hydrogeology as a project manager, supervisor and client manager for a wide range of multidisciplinary projects. Mr. DiRocco has extensive experience with sites under the New York State Department of Environmental Conservation (NYSDEC) Brownfield Clean-up Program (BCP) and New York City Office of Environmental Remediation (OER) E-Designated sites, including hazardous materials, noise attenuation, and air quality. He has considerable leadership experience including extensive client communications, participating in negotiations with regulatory agencies, large-scale cost estimating and long term management of large development projects, and remedial design and implementation.

PROJECT EXPERIENCE

Glass Manufacturing Plant Redevelopment, Dayville, CT

Oversight of remediation of the former Glass factory converted to 25 acre mall under CTDEEP. Ecological investigation of wetland impacts and preparation of an ecological wetlands assessment. Preparation of a remedial action work plan and oversight of the remediation of wetlands impacted by former glass manufacturing operations. Oversight of the demolition, waste characterization and remedial cleanup phases of the project. Managed post groundwater monitoring.

Landfill and Glass Manufacturing Plant Redevelopment, Carteret, NJ

Preparation of a New Jersey Department of Environmental Protection (NJDEP) Landfill Closure Report and Operation & Maintenace Plan. Wetland mitigtaion and phytoremdiaiton barrier design. Environemntal Health & Safety Oversight of Construction on an environemntal impacted and senstive site.

Wetlands Restoration, Chester, NY

Assisted with the cost estimate, design and implementation of a freshwater wetlands restoration project to bring a property into compliance with NYSDEC. Property owner had illegally filled wetlands and NYSDEC required property owner to restore wetlands to an equal or higher value. Project completd in 2004 with ongoing maintenance requirements.

Mixed Use Redevelopment, Long Island City, NY (Mutiple Sites)
Conducted complete Remedial services from Phase I preliminary investigations through completion of remedial cleanup and post remediation site management at multiple Sites throughout the five boroughs under NYSDEC or NYCOER (formerly NYCDEP). With FLS conducting same remedial services on new NYC projects.

Former Asphalt Plant Waterfront Redevelopment, Queens, NY
Oversight of the remdial investigation and cleanup of a 21 acre waterfront redevelopment project in the NYSDEC Brownfield Cleanup Program.

511 West 21st Street Redevelopment
Submitted application for BCP program. Oversaw completion of RAWP and Remedial Investigation (RI) report for new residential high-rise building. Direct and oversee groundwater, soil, and soil vapor sampling and submitted reports to NYSDEC as required.

Jackson Avenue Fleet Redevelopment
Oversee the implementation the Community Air Monitoring Program according to the Remedial Action Work Plan and coordination of intricate soil disposal while site was undergoing massive excavation and foundation building.

550 W 29th Street Redevelopment
Oversaw the completion of RAWP and Remedial Investigation (RI) report for new mixed use high-rise building with a hazardous materials, air, and noise E-Designation.

Fleming
Lee Shue

Environmental Management & Consulting

Arnold F. Fleming, PE
Owner

Education
- Bachelor of Science, Civil Engineering, Manhattan College (1968)
- Masters of Engineering, Manhattan College (1969)

Professional Registration
Professional Engineer, New York

General Expertise
Arnold F. Fleming is an environmental engineer with over 30 years of experience in the areas of water quality and planning studies, domestic and industrial wastewater treatment and disposal, environmental impact analysis, contaminated materials assessment and remediation, and environmental permitting. Mr. Fleming was one of the founders of Allee King Rosen & Fleming, Inc., AKRF, Inc., and AKRF Engineering P.C. For over 20 years, Mr. Fleming has provided these firms with engineering expertise in all technical areas relating to permitting and hazardous waste assessment and management and the assessment of impacts in these technical areas. Mr. Fleming has been Principal in charge for Phase II Environmental Assessments for over 100 residential, commercial and industrial sites in the Metropolitan New York area. Duties include design of sampling program, oversight of means and methods of sample collection, and preparation of final reports including recommendations for remediation. He has also been involved with the design for over 50 remediation systems including UST tank removals, contaminated soil disposal, soil vapor extraction systems, sparged air/ soil vapor extraction systems. Remedial designs include approximately 20 sites remediated under the State of New York Voluntary Clean-up program, and two sites on the Registry of Inactive Hazardous Waste Sites. Mr. Fleming has been the Principal in charge of the preparation of Phase I Environmental Assessments for several hundred residential, commercial and industrial properties, as well as several hospitals throughout the New York Metropolitan Area. He has been the Project manager for the preparation of 208 wastewater facility planning studies, and has prepared the infrastructure and utility assessments for over 100 EIS's in the Metropolitan New York Area.

PROJECT EXPERIENCE

535 West 23rd Street Development
Prepared the Phase I and asbestos surveys for this Manhattan development site. Designed the Phase II sampling program, executed the sampling and on the basis of the findings obtained approval to remediate an extensive oil spill via bio-remediation. The system was designed and installed under the new building with operation to begin upon occupancy of the building. The approach allowed the construction schedule to proceed without delay due to the discovered contamination.

158 West 29th Street, 9th Floor, New York, N.Y. 10001 ❖ T (212) 675-3225 ❖ F (212) 675-3224

Queens West Redevelopment

Technical representative to the Queens West Development Corporation (QWDC) a subsidiary to the Empire State Development Corporation charged with developing the 78 area redevelopment of the Hunters Point waterfront into a mixed commercial/residential development. Mr. Fleming developed a model remediation plan for the first residential building in 1995 and has applied this model to the next three residential development sites in Stage 1 of the development, the first having opened for residency in the summer of 2002. Mr. Fleming is assisting QWDC in selecting a developer for Stage 2 and 4 and is advising them on the remediation of Stage 2, a former oil refinery and paint factories. Development of Stage 2 is to occur simultaneous to the remediation efforts in the refinery portion of the site.

Staten Island Muss Site Redevelopment

Managed the initial Phase II sampling for this former industrial site re-zoned for single family residential development. The site was listed on the Registry of Inactive Hazardous Waste Sites. Prepared in Remedial Investigation and Feasibility Studied that led to a Record of Decision (ROD) setting forth the remediation for the site. Prepared the remedial Design to satisfy the ROD and managed the oversight of the remediation leading up to the removal of the site from the registry. Designed a revetment system to protect the capping material that was an integral part of the remediation from storm related erosion from the adjacent Raritan Bay. Petitioned the Federal Emergency Management Agency to remove the site from the 100-year flood plain on the basis of the new elevations and erosion measures implemented on the site.

Rego Park, Queens Remediation

Prepared a Voluntary Clean-up Application, performed additional sampling and developed a remedial work plan to remove solvent contaminated soils from this development site. Designed a sparged air/ Vapor Extraction System to remediated contaminated groundwater and site soils. Operated the system for two years reducing the groundwater contamination by over 90%. The sparged air / VES was designed to be installed under the building avoiding the delay of remediation the site prior to construction.

Hudson River Park Redevelopment

For this new park stretching from Battery Park City to 59th Street, Mr. Fleming oversaw the preparation of the US Army Corps of Engineers and the New York State Department of Environmental Conservation permit application s and responses to comments leading to issuance of this waterfront development permit. This permit was unique in that it addressed the first segment that was designed and ready to be built as well as the entire park for which no design was available. To address the future segments, schematic design drawings were submitted showing conceptual designs that would be refined as the park was designed and build. A permit condition to submit each segment design for review and determination of consistency with the master permit was included to assure that no impacts were introduced in the design process. If a determination on any segment were made that the design was not consistent with the master permit, a new permit process would be initiated.

Greenpoint Brooklyn Waterfront Development Planning
For a private developer, Mr. Fleming has prepared an evaluation of the permitting concerns including a jurisdictional assessment of the existing waterfront edge, to assist in the establishing of a development plan that will be compatible with the requirements of federal and state permits.

Queens West Redevelopment
Mr. Fleming led the permitting effort to allow redevelopment of the waters edge associated with this 78 acre mixed Commercial/Residential waterfront development. The project has three stages, the first under construction and permitted in 1995. Mr. Fleming managed the permitting effort for this first waterfront permit. The current application to the state and federal permitting agencies is for a project wide permit covering the remaining 3 stages of which 2 are under design. The final stage of the project was the subject to a schematic design only. Notable in the current permit is the reconstruction of collapsed platforms that are to become a site wide park and esplanade providing water access to this portion of the east river for the first time in over a century.

West Side Ferry Terminal
For the New York City Economic Development Corporation, Mr. Fleming led the permit effort to allow a new public ferry terminal located within the bounds of the Hudson River Park. Because the ferry terminal was not approved when the Park permit was issued, this project was carved out of the park permitting process and followed a separate permit track. The permit application was assembled using updated submissions from the Park permit application and addressed the specific concerns of the State and federal permitting

Jersey City Colgate Site Redevelopment
For this mixed commercial/residential waterfront redevelopment project, Mr. Fleming prepared the state Coastal Zone Development permit and a US army Corp of Engineers dredge and fill permit to allow a marina, esplanade and a new combined sewer manifold to be built. The sewer manifold was placed in the river because of space limitations and was permitted, the first fill permit in this portion of the Hudson River in 20 years.

River East Environmental Permits for Shoreline Protection
For this 10 acre site obtained the permits to install 500 feet of revetment to allow a 1.4 million square foot residential development on a former oil terminal. Also prepared the Remedial Action Work Plan to remove historic spilled oil simultaneous to Vernon Realty shoreline construction.

APPENDIX J

FLS Project Personnel Resumes

Fleming Lee Shue

Environmental Management & Consulting

Daniel DiRocco
Project Manager

Education

- Bachelor of Arts (BA), Environmental Science (Geology), Minor economics, Hobart College, Geneva, NY

Awards / Certifications / Training

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Fleming Lee Shue

Environmental Management & Consulting

Peter S. Helseth, PE
Director

Education

- Master of Business Administration (MBA), Finance, Fordham University (2010)
- Bachelor of Science (BS), Civil Engineering, University of Vermont (2003)

Professional Registration

- Professional Engineer, New York (2008)

Health and Safety Training

- OSHA 40-Hour HAZWOPER Training
- OSHA 30-Hour Construction Safety Training

General Expertise

Peter Helseth is currently a Director with Fleming Lee-Shue. As a Director, Mr. Helseth has been involved with UST removals, soil excavation, remedial investigations & design, monitoring & sampling, sub-slab depressurization system (SSDS) and vapor barrier design, construction inspections, submittals review, engineer's estimates, roadway profiling design, grading & earthwork design, drainage design, and general construction knowledge. He has over ten years of civil engineering design experience on various types of projects.

PROJECT EXPERIENCE

3595 Broadway Redevelopment

Prepared Remedial Investigation (RI) scope for hazardous declaration property meeting Office of Environmental Remediation (OER) requirements. Also, designed the Sub-Slab Depressurization System (SSDS) for new mixed-use residential building.

500 West 30th Street Redevelopment

Designed the Sub-Slab Depressurization System (SSDS) for new residential high-rise participating in OER Voluntary Clean-up Program (VCP). Provided construction oversight of engineering controls (EC) installation. Assisted with preparation of OER VCP required documents including Remedial Investigation Work Plan and Remedial Action Report.

312 West 37th Street Redevelopment

Designed the Sub-Slab Depressurization System (SSDS) for new hotel high-rise participating in OER Voluntary Clean-up Program (VCP). Provided construction oversight of engineering controls (EC) installation. Assisted with preparation of OER VCP required documents including Remedial Action Work Plan and Remedial Action Report.

Queens West Redevelopment
Provided construction oversight of several Sub-Slab Depressurization System (SSDS) installations for NYSDEC BCP sites. Performed quarterly groundwater sampling and submitted reports to NYSDEC as required under Site Management Plan (SMP). Prepared annual Period Record Review (PRR) reports for NYSDEC.

388 Bridge Street Development
Prepared Remedial Action Work Plan (RAWP) for new residential high-rise building participating in New York State Department of Environmental Conservation (NYSDEC) Brownfield Clean-up Program (BCP). Also, designed the Sub-Slab Depressurization System (SSDS). Provided construction oversight of engineering controls (EC) installation, which included Soil Vapor Extraction (SVE) system and SSDS.

Skillman Avenue Environmental Liability Assessment & Remediation
Provided 3rd party evaluation of Sub-Slab Depressurization System (SSDS) designs prepared by other firms. Created multiple alternative SSDS design options with greater efficiency and more cost effective installation. Assisted with preparation of Conceptual Site Model (CSM) analyzing approximately ten years of groundwater sampling data.

517 West 28th Street Redevelopment
Designed the Sub-Slab Depressurization System (SSDS) for new residential high-rise. Provide construction oversight of engineering controls (EC) installation.

J. Raúl Ramírez
Environmental Engineer

Education

- Bachelor of Science (BS), Civil Engineering, The University of Texas at Austin (2011)

Health and Safety Training

- OSHA 40-Hour HAZWOPER Training
- LIRR Track Safety Training

General Expertise

J. Raúl Ramírez is currently an Environmental Engineer with Fleming Lee-Shue. As an Environmental Engineer, Mr. Ramírez has been involved with remedial investigations & design, monitoring & sampling, and sub-slab depressurization system (SSDS) design. He also has experience in performing Phase I Environmental Site Assessments (ESAs) in accordance with ASTM standard E1527- 05 and providing due diligence updates for commercial real estate transactions. He has participated in the redevelopment of Sites in the Brownfields Cleanup Program (BCP) for the New York State Department of Environmental Conservation (NYSDEC), and the Voluntary Cleanup Program (VCP) for the Office of Environmental Remediation (OER). Mr. Ramírez also participated in the development of New York City e-designation Sites.

PROJECT EXPERIENCE

511 West 21st Street Redevelopment
Conducted remedial investigation for site with former Underground Storage Tanks and an active spill. Prepared Remedial Investigation Report (RIR) for NYSDEC's BCP.

500 West 30th Street Redevelopment
Prepared draft Remedial Closure Report (RCR) and Air Quality and Noise Installation Report required for the Office of Environmental Remediation (OER) e-designation.

321 West 35th Street Redevelopment
Enrolled new high-rise hotel development with an e-designation into the NYC VCP. Conducted remedial investigation and prepared RIR and Remedial Action Work Plan (RAWP).

41st Avenue Remediation
Created RAWP for new high-rise residential development with BTEX impacts enrolled in OER VCP. Created Remedial Action Report (RAR) and Site Management Plan (SMP) for the operation and maintenance of a passive SSDS.

388 Bridge Street Redevelopment
Conducted inspection and monitoring of Soil Vapor Extraction System (SVE) and SSDS for Site with chlorinated solvents impacts. Collected and analyzed soil vapor data.

529 West 29th Street Redevelopment
Prepared RAP and Noise Installation report required for OER VCP. Obtained Notice of Satisfaction for the completion of VCP.

27st Street Redevelopment
Conducted a Phase I ESA for a residential building with an e-designation. Enrolled in OER VCP and conducted a Remedial Investigation for the redevelopment of a residential building. Created RIR and RAWP for the redevelopment of the property.

Pondfield Road, Bronxville, NY Remediation
Conducted remedial investigation at former dry cleaner with chlorinated solvent spill and prepared a Phase II Site Investigation Report detailing findings. Designed and installed a SSDS and created an Interim Remedial Measure Plan for the site and created an Operation, Maintenance and Monitoring Plan for the system. Enrolled in the NYSDEC 's BCP.

Merrick Road, Lynbrook, NY Remediation
Conducted remedial investigation at a dry cleaner with chlorinated solvent spill and prepared a Phase II Site Investigation Report detailing findings. Designed and installed a SSDS and created an Operation, Maintenance and Monitoring Plan for the system.

4th Street, Brooklyn, NY Remediation
Conducted monthly SVE System monitoring and quarterly groundwater sampling for Site with BTEX impacts. Created a Closure Report for the NYSDEC.

Fleming Lee Shue

Environmental Management & Consulting

Sasha M. Rothenberg
Environmental Scientist

Education

- Bachelor of Science (BS), Environmental Science, Union College (2012)

Health and Safety Training

- OSHA 40-Hour HAZWOPER Training
- OSHA 10-Hour Construction Safety Training

General Expertise

Sasha Rothenberg is currently an Environmental Scientist with Fleming-Lee Shue with almost two years of experience in environmental consulting. As an Environmental Scientist, Ms. Rothenberg has experience in conducting remedial investigations, soil, soil vapor and groundwater monitoring and sampling, development and remediation of Brownfield sites and New York City e-designation sites. Ms. Rothenberg' project expertise include; conducting Phase I Environmental Site Assessments in accordance with ASTM standard E1527-05 and provided due diligence updates for commercial real estate transactions. Ms. Rothenberg has experience working with several regulatory agencies including the NYS Department of Environmental Conservation, NYC Department of Environmental Protection and NYC Mayor's Office of Environmental Remediation.

PROJECT EXPERIENCE

511 West 21st Street Redevelopment

Conducted remedial investigation for site with former Underground Storage Tanks and an active spill. Prepared Remedial Investigation Report (RIR) for NYSDEC's BCP.

388 Bridge Street Redevelopment

Conducted monthly and weekly inspections and monitoring of a Soil Vapor Extraction System (SVE) and SSDS for Site with chlorinated solvents impacts. Collected and analyzed soil vapor data.

Queens West Redevelopment

Conducted quarterly groundwater sampling as required under Site Management Plan (SMP). Inspected and maintained a recovery system for light non-aqueous phase liquid. Compiled data in EDD formats for submittal to NYSDEC database. Coordinated the reduction of the Site Management Plan and the abandonment of 16 groundwater monitoring wells.

Jackson Avenue Fleet Redevelopment

Implemented the Community Air Monitoring Program according to the Remedial Action Work Plan and coordinated intricate soil disposal while site was undergoing massive excavation and foundation building.

550 W 29th Street Redevelopment
Developed a Remedial Investigation Work Plan and executed the sampling of soil, groundwater, and soil vapor. Reported and characterized the sampling data to create a comprehensive characterization of a new mixed use high-rise building with a hazardous materials, air, and noise E-Designation. Assisted in drafting the Remedial Action Work Plan.

Coney Island, Brooklyn, Redevelopment
Coordinated the import of 9,000 cubic yards of clean soil. Implemented the Community Air Monitoring Program according to the Remedial Action Work Plan

216-367 Jersey Street, Staten Island
Managed continued monitoring of residual contamination by the quarterly collection of groundwater samples.

Wantagh, NY
Conducted a Phase I investigation on a former gas station with removed underground storage tanks. Completed a comprehensive Phase II investigation, sampling groundwater, soil vapor, and soil.

Long Island City, Queens, New York Redevelopment
Developed and executed a Remedial Investigation Work Plan for a heavily contaminated two-and-one-half-acre parcel in Long Island City, Queens participating in the Brownfield Cleanup Program. Reported and characterized soil, groundwater, and soil vapor to create a comprehensive plan for remediation.

APPENDIX K

BCP Signage

Brownfield Cleanup Program

511 West 21st Street, Manhattan

Site Number C231080

Fleming Lee-Shue, Inc.

Governor –Andrew Cuomo

Commissioner – Joseph Martens

Municipal Executive – Bill de Blasio

Transform the Past.... Build for the Future

SITE SIGNS FOR REMEDIAL PROGRAMS

Sign Requirements

Size: **Horizontal format - 96" wide by 48" high**

Construction Materials: **Aluminum or wood blank sign boards with vinyl sheeting.**

Inserts: "511 West 21st Street, Manhattan", "Site Number C231080", "Fleming Lee-Shue, Inc." and "Governor Andrew Cuomo, Commissioner Joseph Martens, Municipal Executive Bill de Blasio"

Color Scheme: **Copy surrounding DEC logo - "NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION" - PMS 355**

DEC logo: **PMS 301 Blue**
PMS 355 Green

Text:

Brownfield Cleanup Program	**PMS 301**
511 West 21st Street, Manhattan, Site Number C231080, Fleming Lee-Shue	**PMS 355**
Governor Andrew Cuomo, Commissioner Joseph Martens, Municipal Executive Bill de Blasio	**PMS 301**
Transform the Past.......Build for the Future	**PMS 355**

Type Specifications: **All type is Caslon 540, with the exception of the logotype. Format is: center each line of copy with small caps and initial caps.**

Production Notes: **96" wide x 48" high aluminum blanks will be covered with vinyl sheeting to achieve background color. Copy and logo will be silk screened on this surface.**

See attached format