

**146-148 and 150 WOOSTER STREET
MANHATTAN, NEW YORK**

Remedial Action Work Plan

NYC VCP Project Number 16CVCP060M

OER Project Number 16TEMP046M

E-Designation E-369

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NYSDEC Spill #11-10393

Prepared For:

150 Wooster LLC
134 Spring Street, Suite 305
New York, NY 10012

Prepared By:



AKRF Engineering, P.C.

440 Park Avenue South
New York, NY 10016
212-696-0670

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REMEDIAL ACTION WORK PLAN

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LIST OF ACRONYMS

Acronym	Definition
AOC	Area of Concern
AS/SVE	Air Sparging/Soil Vapor Extraction
BOA	Brownfield Opportunity Area
CAMP	Community Air Monitoring Plan
C&D	Construction and Demolition
CEQR	City Environmental Quality Review
CFR	Code of Federal Regulations
CHASP	Construction Health and Safety Plan
COC	Certificate of Completion
CQAP	Construction Quality Assurance Plan
CSOP	Contractors Site Operation Plan
DCR	Declaration of Covenants and Restrictions
ECs/ICs	Engineering Controls and Institutional Controls
ELAP	Environmental Laboratory Accreditation Program
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations Emergency Response
IRM	Interim Remedial Measure
MNA	Monitored Natural Attenuation
NOC	Notice of Completion
NYS DEC	New York State Department of Environmental Conservation
NYC DEP	New York City Department of Environmental Protection
NYC DOHMH	New York State Department of Health and Mental Hygiene
NYC OER	New York City Office of Environmental Remediation
NYC VCP	New York City Voluntary Cleanup Program
NYCRR	New York Codes Rules and Regulations
NYS DEC	New York State Department of Environmental Conservation
NYS DEC DER	New York State Department of Environmental Conservation Division of Environmental Remediation
NYS DOH	New York State Department of Health
NYS DOT	New York State Department of Transportation
ORC	Oxygen-Release Compound
OSHA	United States Occupational Health and Safety Administration
PCBs	Polychlorinated Biphenyls
PE	Professional Engineer
PID	Photo Ionization Detector
QEP	Qualified Environmental Professional
QHHEA	Qualitative Human Health Exposure Assessment
RAOs	Remedial Action Objectives
RAR	Remedial Action Report

RAWP	Remedial Action Work Plan or Plan
RCA	Recycled Concrete Aggregate
RD	Remedial Design
RI	Remedial Investigation
RMZ	Residual Management Zone
SCOs	Soil Cleanup Objectives
SCG	Standards, Criteria and Guidance
SMP	Site Management Plan
SPDES	State Pollutant Discharge Elimination System
SSDS	Sub-Slab Depressurization System
SVOC	Semi-Volatile Organic Compound
TAL	Target Analyte List
TCL	Target Compound List
USGS	United States Geological Survey
UST	Underground Storage Tank
VCA	Voluntary Cleanup Agreement
VOC	Volatile Organic Compound

CERTIFICATION

I, Michelle Lapin, am currently a registered professional engineer licensed by the State of New York. I performed professional engineering services and had primary direct responsibility for designing the remedial program for the 146-148 and 150 Wooster Street site, site number 16CVCP160M. I certify to the following:

- I have reviewed this document and the Stipulation List, to which my signature and seal are affixed.
- Engineering Controls developed for this remedial action were designed by me or a person under my direct supervision and designed to achieve the goals established in this Remedial Action Work Plan for this site.
- The Engineering Controls to be constructed during this remedial action are accurately reflected in the text and drawings of the Remedial Action Work Plan and are of sufficient detail to enable proper construction.
- This Remedial Action Work Plan (RAWP) has a plan for handling, transport and disposal of soil, fill, fluids and other materials removed from the property in accordance with applicable City, State and Federal laws and regulations. Importation of all soil, fill and other material from off-site will be in accordance with all applicable City, State and Federal laws and requirements. This RAWP has provisions to control nuisances during the remediation and all invasive work, including dust and odor suppression.

Michelle Lapin
Name

073934-1
PE License Number



Signature

3/30/2016
Date



I, Marcus Simons, am a qualified Environmental Professional. I will have primary direct responsibility for implementation of the remedial program for the 146-148 and 150 Wooster Street site, site number 16CVCP160M. I certify to the following:

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

Marcus Simons
QEP Name



QEP Signature

3/30/2016
Date

EXECUTIVE SUMMARY

150 Wooster LLC is working with the NYC Office of Environmental Remediation (OER) in the New York City Voluntary Cleanup Program to investigate and remediate a 7,184-square foot site located at 146-148 and 150 Wooster Street in Manhattan, New York (also identified as Tax Block 514, Lots 7 and 9). A Remedial Investigation (RI) was performed to compile and evaluate data and information necessary to develop this Remedial Action Work Plan (RAWP). The remedial actions described in this document provide for the protection of public health and the environment consistent with the intended property use, comply with applicable environmental standards, criteria and guidance and conform to applicable laws and regulations.

Site Location and Background

The Site is identified as Tax Block 514, Lots 7 and 9 and is located on the east side of Wooster Street, between West Houston and Prince Streets, in the SoHo neighborhood of Manhattan, New York. It is also located in the SoHo-Cast Iron Historic District (the "Historic District") in Manhattan Community District 2. The Site measures approximately 71 feet by 100 feet and comprises approximately 7,184 square feet. A map of the Site is shown on Figure 2. It currently consists of an asphalt-paved surface parking lot at 146-148 Wooster Street and a one-story (plus partial basement) brick and concrete building at 150 Wooster Street. The partial basement is beneath the front (western) portion of the building.

The Site is approximately 25 feet above mean sea level. Past subsurface investigations (environmental and geotechnical) encountered urban fill (sand, gravel and bricks) to depths of approximately 11 to 26.5 feet below grade, with a layer of clay with sand or silt extending to approximately 19 to 23 feet below grade, and sand with some silt below the clay layer. Bedrock was encountered during a past geotechnical investigation at 76 feet below grade. Based on USGS maps, bedrock is expected to be first encountered at approximately 65 feet below grade.

Past borings at 146-148 Wooster Street first encountered groundwater at approximately 24 to 30 feet below grade and at approximately 25 feet below grade in the (current and former) on-site monitoring wells. Groundwater monitoring for an off-site spill (former Mobil filling station, Spill #8803871) indicated that groundwater flow in the vicinity of the Site has varied from a southeasterly direction to a westerly direction, with flow in a south-southwesterly or west-southwesterly direction during the most recent monitoring events. Groundwater flow may be affected by factors including past filling activities, underground utilities (especially reconstruction beneath Houston Street), other subsurface openings or obstructions such as basements, underground parking garages, subway tunnels (the B/D/F/V tunnels are approximately 200 feet to the north and the N/Q/R/W tunnels are approximately 600 feet to the east), and other factors. Groundwater in Manhattan is not used as a source of potable water.

Summary of Redevelopment Plan

The proposed redevelopment plan consists of the demolition of the existing building at 150 Wooster Street, followed by the construction of an eight-story residential building with retail on the cellar and ground floor in an M1-5A district. The internal gross area (as reported to the Department of Buildings) is 35,859 square feet. The proposed project would entail Site-wide excavation to a depth of approximately 12.5 to 15.5 feet below grade. Based on the observed depth to groundwater, dewatering is not expected to be required. The proposed development plans are included in Appendix 1.

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

Summary of Surrounding Property

- The Site's block is bordered by Greene Street to the east, Prince Street to the south, Wooster Street to the west and West Houston Street to the north. The surrounding area is occupied by multistory residential, commercial, institutional, and office buildings, most with ground-floor retail, and low-rise commercial buildings. Figure 3 shows the general surrounding land usage.

Historically, the area surrounding the Site was predominantly commercial and manufacturing, with auto-related uses by 1951 and more residential uses appearing by 1987. Historical off-site properties with the potential to affect subsurface conditions on-site included a south-adjacent packing box and hat factory, garages with buried gasoline tanks and auto repair on the Site's block and the block to the east, and a filling station (with a known spill) north of the Site on the Site's block. Regulatory databases identified open and closed petroleum spills and petroleum storage tanks in the vicinity of the Site with confirmed impact to on-site subsurface conditions.

Summary of Past Site Uses and Areas of Concern

- Prior to its current uses, the Site was occupied by four to five-story commercial, residential, and light manufacturing buildings with basements. The present building at 150 Wooster Street was built prior to 1940, and historically included a garage with a buried gasoline tank, a fuel oil tank reportedly removed during the excavation of the partial basement in 1989, a club, a restaurant and a condominium showroom. The present parking lot included a service station with parking by approximately 1959, but had been removed by 1979.

A March 2010 *Phase I Environmental Site Assessment* (ESA) found no information regarding whether any gasoline tanks remained beneath the Site. A geophysical investigation in the mid-2000s, conducted as part of the investigation of off-site Spill #8803871, indicated no evidence of buried tanks beneath the parking lot; however, the investigation was limited due to the presence of cars and hydraulic lifts. Spill #8803871 occurred at a former Mobil filling station approximately 145 feet northeast of the Site at 37 West Houston Street. Remedial activities included contaminated soil excavation in 2003 and chemical oxidation compound injections in 2006 to 2009. As part of the spill investigation, groundwater monitoring wells (GMW-16 and GMW-17) were installed on the Site at 146-148 Wooster Street in 2004 and 2005. Soil samples collected near the groundwater interface during their installation exhibited elevated photoionization detector (PID) readings, which suggested volatile organic compounds (VOCs), but laboratory analysis identified only trace concentrations of VOCs in the soil samples.

Subsequent groundwater monitoring indicated gasoline-related VOCs at levels exceeding New York State Department of Environmental Conservation (NYSDEC) Class GA Ambient Water Quality Standards (AWQS) (drinking water standards) in groundwater beneath the Site and in monitoring wells at 37 West Houston Street and 152 Wooster Street (north-adjacent to the Site). Based on the groundwater flow direction delineated during the Spill #8803871 investigation, the VOCs appeared to be migrating onto the Site from the former Mobil filling station. No free-phase product was noted in the on-site wells.

These groundwater monitoring results indicated that methyl tert-butyl ether (MTBE) was detected at the former Mobil filling station location and in both on-site monitoring wells (GMW-16 and GMW-17). Since the historical service station at the Site was closed prior to the widespread use of MTBE as a gasoline additive, and no MTBE has been found in on-site soil samples, it is reasonable to assume that the detection of MTBE in on-site monitoring wells indicates that off-site Spill #8803871 has, at a minimum, contributed to groundwater contamination beneath the Site.

The Phase I ESA additionally identified the following:

- A stroller maintenance room in the on-site building contained maintenance chemicals (enamels, paints, etc.) in containers less than a gallon in size. The chemicals were reported to be neatly stored and labeled, and no staining or odors were noted in the storage area.
- A slight petroleum sheen was noted on rainwater in the parking lot, likely due to minor leaks from parked cars. The parking lot pavement was generally in good condition, and no storm drains were noted. The minor leaks were reported to be unlikely to affect subsurface conditions beneath the Site.
- Hydraulic car lifts were observed on the parking lot. The report noted that if the car lifts were installed prior to 1979, the associated aboveground hydraulic tanks may have utilized polychlorinated biphenyl (PCB)-containing hydraulic fluid.

Summary of Work and Findings of the Remedial Investigation

An RI was performed and the results are documented in companion documents *Subsurface (Phase II) Investigation Report, Delineation Report, and Supplemental Remedial Investigation*. In addition, investigations related to off-site Spill #8803871 were performed at the Site. The following provide summaries of these:

Former Mobil Service Station No. 17 – KHB, 37 West Houston Street, New York, New York, Site Status Update Reports, Kleinfelder East Inc., 2010-2011, Spill #8803871

Quarterly groundwater monitoring reports for the Spill #8803871 investigation were reviewed following the completion of AKRF's March 2010 Phase I ESA and indicated that the Site wells had been most recently sampled in September 2011. At that time, on-site monitoring well GMW-16 contained concentrations of gasoline-related VOCs [benzene, toluene, ethylbenzene and xylene (collectively BTEX) and MTBE, a historical gasoline additive], at concentrations exceeding Class GA standards and/or guidance values. No BTEX had been detected in on-site well GMW-17 since December 2009. The MTBE concentration in GMW-17 had generally exceeded the Class GA guidance value (10 micrograms per liter or $\mu\text{g/L}$) during previous sampling events, and MTBE was detected at 10 $\mu\text{g/L}$ in September 2011. Concentrations of BTEX and MTBE in off-site monitoring wells to the north and northeast remained elevated.

Overall, BTEX and MTBE concentrations in both Site wells fluctuated over the years, but generally decreased with time, possibly due to remedial activities at the former filling station and/or natural attenuation. No free-phase gasoline was noted in the Site wells during any monitoring events. The quarterly reports noted that, although a general downward trend in groundwater contaminants at the former Mobil filling station and in the vicinity was noted following remedial activities, elevated contaminant concentrations persisted due to residual soil contamination at the Mobil filling station, and feasibility studies for further remediation (groundwater and vapor recovery) were in progress.

146-148 and 150 Wooster Street, New York, New York - Subsurface (Phase II) Investigation, AKRF, February 2012

A subsurface investigation conducted at the Site was intended to determine whether current or former on- or off-site activities had adversely affected subsurface conditions and included: a geophysical investigation to search for potential buried tanks; the advancement of four borings with the collection and laboratory analysis of eight soil samples; and the collection of two groundwater samples from the existing monitoring wells (GMW-16 and GMW-17). This scope was based on the findings of the Phase I ESA.

During the advancement of boring SB-4 (in the southwestern corner of the Site), evidence of potential contamination [petroleum-like odors and elevated photoionization detector (PID) readings] was encountered at depths from approximately 17 to 27 feet below grade, i.e., starting approximately 9 feet above the water table. As a result, a petroleum release was reported to NYSDEC and was assigned Spill

#1110393. Consistent with the field observations, the laboratory analyses identified evidence of petroleum contamination only in soil sample SB-4 (20'), collected at the interval with the highest PID readings. This sample contained VOCs typically associated with gasoline, with seven VOCs exceeding their NYSDEC Part 375 Soil Cleanup Objectives for Unrestricted Use (USCOs), and two VOCs (1,2,4-trimethylbenzene and p/m-xylene) also exceeding Restricted Residential Use Soil Cleanup Objectives (RRSCOs). Notably, MTBE was not detected in this sample.

Gasoline-related VOCs were detected in the groundwater samples collected from the two existing wells, with ten VOCs in GMW-16 and MTBE in GMW-17 exceeding NYSDEC Class GA Ambient Water Quality Standards (AWQS) or guidance values. The semi-volatile organic compounds (SVOCs) and metals detected in the soil samples appeared to be typical of New York City urban fill materials and did not appear to be related to petroleum contamination. No SVOCs were detected in the groundwater samples at concentrations exceeding Class GA standards.

The geophysical survey identified no suspect buried tanks at the Site; however, the survey identified a buried reinforced concrete pad, approximately 10 feet by 15 feet in size at approximately one foot below grade, in the vicinity of boring SB-4. It was surmised that this pad may have been associated with former buried tanks.

146-148 and 150 Wooster Street, New York, New York - Delineation Report, AKRF, April 2012

A second subsurface investigation was performed to delineate the Spill #1110393. Five borings were advanced in the vicinity of SB-4 and the concrete pad with the collection of ten soil samples. All five borings encountered evidence of petroleum contamination above the groundwater table, but no floating product was observed. Since petroleum contamination was identified, groundwater samples were collected from temporary wells installed in each boring.

Seven of the ten soil samples detected VOCs at concentrations above USCOs and certain VOCs (1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, ethylbenzene, p/m-xylene) also exceeded RRSCOs. SVOCs were detected in the soil samples at generally low levels (below both USCOs and RRSCOs) that appeared to be related to urban fill materials rather than petroleum contamination. Two soil samples contained naphthalene at concentrations exceeding its USCO, but well below its RRSCO, which may be attributable to the petroleum contamination and/or fill materials.

Groundwater samples from four of the five temporary wells contained concentrations of VOCs (including naphthalene) typically associated with gasoline at concentrations exceeding Class GA standards. MTBE was not detected in the groundwater samples; however, the MTBE detection limits were elevated above the concentration of MTBE detected in well GMW-17 in November 2011 (12 or $\mu\text{g/L}$). Therefore, it is possible that MTBE might have been present in the groundwater samples at comparable concentrations to those in GMW-17. One groundwater sample contained SVOC and metal concentrations commonly associated with urban fill materials, exceeding their Class GA standards, likely due to soil particles entrained in the sample.

146-148 and 150 Wooster Street, New York, New York – Supplemental Remedial Investigation Report, AKRF, February 2016

This subsurface investigation was in response to prior Subsurface Investigation findings, per an NYCOER email dated October 8, 2015, and the proposed redevelopment project at the Site. It included soil, groundwater, and soil vapor investigation. No evidence of contamination (odors, staining or elevated PID readings) was noted in any of the three soil borings. However, soil cuttings generated during the installation of monitoring well MW-1 exhibited evidence of petroleum contamination at approximately 20 to 30 feet below grade, i.e., starting 5 feet above the water table. Though not specified in the Supplemental Remedial Investigation Workplan, an additional sample was collected for VOC and SVOC analysis.

In one of the seven soil samples [MW-1 (20-30)], VOCs typically associated with gasoline exceeded their respective USCOs. The remaining soil samples did not detect VOCs in excess of USCOs or RRSCOs. The gasoline additive MTBE was not detected in any of the soil samples. SVOCs exceeded USCOs and/or RRSCOs in two of the seven soil samples and certain metals exceeded USCOs and/or RRSCOs in four of the six soil samples. The SVOCs and metals were likely attributable to urban fill materials, which often contain highly variable concentrations, rather than a Site release.

Six VOCs typically associated with gasoline exceeded Class GA standards in one of the two groundwater samples (MW-1). MTBE was not detected in these samples.

No VOCs exceeded New York State Department of Health (NYSDOH) Air Guideline Values (AGVs) in the three soil vapor samples. However, there are no AGVs for gasoline-related compounds and several VOCs exceeded the typical indoor air background levels presented in Appendix C of NYSDOH's Vapor Intrusion Guidance document.

For more detailed results, consult the *Subsurface (Phase II) Investigation Report, Delineation Report, and Supplemental Remedial Investigation*. Based on an evaluation of the data and information from the RI, disposal of hazardous waste is not anticipated at this Site (petroleum is not a hazardous waste). Soil disposal characterization testing will be performed prior to redevelopment activities.

Summary of the Remedial Action

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

The proposed remedial action will consist of:

1. Preparation of a Community Protection Statement and performance of all required NYC VCP Citizen Participation activities according to an approved Citizen Participation Plan.
2. Performance of a CAMP for particulates and volatile organic compounds.
3. Establishment of Site-Specific (Track 4) Soil Cleanup Objectives (SCOs).
4. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas.
5. Completion of a Waste Characterization Study prior to excavation activities. Waste characterization soil samples will be collected at a frequency dictated by disposal facility(s).
6. Excavation and removal of soil/fill will be performed Site-wide to a depth of approximately 12.5 to 15.5 feet below grade for development purposes. In the center of the Site, a small portion will be excavated to the depth of 17.5 to 18.5 feet below grade for an elevator pit. Approximately 4,500 tons of soil/fill will be removed from the Site and properly disposed of at an appropriately licensed or permitted facility.
7. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor and monitoring with a PID. Appropriate segregation of excavated media on-site.
8. Management of excavated materials including temporarily stockpiling and segregating in accordance with defined material types and to prevent co-mingling of contaminated material and non-contaminated materials.

9. Removal of any underground storage tanks (USTs) that are encountered during excavation. Registration of any tanks and reporting of any petroleum spills and appropriate closure of these petroleum spills in compliance with applicable local, State and Federal laws and regulations.
10. Request for closure of on-site petroleum spill number #1110393 under the authority of NYSDEC in accordance with CP-51 Soil Cleanup Objectives. This RAWP does not contemplate remedial action for the petroleum spill beyond the excavation and removal of any tanks described above, as natural attenuation is indicated by the groundwater data and the remaining contamination does not appear to be causing adverse impacts. If these assumptions are not borne out during the excavation for the foundation, a separate spill RAWP addendum may need to be prepared and submitted to NYSDEC addressing additional measures for the spill. Otherwise, Spill #1110393 is anticipated to be closed following completion of Site excavation.
11. Transportation and off-site disposal of all soil/fill material at licensed or permitted facilities in accordance with applicable laws and regulations for handling, transport, and disposal, and this plan. Sampling and analysis of excavated media as required by disposal facilities. Appropriate segregation of excavated media on-site.
12. Collection and analysis of end-point samples to determine the performance of the remedy with respect to attainment of SCOs.
13. Import of materials to be used for backfill and cover in compliance with this plan and in accordance with applicable laws and regulations. Any imported material will meet RRSCOs.
14. Construction of an engineered composite cover consisting of a minimum of a six-inch thick concrete building slab, with six-inch thick clean gravel layer beneath all building areas, which will cover the entire Site, with the exception of a portion requiring a 48-inch thick concrete slab, which will not have a gravel layer beneath it.
15. Installation of a vapor barrier system consisting of vapor barrier beneath the building slab and along the sub-grade foundation sidewalls adjacent to soil to mitigate soil vapor migration into the building. The vapor barrier system will consist of a 20-mil Stego[®] Vapor Barrier (or OER approved equal) below the slab throughout the full building area and Aquafin[®] 2k, (or OER approved equal) applied on the interior of all sub-grade foundation sidewalls adjacent to soil. As construction plans progress, 20-mil Stego[®] Vapor Barrier may be used on the outside of the foundation sidewalls instead of Aquafin[®]-2k. All welds, seams and penetrations will be properly sealed to prevent preferential pathways for vapor migration. The vapor barrier system is an Engineering Control for the remedial action. The remedial engineer will certify in the Remedial Action Report (RAR) that the vapor barrier system was designed and properly installed to mitigate soil vapor migration into the building.

Installation of an active sub-slab depressurization system (SSDS) consisting of a network of horizontal pipe set in the middle of a gas permeable layer immediately beneath the building slab and vapor barrier system. The horizontal piping will consist of fabric wrapped, perforated schedule 40 4-inch PVC pipe connected to a 4-inch steel riser pipe that penetrates the slab and travels through the building to the roof. The gas permeable layer will consist of a 6-inch thick layer of 2-inch stone. The pipe will be finished above the roof line with a 4-inch steel galvanized wind driven turbine ventilator to prevent rain infiltration. The active SSDS will be hardwired and will include a blower installed on the roof line and a pressure gauge and alarm located in an accessible area in the basement. The active SSDS is an Engineering Control for the remedial action. The remedial engineer will certify in the RAR that the active SSDS was designed and properly installed to establish a vacuum in the gas permeable layer and a negative (decreasing outward) pressure gradient beneath the building slab to prevent vapor migration into the building. A soil vapor intrusion investigation, consisting of sub-slab soil vapor, indoor air, and ambient air samples will be performed during the

heating season after the new building is constructed. This will determine whether the SSDS can be modified from active to passive.

16. Performance of all activities required for the remedial action, including acquisition of required permits and attainment of pretreatment requirements, in compliance with applicable laws and regulations.
17. Implementation of stormwater pollution prevention measures in compliance with applicable laws and regulations.
18. Submission of a Remedial Action Report (RAR) that describes the remedial activities, certifies that the remedial requirements have been achieved, defines the Site boundaries, lists any changes from this RAWP, and describes all Engineering and Institutional Controls to be implemented at the Site.
19. Submission of an approved SMP in the RAR for long-term management of residual contamination, including plans for operation, maintenance, monitoring, inspection and certification of Engineering and Institutional Controls and reporting at a specified frequency.
20. The property will continue to be registered with an E-Designation at the NYC Buildings Department. Establishment of Engineering Controls and Institutional Controls in this RAWP and a requirement that management of these controls must be in compliance with an approved SMP. Institutional Controls will include prohibition of the following: (1) vegetable gardening and farming; (2) use of groundwater without treatment rendering it safe for the intended use; (3) disturbance of residual contaminated material unless it is conducted in accordance with the SMP; and (4) higher level of land usage without OER approval.

COMMUNITY PROTECTION STATEMENT

The NYC Office of Environmental Remediation (OER) provides governmental oversight for the cleanup of contaminated property in NYC. This Remedial Action Work Plan (“cleanup plan”) describes the findings of prior environmental studies, shows the location of identified contamination at the Site, and describes the plans to clean up the Site to protect public health and the environment.

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

Project Information:

- Site Name: 146-148 and 150 Wooster Street
- Site Address: 146-148 and 150 Wooster Street, Manhattan, New York
- NYC Voluntary Cleanup Program Project Number: 16CVCP060M

Project Contacts:

- OER Project Manager: Katherine Glass, 212-788-8841
- Site Project Manager: Marcus Simons, 646-388-9527
- Site Assistant Project Manager: Kenneth Wiles, 646-388-9528
- Site Safety Officer: Marco Balletta, 646-388-9514
- Online Document Repository: <http://www.nyc.gov/html/oer/html/document-repository/document-repository.shtml>

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

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

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

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

Site Safety Coordinator: This project has a designated Site safety coordinator to implement the CHASP. The safety coordinator maintains an emergency contact sheet and protocol for management of emergencies. The Site safety coordinator is identified at the beginning of this Community Protection Statement.

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

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

Odor, Dust and Noise Control: This cleanup plan includes actions for odor and dust control. These actions are designed to prevent off-site odor and dust nuisances and include steps to be taken if nuisances are detected. Generally, dust is managed by application of physical covers and by water sprays. Odors are controlled by limiting the area of open excavations, physical covers, spray foams and by a series of other actions (called operational measures). The project is also required to comply with applicable NYC noise control standards. If you observe problems in these areas, please contact the on-site Project Manager or NYC Office of Environmental Remediation Project Manager listed on the first page of this Community Protection Statement document.

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

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

Hours of Operation: The hours for operation of cleanup will comply with the NYC Department of Buildings construction code requirements or according to specific variances issued by that agency. For this cleanup project, the hours of operation will conform to requirements of the NYC Department of Buildings.

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

Complaint Management: The contractor performing this cleanup is required to address all complaints. If you have any complaints, you can call the facility Project Manager or the NYC Office of Environmental Remediation Project Manager listed on the first page of this Community Protection Statement document, or call 311 and mention the Site is in the NYC Voluntary Cleanup Program.

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

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

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

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

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

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

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

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

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

Final Report: The results of all cleanup work will be fully documented in a final report (called the Remedial Action Report) that will be available for public review online. A link to the online document repository and the public library with Internet access nearest the Site are listed on the first page of this Community Protection Statement document

Long-Term Site Management: If long-term protection is needed after the cleanup is complete, the property owner will be required to comply with an ongoing Site Management Plan that calls for continued inspection of protective controls, such as Site covers. The Site Management Plan is evaluated and approved by the NYC Office of Environmental Remediation. Requirements that the property owner must comply with are defined either in the property's deed or established through a city environmental designation registered with the Department of Buildings. A certification of continued protectiveness of the cleanup will be required from time to time to show that the approved cleanup is still effective.

REMEDIAL ACTION WORK PLAN

1.0 PROJECT BACKGROUND

150 Wooster LLC is working with the NYC Office of Environmental Remediation (OER) in the New York City Voluntary Cleanup Program and/or in the “E” Designation Program to investigate and remediate a property located at 146-148 and 150 Wooster Street, Manhattan, New York (the “Site”). Figure 1 shows the Site location. A Remedial Investigation (RI) was performed to compile and evaluate data and information necessary to develop this Remedial Action Work Plan (RAWP) in a manner that will render the Site protective of public health and the environment consistent with the contemplated end use. This RAWP establishes remedial action objectives, provides a remedial alternatives analysis that includes consideration of a permanent cleanup, and provides a description of the selected remedial action. The remedial action described in this document provides for the protection of public health and the environment, and complies with applicable environmental standards, criteria and guidance and applicable laws and regulations.

1.1 Site Location and Background

The Site is identified as Tax Block 514, Lots 7 and 9 and is located on the east side of Wooster Street, between West Houston and Prince Streets, in the SoHo neighborhood of Manhattan, New York. It is also located in the SoHo-Cast Iron Historic District (the “Historic District”) in Manhattan Community District 2. The Site measures approximately 71 feet by 100 feet and comprises approximately 7,184 square feet. A map of the Site is shown on Figure 2. It currently consists of an asphalt-paved surface parking lot at 146-148 Wooster Street and a one-story (plus partial basement) brick and concrete building at 150 Wooster Street. The partial basement is beneath the front (western) portion of the building.

The Site is approximately 25 feet above mean sea level. Past subsurface investigations (environmental and geotechnical) encountered urban fill (sand, gravel and bricks) to depths of approximately 11 to 26.5 feet below grade, with a layer of clay with sand or silt extending to approximately 19 to 23 feet below grade, and sand with some silt below the clay layer. Bedrock was encountered during a past geotechnical investigation at 76 feet below grade. Based on USGS maps, bedrock is expected to be first encountered at approximately 65 feet below grade.

Past borings at 146-148 Wooster Street first encountered groundwater at approximately 24 to 30 feet below grade and at approximately 25 feet below grade in the (current and former) on-site monitoring wells. Groundwater monitoring for an off-site spill (former Mobil filling station, Spill #8803871) indicated that groundwater flow in the vicinity of the Site has varied from a southeasterly direction to a westerly direction, with flow in a south-southwesterly or west-southwesterly direction during the most recent monitoring events. Groundwater flow may be affected by factors including past filling activities, underground utilities (especially reconstruction beneath Houston Street), other subsurface openings or obstructions such as basements, underground parking garages, subway tunnels (the B/D/F/V tunnels are approximately 200 feet to the north and the N/Q/R/W tunnels are approximately 600 feet to the east), and other factors. Groundwater in Manhattan is not used as a source of potable water.

1.2 Redevelopment Plan

The proposed redevelopment plan consists of the demolition of the existing building at 150 Wooster Street, followed by the construction of an eight-story residential building with retail on the cellar and ground floor in an M1-5A district. The internal gross area (as reported to the Department of Buildings) is 35,859 square feet. The proposed project would entail site-wide excavation to a depth of approximately 12.5 to 15.5 feet below grade. Based on the observed

depth to groundwater, dewatering is not expected to be required. The proposed development plans are included in Appendix 1.

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

1.3 Description of Surrounding Property

The Site's block is bordered by Greene Street to the east, Prince Street to the south, Wooster Street to the west and West Houston Street to the north. The surrounding area is occupied by multistory residential, commercial, institutional, and office buildings, most with ground-floor retail, and low-rise commercial buildings. Figure 3 shows the general surrounding land usage.

Historically, the area surrounding the Site was predominantly commercial and manufacturing, with auto-related uses by 1951, and more residential uses appearing by 1987. Historical off-site properties with the potential to affect subsurface conditions on-site included a south-adjacent packing box and hat factory, garages with buried gasoline tanks and auto repair on the Site's block and the block to the east, and a filling station (with a known spill) north of the Site on the Site's block. Regulatory databases identified open and closed petroleum spills and petroleum storage tanks in the vicinity of the Site with confirmed impact to on-site subsurface conditions.

1.4 Summary of Past Site Uses and Areas of Concern

Prior to its current uses, the Site was occupied by four to five-story commercial, residential, and light manufacturing buildings with basements. The present building at 150 Wooster Street was built prior to 1940, and historically included a garage with a buried gasoline tank, a fuel oil tank reportedly removed during the excavation of the partial basement in 1989, a club, a restaurant and a condominium showroom. The present parking lot included a service station with parking by approximately 1959, but had been removed by 1979.

A March 2010 *Phase I Environmental Site Assessment* (ESA) found no information regarding whether any gasoline tanks remained beneath the Site. A geophysical investigation in the mid-2000s, conducted as part of the investigation of off-site Spill #8803871, indicated no evidence of buried tanks beneath the parking lot; however, the investigation was limited due to the presence of cars and hydraulic lifts. Spill #8803871 occurred at a former Mobil filling station approximately 145 feet northeast of the Site at 37 West Houston Street. Remedial activities included contaminated soil excavation in 2003 and chemical oxidation compound injections in 2006 to 2009. As part of the spill investigation, groundwater monitoring wells (GMW-16 and GMW-17) were installed on the Site at 146-148 Wooster Street in 2004 and 2005. Soil samples collected near the groundwater interface during their installation exhibited elevated photoionization detector (PID) readings, which suggested volatile organic compounds (VOCs), but laboratory analysis identified only trace concentrations of VOCs in the soil samples.

Subsequent groundwater monitoring indicated gasoline-related VOCs at levels exceeding New York State Department of Environmental Conservation (NYSDEC) Class GA Ambient Water Quality Standards (AWQS) (drinking water standards) in groundwater beneath the Site and in monitoring wells at 37 West Houston Street and 152 Wooster Street (north-adjacent to the Site). Based on the groundwater flow direction delineated during the Spill #8803871 investigation, the VOCs appeared to be migrating onto the Site from the former Mobil filling station. No free-phase product was noted in the on-site wells.

These groundwater monitoring results indicated that methyl tert-butyl ether (MTBE) was detected at the former Mobil filling station location and in both on-site monitoring wells (GMW-16 and GMW-17). Since the historical service station at the Site was closed prior to the widespread use of MTBE as a gasoline additive, and no MTBE has been found in on-site soil samples, it is

reasonable to assume that the detection of MTBE in on-site monitoring wells indicates that off-site Spill #8803871 has, at a minimum, contributed to groundwater contamination beneath the Site.

The Phase I ESA additionally identified the following:

- A stroller maintenance room in the on-site building contained maintenance chemicals (enamels, paints, etc.) in containers less than a gallon in size. The chemicals were reported to be neatly stored and labeled, and no staining or odors were noted in the storage area.
- A slight petroleum sheen was noted on rainwater in the parking lot, likely due to minor leaks from parked cars. The parking lot pavement was generally in good condition, and no storm drains were noted. The minor leaks were reported to be unlikely to affect subsurface conditions beneath the Site.
- Hydraulic car lifts were observed on the parking lot. The report noted that if the car lifts were installed prior to 1979, the associated aboveground hydraulic tanks may have utilized polychlorinated biphenyl (PCB)-containing hydraulic fluid.

1.5 Summary of Work and Findings Performed under the Remedial Investigation

An RI was performed and the results are documented in companion documents *Subsurface (Phase II) Investigation Report, Delineation Report, and Supplemental Remedial Investigation*. In addition, investigations related to off-site Spill #8803871 were performed at the Site. The following provide summaries of these:

Former Mobil Service Station No. 17 – KHB, 37 West Houston Street, New York, New York, Site Status Update Reports, Kleinfelder East Inc., 2010-2011, Spill #8803871

Quarterly groundwater monitoring reports for the Spill #8803871 investigation were reviewed following the completion of AKRF's March 2010 Phase I ESA and indicated that the Site wells had been most recently sampled in September 2011. At that time, on-site monitoring well GMW-16 contained concentrations of gasoline-related VOCs [benzene, toluene, ethylbenzene and xylene (collectively BTEX) and MTBE, a historical gasoline additive], at concentrations exceeding Class GA standards and/or guidance values. No BTEX had been detected in on-site well GMW-17 since December 2009. The MTBE concentration in GMW-17 had generally exceeded the Class GA guidance value (10 micrograms per liter or $\mu\text{g/L}$) during previous sampling events, and MTBE was detected at 10 $\mu\text{g/L}$ in September 2011. Concentrations of BTEX and MTBE in off-site monitoring wells to the north and northeast remained elevated.

Overall, BTEX and MTBE concentrations in both Site wells fluctuated over the years, but generally decreased with time, possibly due to remedial activities at the former filling station and/or natural attenuation. No free-phase gasoline was noted in the Site wells during any monitoring events. The quarterly reports noted that, although a general downward trend in groundwater contaminants at the former Mobil filling station and in the vicinity was noted following remedial activities, elevated contaminant concentrations persisted due to residual soil contamination at the Mobil filling station, and feasibility studies for further remediation (groundwater and vapor recovery) were in progress.

146-148 and 150 Wooster Street, New York, New York - Subsurface (Phase II) Investigation, AKRF, February 2012

A subsurface investigation conducted at the Site was intended to determine whether current or former on- or off-site activities had adversely affected subsurface conditions and included: a geophysical investigation to search for potential buried tanks; the advancement of four borings with the collection and laboratory analysis of eight soil samples; and the collection of two

groundwater samples from the existing monitoring wells (GMW-16 and GMW-17). This scope was based on the findings of the Phase I ESA.

During the advancement of boring SB-4 (in the southwestern corner of the Site), evidence of potential contamination [petroleum-like odors and elevated photoionization detector (PID) readings] was encountered at depths from approximately 17 to 27 feet below grade, i.e., starting approximately 9 feet above the water table. As a result, a petroleum release was reported to NYSDEC and was assigned Spill #1110393. Consistent with the field observations, the laboratory analyses identified evidence of petroleum contamination only in soil sample SB-4 (20'), collected at the interval with the highest PID readings. This sample contained VOCs typically associated with gasoline, with seven VOCs exceeding their NYSDEC Part 375 Soil Cleanup Objectives for Unrestricted Use (USCOs), and two VOCs (1,2,4-trimethylbenzene and p/m-xylene) also exceeding Restricted Residential Use Soil Cleanup Objectives (RRSCOs). Notably, MTBE was not detected in this sample.

Gasoline-related VOCs were detected in the groundwater samples collected from the two existing wells, with ten VOCs in GMW-16 and MTBE in GMW-17 exceeding NYSDEC Class GA Ambient Water Quality Standards (AWQS) or guidance values. The semi-volatile organic compounds (SVOCs) and metals detected in the soil samples appeared to be typical of New York City urban fill materials and did not appear to be related to petroleum contamination. No SVOCs were detected in the groundwater samples at concentrations exceeding Class GA standards.

The geophysical survey identified no suspect buried tanks at the Site; however, the survey identified a buried reinforced concrete pad, approximately 10 feet by 15 feet in size at approximately one foot below grade, in the vicinity of boring SB-4. It was surmised that this pad may have been associated with former buried tanks.

146-148 and 150 Wooster Street, New York, New York - Delineation Report, AKRF, April 2012

A second subsurface investigation was performed to delineate the Spill #1110393. Five borings were advanced in the vicinity of SB-4 and the concrete pad with the collection of ten soil samples. All five borings encountered evidence of petroleum contamination above the groundwater table, but no floating product was observed. Since petroleum contamination was identified, groundwater samples were collected from temporary wells installed in each boring.

Seven of the ten soil samples detected VOCs at concentrations above USCOs and certain VOCs (1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, ethylbenzene, p/m-xylene) also exceeded RRSCOs. SVOCs were detected in the soil samples at generally low levels (below both USCOs and RRSCOs) that appeared to be related to urban fill materials rather than petroleum contamination. Two soil samples contained naphthalene at concentrations exceeding its USCO, but well below its RRSCO, which may be attributable to the petroleum contamination and/or fill materials.

Groundwater samples from four of the five temporary wells contained concentrations of VOCs (including naphthalene) typically associated with gasoline at concentrations exceeding Class GA standards. MTBE was not detected in the groundwater samples; however, the MTBE detection limits were elevated above the concentration of MTBE detected in well GMW-17 in November 2011 (12 or $\mu\text{g/L}$). Therefore, it is possible that MTBE might have been present in the groundwater samples at comparable concentrations to those in GMW-17. One groundwater sample contained SVOC and metal concentrations commonly associated with urban fill materials, exceeding their Class GA standards, likely due to soil particles entrained in the sample.

146-148 and 150 Wooster Street, New York, New York – Supplemental Remedial Investigation Report, AKRF, February 2016

This subsurface investigation was in response to prior Subsurface Investigation findings, per an NYCOER email dated October 8, 2015, and the proposed redevelopment project at the Site. It included soil, groundwater, and soil vapor investigation. No evidence of contamination (odors, staining or elevated PID readings) was noted in any of the three soil borings. However, soil cuttings generated during the installation of monitoring well MW-1 exhibited evidence of petroleum contamination at approximately 20 to 30 feet below grade, i.e., starting 5 feet above the water table. Though not specified in the Supplemental Remedial Investigation Workplan, an additional sample was collected for VOC and SVOC analysis.

Soil/fill samples collected during the RI were compared to NYSDEC Part 375-6 Unrestricted Use (Track 1) and Restricted Residential Use (Track 2) Soil Cleanup Objectives (SCOs) and CP-51. VOCs typically associated with gasoline were detected in one of the seven soil samples [MW-1 (20-30)] at elevated levels and included benzene (at 170 µg/kg), ethylbenzene (at 28,000 µg/kg), total xylene (at 126,000 µg/kg), and toluene (at 9100 µg/kg) for a total of 170,770 µg/kg. The remaining soil samples did not detect VOCs in excess of USCOs or RRSCOs. The gasoline additive MTBE was not detected in any of the soil samples. SVOCs, specifically PAHs, exceeding their respective Track 2 Restricted Residential SCOs were detected in one soil sample SB-10 (13-15') and included benzo(a)anthracene (max. 18 mg/Kg), benzo(a)pyrene (max. 17 mg/Kg), benzo(b)fluoranthene (max. 22 mg/Kg), benzo(k)fluoranthene (max. 7.6 mg/Kg), chrysene (max. 21 mg/Kg), dibenzo(a,h)anthracene (max. 3.7 mg/Kg) and indeno(1,2,3-cd)pyrene (max. 13 mg/Kg). One metal, arsenic (at 38.2 ppm) exceeded Restricted Residential Use SCOs. Several other metals were detected at concentrations exceeding Unrestricted Use SCOs. The SVOCs and metals were likely attributable to urban fill materials.

Groundwater samples collected during the RI reported six (6) VOCs elevated above their respective New York State 6 NYCRR Part 703.5 Groundwater Quality Standards (GQS) in monitoring well MW-1. VOCs reported in MW-1 include, benzene (50 µg/L), ethylbenzene (1400 µg/L), isopropylbenzene (61 µg/L), total xylenes (2550 µg/L) and toluene (45 µg/L). MTBE was not detected in these samples.

Soil vapor samples collected during the RI were compared to compounds listed in Table 3.1 Air Guideline Values derived by the NYSDOH located in the New York State Department of Health Final Guidance for Evaluating Soil Vapor Intrusion dated October 2006. Soil vapor collected during the RI shows low levels of petroleum-related VOCs (BTEX). Acetone was the highest detected compound with a concentration of 1600 µg/m³. Chlorinated VOCs were not detected at significant concentrations. No VOCs exceeded New York State Department of Health (NYSDOH) Air Guideline Values (AGVs) in the three soil vapor samples. However, there are no AGVs for gasoline-related compounds and several VOCs exceeded the typical indoor air background levels presented in Appendix C of NYSDOH's Vapor Intrusion Guidance document.

For more detailed results, consult the *Subsurface (Phase II) Investigation Report, Delineation Report, and Supplemental Remedial Investigation*. Based on an evaluation of the data and information from the RI, disposal of hazardous waste is not anticipated at this Site (petroleum is not a hazardous waste). Soil disposal characterization testing will be performed prior to redevelopment activities.

2.0 REMEDIAL ACTION OBJECTIVES

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

Soil

- Prevent direct contact with contaminated soil.
- Prevent exposure to contaminants volatilizing from contaminated soil.
- Prevent migration of contaminants that would result in groundwater or surface water contamination.

Groundwater

- Prevent direct exposure to contaminated groundwater.
- Prevent exposure to contaminants volatilizing from contaminated groundwater.
- Prevent off-site migration of contaminated groundwater above applicable groundwater standards.

Soil Vapor

- Prevent exposure to contaminants in soil vapor.
- Prevent migration of soil vapor into the new building.

3.0 REMEDIAL ALTERNATIVES ANALYSIS

The goal of the remedy selection process 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 exceeds of applicable standards, criteria, and guidance values (SCGs). Remedial alternatives are then developed and evaluated based on the following ten criteria:

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

As required, a Track 1 Unrestricted Use scenario is evaluated for the remedial action. The following is a detailed description of the alternatives analyzed to address impacted media at the Site:

Alternative 1:

- Selection of NYSDEC 6NYCRR Part 375 Unrestricted Use (Track 1) Soil Cleanup Objectives (USCOs).
- Removal of all soil/fill exceeding Track 1 USCOs throughout the Site and confirmation that Track 1 USCOs have been achieved with post-excavation end-point sampling. Based on the results of the RI, it is expected that this alternative would require excavating the entire Site from a depth of 15 feet below grade to 25 feet below grade to remove the identified urban fill and petroleum contaminated soils. Additionally, excavation would be required of the petroleum-contaminated area identified during the RI in the southwestern corner of the Site, consisting of soil to depths greater than 25 feet below grade. Post-excavation end-point sampling would be performed. If soil/fill containing concentrations above UUSCOs were still present at the base of the excavation, additional excavation would be performed to ensure complete removal of soil/fill that did not meet Track 1 USCOs.
- No Engineering or Institutional Controls are required for a Track 1 cleanup. As part of development, a vapor barrier and active sub-slab depressurization system (SSDS) would be installed to prevent potential exposures from soil vapor in the future (in addition to the on-site hotspot, an upgradient source of gasoline-related contamination is known to be present, albeit largely remediated). A soil vapor intrusion investigation, consisting of sub-slab soil vapor, indoor air, and ambient air samples would be performed during the heating season after the new building is constructed. This would determine whether the SSDS could be modified from active to passive..

Alternative 2:

- Establishment of Site Specific Use (Track 4) Soil Cleanup Objectives.

- Removal of all soil/fill Site-wide to the depth required for the foundations, i.e., approximately 12.5 to 15.5 feet below grade. Based on the results of the RI, this would not remove the petroleum-contaminated soil, which was identified from 17 to 27 feet below grade. Post-excavation end-point sampling would be performed to determine the presence and magnitude of soil contamination at the excavation base.
- Request for closure of on-site petroleum spill number #1110393 under the authority of NYSDEC in accordance with CP-51 Soil Cleanup Objectives. This RAWP does not contemplate remedial action for the petroleum spill beyond the excavation and removal of any tanks described above, as natural attenuation is indicated by the groundwater data and the remaining contamination does not appear to be causing adverse impacts. If these assumptions are not borne out during the excavation for the foundation, a separate spill RAWP addendum may need to be prepared and submitted to NYSDEC addressing additional measures for the spill. Otherwise, Spill #1110393 is anticipated to be closed following completion of Site excavation.
- Placement of a composite cover system over the entire Site to prevent exposure to remaining soil/fill.
- Installation of a vapor barrier system beneath the building slab and outside of foundation side walls adjacent to soil to prevent potential exposures from soil vapor.
- Installation of an active SSDS. A soil vapor intrusion investigation, consisting of sub-slab soil vapor, indoor air, and ambient air samples will be performed during the heating season after the new building is constructed. This will determine whether the SSDS can be modified from active to passive.
- Establishment of use restrictions including prohibitions on the use of groundwater from the Site; prohibitions of restricted Site uses, such as farming or vegetable gardening, to prevent future exposure pathways; and prohibition of a higher level of land use without OER approval.
- Establishment of an approved Site Management Plan (SMP) to ensure long-term management of appropriate Engineering and Institutional Controls including the performance of periodic inspections and certification that the controls are performing as they were intended. The SMP would note that the property owner and property owner's successors and assigns must comply with the approved SMP.
- The property would continue to be registered with an E-Designation at the NYC Buildings Department.

3.1 Threshold Criteria

3.1.1 Protection of Public Health and the Environment

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

Alternative 1 would be protective of human health and the environment by removing all soil/fill exceeding Track 1 USCOs and groundwater protection standards, thus eliminating potential for direct contact with contaminated soil/fill once construction is complete and eliminating the risk of contaminants leaching into groundwater.

Alternative 2 would achieve comparable protections of human health by excavation and removal of most of the urban fill at the Site and by ensuring placement of Institutional and Engineering Controls. The Engineering Controls, consisting of a composite cover system, vapor barrier, and SSDS, would provide protection of human health from the

petroleum and urban fill contamination identified during the RI. The composite cover system would prevent direct contact with any remaining on-site soil/fill. The vapor barrier would inhibit potential vapors entering the new building. The SSDS would mitigate potential soil vapors that are confined beneath vapor barrier. Implementing Institutional Controls including a SMP and continuing the E-designation would ensure that the composite cover system, vapor barrier, and SSDS remain intact and protective of public health.

For both Alternatives, potential exposure to contaminated soil or groundwater during construction would be minimized by implementing a Construction Health and Safety Plan (CHASP), an approved Soil/Materials Management Plan (SMMP), and Community Air Monitoring Plan (CAMP). Potential contact with contaminated groundwater would be prevented as its use is prohibited by city laws and regulations. Potential future migration of soil vapors into the new building would be prevented by installing a vapor barrier and SSDS. The vapor barrier will be installed below the building slab and along foundations walls adjacent to soil.

3.2 Balancing Criteria

3.2.1 Compliance with Standards, Criteria, and Guidance (SCGs)

This evaluation criterion assesses the ability of the alternative to achieve applicable standards, criteria and guidance.

Alternative 1 would achieve compliance with the remedial goals, chemical-specific SCGs and RAOs for soil through removal of soil to achieve Track 1 USCOs and Protection of Groundwater SCO's. No Engineering or Institutional Controls are required for a Track 1 cleanup. As part of development, a vapor barrier and active sub-slab depressurization system (SSDS) would be installed to prevent potential exposures from soil vapor in the future (in addition to the on-site hotspot, an upgradient source of gasoline-related contamination is known to be present, albeit largely remediated).

Alternative 2 would remove most of the historic fill, but the majority of the petroleum contamination would remain. Compliance with SCG's for soil vapor would be achieved by installing a vapor barrier system below the new building's basement slab and along the foundation walls adjacent to soil and an SSDS. An SMP would ensure that these controls remained protective for the long term.

Health and safety measures contained in the CHASP and CAMP will be implemented during Site redevelopment under this RAWP. The CHASP is included in Appendix 2. For both Alternatives, focused attention on means and methods employed during the remedial action would ensure that handling and management of contaminated material would be in compliance with applicable SCGs. These measures will protect on-site workers and the surrounding community from exposure to Site-related contaminants.

3.2.2 Short-Term Effectiveness and Impacts

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

Both Alternative 1 and 2 would result in short-term dust generation impacts associated with excavation, handling, load out of materials, and truck traffic. Short-term impacts

could potentially be higher for Alternative 1 since excavation of greater amounts of historical fill material would take place. However, focused attention to means and methods during a Track 1 removal action, including community air monitoring and appropriate truck routing, would minimize the overall impact of these activities.

An additional short-term adverse impact and risks to the community associated with both remedial alternatives is increased truck traffic. Truck traffic will be routed on the most direct course using major thoroughfares where possible and flag persons will be used to protect pedestrians at Site entrances and exits.

The potential adverse impact to the community, workers and the environment for both alternatives would be minimized through implementation of control plans including a CHASP, a CAMP and a SMMP, during all on-site soil disturbance activities and would minimize the release of contaminants into the environment. Both alternatives provide short-term effectiveness in protecting the surrounding community by decreasing the risk of contact with on-site contaminants. Construction workers operating under appropriate management procedures and a CHASP would provide protection from on-site contaminants by using personal protective equipment would be worn consistent with the documented risks within the respective work zones.

3.2.3 Long-term effectiveness and permanence

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

Alternative 1 would achieve long-term effectiveness and permanence related to on-site contamination by permanently removing all contaminated soil/fill above Track 1 USCOS. Removal of on-site contaminant sources will also prevent future groundwater contamination.

Alternative 2 would provide long-term effectiveness by removing most of the on-site contamination; installing a composite cover system, vapor barrier, and SSDS across the Site; maintaining use restrictions; establishing an SMP to ensure long-term management of Institutional Controls and Engineering Controls; and maintaining registration as an E-designated property to memorialize these controls for the long term. The SMP would ensure long-term effectiveness of all Engineering Controls and Institutional Controls by requiring periodic inspection and certification that these controls and restrictions continue to be in place and are functioning as they were intended, assuring that protections designed into the remedy continue to provide the required level of protection.

3.2.4 Reduction of toxicity, mobility, or volume of contaminated material

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

contaminants at a Site, reduce the total mass of toxic contaminants, cause irreversible reduction in contaminants mobility, or reduce of total volume of contaminated media.

Alternative 1 will permanently eliminate the toxicity, mobility, and volume of contaminants from on-site soil by removing all soil in excess of Track 1 USCOs.

Alternative 2 would remove most of the urban fill and petroleum contaminated soil to approximately 12.5 to 15.5 feet below grade at the Site, and all remaining on-site soil/fill, including a portion of the petroleum-contamination.

Alternative 1 would remove a greater total mass of contaminants from the Site. Alternative 1 would require the removal of all petroleum contaminated soil, which is estimated to be at depths greater than 25 feet below grade. Alternative 2 would remove the petroleum contaminated soil to 12.5 to 15.5 feet below grade for the new development.

3.2.5 Implementability

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

To achieve Alternative 1, excavation depths greater than 25 feet below grade would have to be accomplished to remove the petroleum-contaminated soil. An excavation of this depth was determined to not be feasible, due to concerns of undermining the foundations of the neighboring buildings and sidewalk. An excavation depth of 12.5 to 15.5 feet below grade was determined to be the maximum permissible depth without compromising the neighboring buildings. In the center of the Site, the excavation will continue to an approximate depth of 17.5 to 18.5 feet below grade for an elevator pit, but deeper excavation will not be able to be safely performed near the Site boundary due to the proximity of the neighboring buildings and sidewalk.

The techniques, materials and equipment to implement Alternative 2 are readily available and have been proven to be effective in protection of human health. They use standard equipment and technologies that are well established in the industry. The reliability of each remedy is also high. There are no special difficulties associated with any of the activities proposed.

3.2.6 Cost effectiveness

This evaluation criterion addresses the cost of alternatives, including capital costs (such as construction costs, equipment costs, and disposal costs, engineering expenses) and Site management costs (costs incurred after remedial construction is complete) necessary to ensure the continued effectiveness of a remedial action.

Since urban fill at the Site was found to extend to depths up to 26.5 feet below grade during the RI, and the new building foundation requires excavation of the entire Site to approximately 12.5 to 15.5 feet below grade, the costs associated with Alternative 1 would be significantly higher, even excluding the additional underpinning that would be required, but which has been determined to be impractical. Additional costs would include disposal of additional soil and import of clean soil for backfill. However, the post-construction costs for Alternative 2 would be slightly higher than for Alternative 1, based on the need for an SMP as part of Alternative 2.

The remedial plan would couple the remedial action with the redevelopment of the Site, lowering total costs. The remedial plan will also consider the selection of the most appropriate disposal facilities to reduce transportation and disposal costs during cleanup and redevelopment of the Site.

3.2.7 Community Acceptance

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

This RAWP will be subject to a public review under the NYC VCP and will provide the opportunity for detailed public input on the remedial alternatives and the selected remedy. This public comment will be considered by OER prior to approval of this plan. The Citizen Participation Plan for the project is provided in Appendix 3. Observations here will be supplemented by public comment received on the RAWP. Under both alternatives, the overall goals of the remedial program, to protect public health and the environment and eliminate potential contaminant exposures, have been broadly supported by citizens in NYC communities.

3.2.8 Land use

This evaluation criterion addresses the proposed use of the property. This evaluation has considered reasonably anticipated future uses of the Site and takes into account: current use and historical and/or recent development patterns; applicable zoning laws and maps; NYS Department of State's Brownfield Opportunity Areas (BOA) pursuant to section 970-r of the general municipal law; applicable land use plans; proximity to real property currently used for residential use, and to commercial, industrial, agricultural, and/or recreational areas; environmental justice impacts, Federal or State land use designations; population growth patterns and projections; accessibility to existing infrastructure; proximity of the Site to important cultural resources and natural resources, potential vulnerability of groundwater to contamination that might emanate from the Site, proximity to flood plains, geography and geology; and current Institutional Controls applicable to the Site.

The current, intended, and reasonably anticipated future land use of the Site and its surroundings are compatible with the selected remedy of soil remediation. The proposed future use of the Site includes eight-story residential building with retail uses on the ground floor and cellar. Following remediation, the Site will be protective of public health and the environment for its planned residential use. The proposed use is compliant with the property's zoning and is consistent with recent development patterns. The areas surrounding the Site is urban and consists of predominantly mixed residential and commercial buildings in zoning districts designated for commercial and residential uses. The development would demolish a one-story building and a vacant contaminated lot and provide a modern residential building. The proposed development would make the property safer, create new employment opportunities, living space, and other economic benefits from land revitalization.

Temporary short-term project impacts would be mitigated through Site management controls and truck traffic controls during remediation activities. Following remediation, the Site will be protective of public health and the environmental for its planned use.

The Site redevelopment would comply with NYC Historic District requirements. It is not near significant natural resources, waterways, wildlife refuges, wetlands, or critical habitats of endangered or threatened species. The Site is located in an urban area and not

in proximity to fish or wildlife and neither alternative would result in any potential exposure pathways of contaminant migration affecting fish or wildlife. The remedial action is also protective of groundwater natural resources. The Site does not lie in a Federal Emergency Management Agency (FEMA)-designated flood plain. Both alternatives are equally protective of natural resources and cultural resources. Improvements in the current environmental condition of the property achieved by both alternatives considered in this plan are consistent with the City's goals for cleanup of contaminated land.

3.2.9 Sustainability of the Remedial Action

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

While Alternative 2 would potentially result in lower energy usage based on reducing the volume of material transported off-site, both remedial alternatives are comparable with respect to the opportunity to achieve sustainable remedial action. The remedial plan for either alternative would take into consideration the shortest trucking routes during off-site disposal of urban fill and other soil, which would reduce greenhouse gas emissions and conserve energy used to fuel trucks. The New York City Clean Soil Bank program is available for reuse of any clean native soil under either alternative. A complete list of green remedial activities considered as part of the NYC VCP is included in a Sustainability Statement (Appendix 4).

3.2.10 Selection of the Preferred Remedy

The preferred remedy for the Site is Alternative 2, Track 4 cleanup. The Alternative 2 remedy will remove all soil/fill exceeding Track 4 Site Specific Use SCOs throughout the Site and the hotspot area, which will be confirmed with post-excavation sampling. If soil/fill containing analytes at concentrations above Track 4 Site Specific Use SCOs is still present at the base or walls of the excavation after removal of all soil required for construction of the new building's cellar level and slab are complete, if permissible, additional excavation would be performed to ensure complete removal of soil/ fill that does not meet Track 4 Site Specific SCOs. However, it should be noted that an excavation depth of 12.5 to 15.5 feet below grade was determined to be the maximum permissible depth without compromising the neighboring buildings. In the center of the Site, the excavation will continue to an approximate depth of 17.5 to 18.5 feet below grade for an elevator pit, but any excavation deeper than that associated with construction will not be able to be safely performed near the Site boundary due to the proximity of the neighboring buildings and sidewalk.

Engineering Controls are required for a Track 4 cleanup. A concrete slab covering the entire Site and waterproofing membrane would be installed as part of standard building development and are not considered part of the remedy. Additional soil vapor management would include an active SSDS to address petroleum related soil vapor contamination.

Use restrictions will be imposed on the Site (including prohibitions on any use higher than Restricted Residential, e.g. the use of groundwater from the Site; prohibitions of restricted Site uses, such as farming or vegetable gardening, to prevent future exposure pathways; and prohibition of a higher level of land use without NYSDEC approval). The property would receive an environmental easement registered with the county clerk memorializing institutional controls. The Site would continue to be encumbered with an E-designation for hazardous material.

4.0 REMEDIAL ACTION

4.1 Summary of Preferred Remedial Action

The preferred remedial action alternative is Alternative 2. Alternative 1 cannot be practically implemented due to the potential for undermining the foundations of the adjacent structures. The preferred remedial action achieves protection of public health and the environment for the intended use of the property. The preferred remedial action will achieve all of the remedial action objectives established for the project and addresses applicable SCGs. The preferred remedial action is effective in both the short-term and long-term and reduces mobility, toxicity and volume of contaminants. The preferred remedial action alternative is cost effective and implementable and uses standards methods that are well established in the industry.

The proposed remedial action will consist of:

1. Preparation of a Community Protection Statement and performance of all required NYC VCP Citizen Participation activities according to an approved Citizen Participation Plan.
2. Performance of a CAMP for particulates and volatile organic compounds.
3. Establishment of Site-Specific (Track 4) Soil Cleanup Objectives (SCOs).
4. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas.
5. Completion of a Waste Characterization Study prior to excavation activities. Waste characterization soil samples will be collected at a frequency dictated by disposal facility(s).
6. Excavation and removal of soil/fill will be performed Site-wide to a depth of approximately 12.5 to 15.5 feet below grade for development purposes. In the center of the Site, a small portion will be excavated to the depth of 17.5 to 18.5 feet below grade for an elevator pit. Approximately 4,500 tons of soil/fill will be removed from the Site and properly disposed of at an appropriately licensed or permitted facility.
7. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor and monitoring with a PID. Appropriate segregation of excavated media on-site.
8. Management of excavated materials including temporarily stockpiling and segregating in accordance with defined material types and to prevent co-mingling of contaminated material and non-contaminated materials.
9. Removal of any underground storage tanks (USTs) that are encountered during excavation. Registration of any tanks and reporting of any petroleum spills and appropriate closure of these petroleum spills in compliance with applicable local, State and Federal laws and regulations.
10. Request for closure of on-site petroleum spill number #1110393 under the authority of NYSDEC in accordance with CP-51 Soil Cleanup Objectives. This RAWP does not contemplate remedial action for the petroleum spill beyond the excavation and removal of any tanks described above, as natural attenuation is indicated by the groundwater data and the remaining contamination does not appear to be causing adverse impacts. If these assumptions are not borne out during the excavation for the foundation, a separate spill RAWP addendum may need to be prepared and submitted to NYSDEC addressing additional measures for the spill. Otherwise, Spill #1110393 is anticipated to be closed following completion of Site excavation.
11. Transportation and off-site disposal of all soil/fill material at licensed or permitted facilities in accordance with applicable laws and regulations for handling, transport, and disposal, and this

plan. Sampling and analysis of excavated media as required by disposal facilities. Appropriate segregation of excavated media on-site.

12. Collection and analysis of end-point samples to determine the performance of the remedy with respect to attainment of SCOs.
13. Import of materials to be used for backfill and cover in compliance with this plan and in accordance with applicable laws and regulations. Any imported material will meet RRSCOs.
14. Construction of an engineered composite cover consisting of a minimum of a six-inch thick concrete building slab, with six-inch thick clean gravel layer beneath all building areas, which will cover the entire Site, with the exception of a portion requiring a 48-inch thick concrete slab, which will not have a gravel layer beneath it.
15. Installation of a vapor barrier system consisting of vapor barrier beneath the building slab and along the sub-grade foundation sidewalls adjacent to soil to mitigate soil vapor migration into the building. The vapor barrier system will consist of a 20-mil Stego[®] Vapor Barrier (or OER approved equal) below the slab throughout the full building area and Aquafin[®] 2k, (or OER approved equal) applied on the interior of all sub-grade foundation sidewalls adjacent to soil. As construction plans progress, 20-mil Stego[®] Vapor Barrier may be used on the outside of the foundation sidewalls instead of Aquafin[®]-2k. All welds, seams and penetrations will be properly sealed to prevent preferential pathways for vapor migration. The vapor barrier system is an Engineering Control for the remedial action. The remedial engineer will certify in the Remedial Action Report (RAR) that the vapor barrier system was designed and properly installed to mitigate soil vapor migration into the building.

Installation of an active sub-slab depressurization system (SSDS) consisting of a network of horizontal pipe set in the middle of a gas permeable layer immediately beneath the building slab and vapor barrier system. The horizontal piping will consist of fabric wrapped, perforated schedule 40 4-inch PVC pipe connected to a 4-inch steel riser pipe that penetrates the slab and travels through the building to the roof. The gas permeable layer will consist of a 6-inch thick layer of 2-inch stone. The pipe will be finished above the roof line with a 4-inch steel galvanized wind driven turbine ventilator to prevent rain infiltration. The active SSDS will be hardwired and will include a blower installed on the roof line and a pressure gauge and alarm located in an accessible area in the basement. The active SSDS is an Engineering Control for the remedial action. The remedial engineer will certify in the RAR that the active SSDS was designed and properly installed to establish a vacuum in the gas permeable layer and a negative (decreasing outward) pressure gradient beneath the building slab to prevent vapor migration into the building. A soil vapor intrusion investigation, consisting of sub-slab soil vapor, indoor air, and ambient air samples will be performed during the heating season after the new building is constructed. This will determine whether the SSDS can be modified from active to passive.

16. Performance of all activities required for the remedial action, including acquisition of required permits and attainment of pretreatment requirements, in compliance with applicable laws and regulations.
17. Implementation of stormwater pollution prevention measures in compliance with applicable laws and regulations.
18. Submission of a Remedial Action Report (RAR) that describes the remedial activities, certifies that the remedial requirements have been achieved, defines the Site boundaries, lists any changes from this RAWP, and describes all Engineering and Institutional Controls to be implemented at the Site.

19. Submission of an approved SMP in the RAR for long-term management of residual contamination, including plans for operation, maintenance, monitoring, inspection and certification of Engineering and Institutional Controls and reporting at a specified frequency.
20. The property will continue to be registered with an E-Designation at the NYC Buildings Department. Establishment of Engineering Controls and Institutional Controls in this RAWP and a requirement that management of these controls must be in compliance with an approved SMP. Institutional Controls will include prohibition of the following: (1) vegetable gardening and farming; (2) use of groundwater without treatment rendering it safe for the intended use; (3) disturbance of residual contaminated material unless it is conducted in accordance with the SMP; and (4) higher level of land usage without OER approval.

4.2 Soil Cleanup Objectives and Soil/ Fill Management

The excavation for the development purposes will remove of most of the urban fill and petroleum contaminated soil to a depth of approximately 12.5 to 15.5 feet below grade at the Site and post-excavation end-point samples will be collect to document any contamination remaining at the Site.

The SCOs for this Site are the 6NYCRR Part 375, Table 6.8(b) Restricted Residential Use SCOs as amended by the following Site-Specific SCOs:

<u>Contaminant</u>	<u>Track 4 SCOs</u>
Total SVOCs	250 ppm
Lead	1,000 ppm

Soil and materials management on-site and off-site, including excavation, handling and disposal, will be conducted in accordance with the SMMP in Appendix 5. Discrete contaminant sources (such as hotspots) identified during the remedial action will be identified by GPS or surveyed. This information will be provided in the RAR.

4.2.1 Soil/Fill Excavation and Removal

The excavation will be performed Site-wide to a depth of approximately 12.5 to 15.5 feet below grade for development purposes. A small portion will be excavated to a depth of 17.5 to 18.5 feet below grade for an elevator pit. The location of planned excavations is shown on Figure 4. The total quantity of soil/fill expected to be excavated and disposed of off-site is approximately 4,500 tons. For each disposal facility to be used in the remedial action, a letter from the developer/QEP to the receiving facility requesting approval for disposal and a letter back to the developer/QEP providing approval for disposal will be submitted to OER prior to any transport and disposal of soil at a facility.

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

4.2.2 End-point Sampling

End-point samples will be analyzed for compounds and elements as described below utilizing the following methodology:

- VOCs by EPA Method 8260;
- SVOCs by EPA Method 8270; and
- Target Analyte List metals by EPA Method 6000/7000.

New York State ELAP certified labs will be used for all end-point sample analyses. Labs performing end-point sample analyses will be reported in the RAR. The RAR will provide a tabular and map summary of all end-point sample results and will include all data including non-detects and applicable standards and/or guidance values.

4.2.3 Confirmation End-point Sampling

Removal actions for development purposes under this plan will be performed in conjunction with confirmation end-point soil sampling. Five confirmation samples will be collected from the base of the excavation at locations to be approved by OER, with tentative locations shown on Figure 5.

4.2.4 Hotspot End-point Sampling

End-point samples will be collected from the sidewalls and base of excavation for the petroleum contamination hotspot identified in the RI, according to the following procedures.

For any hotspots identified during this remedial action, hotspot removal will be performed to the extent permitted within the support of excavation limits, and end-point samples will be collected at the following frequency:

1. For excavations less than 20 feet in total perimeter, at least one bottom sample and one sidewall sample biased in the direction of surface runoff.
2. For excavations 20 to 300 feet in perimeter:
 - For surface removals, one sample from the top of each sidewall for every 30 linear feet of sidewall and one sample from the excavation bottom for every 900 square feet of bottom area.
 - For subsurface removals, one sample from each sidewall for every 30 linear feet of sidewall and one sample from the excavation bottom for every 900 square feet of bottom area.
3. For sampling of volatile organics, bottom samples will be taken within 24 hours of excavation, and will be taken from the zero to six-inch interval at the excavation floor. Samples taken after 24 hours will be taken at six to twelve inches.
4. For contaminated soil removal, post remediation soil samples for laboratory analysis will be taken immediately after contaminated soil removal. If the excavation is enlarged horizontally, additional soil samples will be taken pursuant to bullets 1-3 above.

Post-remediation end-point sample locations and depth will be biased towards the areas and depths of highest contamination identified during previous sampling episodes unless field indicators such as field instrument measurements or visual contamination identified during the remedial action indicate that other locations and depths may be more heavily contaminated. In all cases, post-remediation samples should be biased toward locations and depths of the highest expected contamination.

If either Light Non-Aqueous Phase Liquid (LNAPL) and/or Dense Non-Aqueous Phase Liquid (DNAPL) are detected, appropriate samples will be collected for characterization and “fingerprint analysis” and required reporting (i.e., spills hotline or notification to the NYSDEC Project Manager) will be performed.

4.2.5 Quality Assurance/Quality Control

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

One duplicate sample for every 20 samples collected will be submitted to the approved laboratory for analysis of the same parameters.

Samples will be collected in accordance with the following procedures:

- Record sample observations (e.g., evidence of contamination, PID readings, soil classification) in a field log book.
- Collect an aliquot of soil or groundwater using a dedicated and disposable plastic sample spoon or sample bailer and place in laboratory-supplied sample jars.
- Seal and label the sample jars as described below and place in a chilled cooler.

Decontamination Procedures

To avoid contamination and cross-contamination of samples, only dedicated or disposable sampling equipment may be used to collect these samples. All non-disposable equipment involved in field sampling must be decontaminated before being brought to the sampling location, and must be properly decontaminated after use.

Sample Identification

All samples will be consistently identified in all field documentation, chain-of-custody documents and laboratory reports using an alpha-numeric or alpha-alpha code. For end-point soil samples, the alpha prefix will be “EP” followed by numbers as indicated on Figure 5.

For stockpiled soil, if samples are necessary, the alpha prefix will be “SP” and the numbers following the alpha prefix will correspond to excavated stockpiles, beginning with “1, 2, 3...etc.” For example, the first sample collected from the first stockpile will be labeled “SP-1-1” and the first sample collected from the second stockpile will be labeled “SP-2-1.”

Sample Labeling and Shipping

All sample containers will be labeled with the following information:

- Site identification
- Sample identification
- Date and time of collection
- Analysis(es) to be performed
- Sampler’s initials

Once the samples are collected and labeled, they will be placed in chilled coolers and stored in a cool area away from direct sunlight to await shipment to the laboratory. Soil samples will be shipped to the laboratory at a frequency that will not result in an exceedance of applicable holding times for sample methods. At the start and end of each workday, field personnel will add ice to the coolers as needed.

The samples will be prepared for shipment by placing each sample jar in a sealable plastic bag, then wrapping each bag in bubble wrap to prevent breakage, adding freezer packs and/or fresh ice in sealable plastic bags and the chain-of-custody form. Samples will be shipped overnight (e.g., Federal Express) or transported by a laboratory courier. All coolers shipped to the laboratory will be sealed with mailing tape and a chain-of-custody seal to ensure that the coolers remain sealed during delivery.

Sample Custody

Field personnel will be responsible for maintaining the sample coolers in a secured location until they are picked up and/or sent to the laboratory. The record of possession of samples from the time they are obtained in the field to the time they are delivered to the laboratory or shipped off-site will be documented on chain-of-custody forms. The chain-of-custody forms will contain the following information: project name; names of sampling personnel; sample number; date and time of collection and matrix; and signatures of individuals involved in sample transfer, and the dates and times of transfers. Laboratory personnel will note the condition of the custody seal and sample containers at sample check-in.

Documentation

A sample log book will be maintained. The following information, as a minimum will be recorded to the log:

- Sample identification number
- Sample location
- Field observations
- Sample type
- Analyses
- Date/time of collection
- Collector's name
- Sample procedures and equipment utilized
- Date sent to laboratory/name of laboratory
- Copies of Site drawings indicating stockpile numbers and locations

4.2.6 Import of Soils

Soil import is not planned on this project.

4.2.7 Reuse of On-site Soils

Soil reuse is not planned on this project.

4.3 Engineering Controls

Engineering Controls will be employed in the remedial action to address residual contamination remaining at the Site. The Site has three primary Engineering Control Systems. These are:

1. Composite Cover System
2. Soil Vapor Barrier System
3. Active Sub-Slab Depressurization System

4.3.1 Composite Cover System

Exposure to residual soil/fill will be prevented by an engineered, composite cover system to be built on the Site. This composite cover system will be comprised of a minimum of a six-inch thick reinforced concrete building slab with six-inch thick clean gravel layer

beneath all building areas, with the exception of the portion having a 48-inch thick concrete slab, which will not have a gravel layer beneath it. Figure 6 shows the typical design and location the composite cover system.

The composite cover system will be a permanent engineering control. The system will be inspected and its performance certified at specified intervals as required by this RAWP and the SMP. An SMMP 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 soil/fill is disturbed after the remedial action is complete. Maintenance of this composite cover system will be described in the SMP in the RAR.

4.3.2 Vapor Barrier System

Migration of soil vapor from on-site or off-site sources into the building will be mitigated with a combination of the building slab and vapor barrier. The vapor barrier will consist of a 20-mil Stego[®] Vapor Barrier (or OER-approved equivalent) below the slab throughout the full building area and Aquafin[®]-2K (or OER-approved equivalent) applied on the interior of all sub-grade foundation sidewalls adjacent to soil. As construction plans progress, 20-mil Stego[®] Vapor Barrier may be used on the outside of the foundation sidewalls instead of Aquafin[®]-2k. All welds, seams and penetrations will be properly sealed to prevent preferential pathways for vapor migration.

The vapor barrier will be installed in accordance with manufacturer specifications.

A plan view, typical design sections for the proposed vapor barrier system is provided in Appendix 6. The RAR will include as-built drawings and diagrams, manufacturer documentation, and photographs.

The RAR will include a P.E.-certified letter (on company letterhead) from the primary contractor responsible for installation oversight and field inspections and a copy of the manufacturer's certificate of warranty.

The vapor barrier system is a permanent engineering control and will be inspected and its performance certified at specified intervals, as required by this RAWP and the SMP. An SMMP will be included in the SMP and will outline the procedures to be followed in the event that the composite cover system and underlying vapor barrier system is disturbed after the remedial action is complete. Maintenance of these systems will be described in the SMP in the RAR.

4.3.3 Sub-Slab Depressurization System

Migration of soil vapor into the building will be additionally mitigated by the construction of an active SSDS. The SSDS will consist of a network of horizontal pipe set in the middle of a gas permeable layer immediately beneath the building slab and vapor barrier system. The horizontal piping will consist of fabric wrapped, perforated schedule 40 4-inch PVC pipe connected to a 4-inch steel riser pipe that penetrates the slab and travels through the building to the roof. The gas permeable layer will consist of a 6-inch thick layer of 2-inch stone. The pipe will be finished at the roof line with a 4-inch steel galvanized wind driven turbine ventilator to prevent rain infiltration. The remedial engineer will certify in the RAR that the active SSDS was designed and properly installed to establish a vacuum in the gas permeable layer and a negative (decreasing outward) pressure gradient across the building slab to prevent vapor migration into the building.

The SSDS is a permanent engineering control. The system will be inspected and its performance certified at specified intervals as required by this RAWP and the SMP. The

Site will be tested upon completion of the building, including collection of soil vapor, indoor air, and ambient air samples, to determine whether the SSDS can be converted to a passive system. Maintenance of this SSDS will be described in the SMP in the RAR. The location and layout and typical section of the SSDS are shown in Appendix 6. Results of the testing will also be forwarded to the NYSDEC for review who in turn will consult with NYSDOH for review and comment.

4.4 Institutional Controls

A series of Institutional Controls are required under this remedial action to assure permanent protection of public health by elimination of exposure to residual materials. These Institutional Controls define the program to operate, maintain, inspect and certify the performance of Engineering Controls and Institutional Controls on this property. Institutional Controls would be implemented in accordance with a SMP included in the final RAR. Institutional Controls would be:

- Continued registration of the E-Designation for the property. This RAWP includes a description of all Engineering Controls and Institutional Controls and summarizes the requirements of the SMP, which will note that the property owner and property owner's successors and assigns must comply with the approved SMP.
- Submittal of a SMP in the RAR for approval by OER that provides procedures for appropriate operation, maintenance, inspection, and certification of Engineering Controls and Institutional Controls. SMP will require that the property owner and property owner's successors and assigns will submit to OER a periodic written statement that certifies that: (1) controls employed at the Site are unchanged from the previous certification or that any changes to the controls were approved by OER; 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. OER retains the right to enter the Site to evaluate the continued maintenance of any controls. This certification shall be submitted at a frequency to be determine by OER in the SMP and will comply with RCNY §43-1407(1)(3).
- Vegetable gardens and farming on the Site are prohibited in contact with residual soil materials.
- Use of groundwater underlying the Site is prohibited without treatment rendering it safe for its intended use.
- All future activities on the Site that will disturb residual material must be conducted pursuant to the soil management provisions in an approved SMP.
- The Site will be used for residential and commercial use and will not be used for a higher level of use without prior approval by OER.

4.5 Site Management Plan

Site Management is the last phase of remediation and begins with the approval of the RAR and issuance of the Notice of Completion (NOC) for the Remedial Action. The SMP describes appropriate methods and procedures to ensure implementation of all Engineering Controls and Institutional Controls that are required by this RAWP. The SMP is submitted as part of the RAR but will be written in a manner that allows its use as an independent document. Site Management continues until terminated in writing by OER. The property owner is responsible to ensure that all Site Management responsibilities defined in the SMP are implemented.

The SMP will provide a detailed description of the procedures required to manage residual soil/fill left in place following completion of the remedial action in accordance with the

Voluntary Cleanup Agreement with OER. This includes a plan for: (1) implementation of Engineering Controls and Institutional Controls; (2) operation and maintenance of Engineering Controls; (3) inspection and certification of Engineering Controls and Institutional Controls.

Site management activities and Engineering Controls/Institutional Controls certification will be scheduled by OER on a periodic basis to be established in the RAR and the SMP and will be subject to review and modification by OER. The SMP will be based on a calendar year and certification reports will be due for submission to OER by July 30 of the year following the reporting period.

4.6 Qualitative Human Health Exposure Assessment

The objective of the qualitative exposure assessment is to identify potential receptors and pathways for human exposure to the contaminants of concern (COC) that are present at, or migrating from, the Site. The identification of exposure pathways describes the route that the COC takes to travel from the source to the receptor. An identified pathway indicates that the potential for exposure exists; it does not imply that exposures actually occur.

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

4.6.1 Known and Potential Contaminant Sources

A Phase I ESA, a RI, and petroleum spill investigation have been performed at the Site and identified the following Areas of Concern (AOCs):

Soil

- VOCs: 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, ethylbenzene, and p/m-xylene exceeded NYSDEC RRSCOs;
- SVOCS: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo[k]fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene exceeded RRSCOs; and
- Metals: arsenic, barium, cadmium, copper, lead, and mercury exceeded RRSCOs.

Groundwater

- VOCs: 1,2,4,5-tetramethylbenzene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, isopropylbenzene, methyl tert-butyl ether, naphthalene, n-butylbenzene, n-propylbenzene, o-xylene, p/m-xylene, sec-butylbenzene, and toluene exceeded the NYSDEC Class GA Groundwater Quality Standards;
- SVOCS: benzo(a)anthracene, chrysene, and naphthalene exceeded Class GA Standards; and
- Metals: magnesium, and selenium, exceeded Class GA Standards.

Soil Vapor

- VOCs: No VOCs exceed the NYSDOH AGVs. Benzene, cyclohexane, n-heptane, n-hexane, and toluene exceeded typical indoor air background levels.

4.6.2 Nature, Extent, Fate and Transport of Contaminants

The Site is underlain by approximately 11 to 26.5 feet of urban fill, with native soil thereafter. VOCs, SVOCs, and metals are present at varying depths within the urban fill and upper portion of the native soil throughout the Site. These contaminants are largely constituents of the urban fill material that was used to fill the land for development purposes and past on-site uses.

Petroleum-related compounds were identified in soil, groundwater, and soil vapor during the RI and are potentially associated with past on-site uses. Based on the results of the RI, the following qualitative conclusions were determined:

- Elevated petroleum-related compound concentrations identified in the on-site soil above RRSCOs
- Elevated petroleum-related compound concentrations were identified in the downgradient on-site groundwater monitoring well (MW-1) above the Class GA AWQS. Potential contact with the contaminated groundwater is prevented, as its use is prohibited by city laws and regulations. Additionally, on-site groundwater was identified at depths of approximately 25 feet below grade during the RI, further limiting any potential for contact. Additionally, there will be use restrictions, including: prohibitions on the use of groundwater from the Site; prohibitions of restricted Site uses, such as farming or vegetable gardening, to prevent future exposure pathways; and prohibition of a higher level of land use without OER approval.
- Elevated VOC concentrations were not identified in soil vapor above the AGVs, however petroleum-related compounds were identified in soil vapor above typical indoor air background levels presented in Appendix C of the NYSDOH Vapor Intrusion Guidance document. The identified on-site soil vapor will be mitigated by engineering controls (vapor barrier and active SSDS).

4.6.3 Receptor Populations

On-site Receptors: The Site is currently a one-story building and an asphalt-paved parking lot. For redevelopment, the one-story building will be demolished and access to the Site will be restricted by an 8-foot high, chained and locked, perimeter fence. During construction, potential on-site receptors include construction workers, Site representatives, and visitors. Under proposed future conditions, potential on-site receptors include adult and child building residents, retail store and building workers and customers/visitors.

Off-site Receptors: Potential off-site receptors within a 500 foot radius of the Site include adult and child residents, commercial and construction workers, and pedestrians, based on the following land uses within 500 feet of the Site:

1. Commercial Businesses – existing and future
2. Residential Buildings – existing and future
3. Building Construction/Renovation – existing and future

4. Pedestrians, Cyclists – existing and future
5. Schools – existing and future

4.6.4 Potential Routes of Exposure

Three potential primary routes exist by which chemicals can enter the body: ingestion, inhalation, and dermal absorption. Exposure can occur based on the following potential media:

- Ingestion of groundwater or fill/ soil;
- Inhalation of vapors or particulates; and
- Dermal absorption of groundwater or fill/ soil.

4.6.5 Potential Exposure Points

Current Conditions: The Site is currently capped with asphalt and the existing one-story building slab. There are no potential exposure pathways from ingestion, inhalation, or dermal absorption of soil/ fill. Groundwater is not exposed at the Site. The Site is served by the public water supply and groundwater is not used at the Site for potable supply and there is no potential for exposure. The on-site one-story building is located about 30 feet from the petroleum contaminated soil identified in past soil borings but is located upgradient of the groundwater flow from that area based on the flow direction cited in the Mobil filling station reports (Spill #8803871).

Construction/ Remediation Conditions: During the remedial action, on-site workers will come into direct contact with surface and subsurface soils as a result of on-site construction and excavation activities. On-site construction workers potentially could ingest, inhale or have dermal contact with exposed contaminated soil and fill. Similarly, off-site receptors could be exposed to dust and vapors from on-site activities. Due to the depth of groundwater, direct contact with groundwater is not expected. During construction, on-site and off-site exposures to contaminated dust from on-site will be addressed through the SMMP, dust controls, and through the implementation of the CAMP and a CHASP.

Proposed Future Conditions: Under future remediated conditions, all soil/fill to a depth of approximately 12.5 to 15.5 feet below grade will be removed. Soil/fill will be additionally removed for the excavation of an elevator pit to a depth of approximately 17.5 to 18.5 feet below grade. The Site will be fully capped, preventing potential direct exposure to soil and groundwater remaining in place, and Engineering Controls (composite cover system/vapor barrier/SSDS) will prevent any potential exposure due to inhalation by preventing soil vapor intrusion. The Site is served by the public water supply, and groundwater is not used at the Site. There are no plausible off-site pathways for oral, inhalation, or dermal exposure to contaminants derived from the Site.

4.6.6 Overall Human Health Exposure Assessment

There are potential complete exposure pathways for the current Site condition. There are potential complete exposure pathways that require mitigation during implementation of the remedy. There are no complete exposure pathways under future conditions after the Site is developed. This assessment takes into consideration the reasonably anticipated use of the Site, which includes a residential structure, Site-wide surface cover, and a subsurface vapor barrier system for the building. Under current conditions, on-site exposure pathways exist for those with access to the Site and trespassers. During remedial construction, on-site and off-site exposures to contaminated dust from urban fill

material will be addressed through dust controls, and through the implementation of the CAMP, the SMMP, and a CHASP. Potential post-construction use of groundwater is not considered an option because groundwater in this area of New York City is not used as a potable water source. There are no surface waters in close proximity to the Site that could be affected or threatened.

5.0 REMEDIAL ACTION MANAGEMENT

5.1 Project Organization and Oversight

Principal personnel who will participate in the remedial action include Marcus Simons and Kenneth Wiles. The Professional Engineer (PE) and Qualified Environmental Professionals (QEP) for this project are Michelle Lapin and Marcus Simons, respectively.

5.2 Site Security

Site access will be controlled by through gated entrances to the fenced property.

5.3 Work Hours

The hours for operation of cleanup will comply with the NYC Department of Buildings construction code requirements or according to specific variances issued by that agency. The hours of operation will be conveyed to OER during the pre-construction meeting.

5.4 Construction Health and Safety Plan

The CHASP is included in Appendix 2. The Site Safety Coordinator will be Marco Balletta. Remedial work performed under this RAWP will be in full compliance with applicable health and safety laws and regulations, including Site and OSHA worker safety requirements and HAZWOPER requirements. Confined space entry, if any, will comply with OSHA requirements and industry standards and will address potential risks. The parties performing the remedial construction work will ensure that performance of work is in compliance with the CHASP and applicable laws and regulations. The CHASP pertains to remedial and invasive work performed at the Site until the issuance of the Notice of Completion.

All field personnel involved in remedial activities will participate in training required under 29 CFR 1910.120, such as 40-hour hazardous waste operator training and annual 8-hour refresher training. Site Safety Officer will be responsible for maintaining workers training records.

Personnel entering any exclusion zone will be trained in the provisions of the CHASP and will comply with all requirements of 29 CFR 1910.120. Site-specific training will be provided to field personnel. Additional safety training may be added depending on the tasks performed. Emergency telephone numbers will be posted at the Site location before any remedial work begins. A safety meeting will be conducted before each shift begins. Topics to be discussed include task hazards and protective measures (physical, chemical, environmental); emergency procedures; PPE levels and other relevant safety topics. Meetings will be documented in a log book or specific form.

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

5.5 Community Air Monitoring Plan

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

Periodic monitoring for VOCs will be performed during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. Periodic monitoring during sample collection, for instance, will consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or

overturning soil, monitoring during well bailing/purging, and taking a reading prior to leaving a sample location. Depending upon the proximity of potentially exposed individuals, continuous monitoring may be performed during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence. Exceedances of action levels observed during performance of the CAMP will be reported to the OER Project Manager and included in the Daily Report and will also be reported to the NYSDEC Project Manager.

5.5.1 Volatile Organic Compound Monitoring, Response Levels, and Actions

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

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

5.5.2 Particulate Monitoring, Response Levels, and Actions

Particulate concentrations will be monitored continuously at the downwind perimeter of the exclusion zone and periodically upwind using portable particulate monitoring equipment. 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 would be visually assessed during all work activities.

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) 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 $150 \mu\text{g}/\text{m}^3$ 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 $150 \mu\text{g}/\text{m}^3$ 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 $150 \mu\text{g}/\text{m}^3$ of the upwind level and in preventing visible dust migration.

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

5.6 Agency Approvals

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

5.7 Site Preparation

5.7.1 Pre-Construction Meeting

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

5.7.2 Mobilization

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

5.7.3 Utility Marker Layouts, Easement Layouts

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

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

5.7.4 Dewatering

Dewatering is not anticipated during remediation and construction.

5.7.5 Equipment and Material Staging

Equipment and materials will be stored and staged in a manner that complies with applicable laws and regulations.

5.7.6 Stabilized Construction Entrance

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

5.7.7 Truck Inspection Station

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

5.7.8 Extreme Storm Preparedness and Response Contingency Plan

Damage from flooding or storm surge can include dislocation of soil and stockpiled materials, dislocation of Site structures and construction materials and equipment, and dislocation of support of excavation structures. Damage from wind during an extreme storm event can create unsafe or unstable structures, damage safety structures and cause downed power lines creating dangerous Site conditions and loss of power. In the event of emergency conditions caused by an extreme storm event, the enrollee will undertake the following steps for Site preparedness prior to the event and response after the event.

5.7.9 Storm Preparedness

Preparations in advance of an extreme storm event will include the following: containerized hazardous materials and fuels will be removed from the property; loose materials will be secured to prevent dislocation and blowing by wind or water; heavy equipment such as excavators and generators will be removed from excavated areas, trenches and depressions on the property to high ground or removed from the property; an inventory of the property with photographs will be performed to establish conditions for the Site and equipment prior to the event; stockpile covers for soil and fill will be secured by adding weights such as sandbags for added security and worn or ripped stockpile covers will be replaced with competent covers; stockpiled hazardous wastes will be removed from the property; stormwater management systems will be inspected and fortified, including, as necessary: clean and reposition silt fences, hay bales; clean storm sewer filters and traps; and secure and protect pumps and hosing.

5.7.10 Storm Response

At the conclusion of an extreme storm event, as soon as it is safe to access the property, a complete inspection of the property will be performed. A Site inspection report will be submitted to OER at the completion of Site inspection and after the Site security is assessed. Site conditions will be compared to the inventory of Site conditions and material performed prior to the storm event and significant differences will be noted.

Damage from storm conditions that result in acute public safety threats, such as downed power lines or imminent collapse of buildings, structures or equipment will be reported to public safety authorities via appropriate means such as calling 911. Petroleum spills will be reported to NYS DEC within 2 hours of identification and consistent with State regulations. Emergency and spill conditions will also be reported to OER. Public safety structures, such as construction security fences will be repaired promptly to eliminate public safety threats. Debris will be collected and removed. Dewatering will be performed in compliance with existing laws and regulations and consistent with emergency notifications, if any, from proper authorities. Eroded areas of soil including unsafe slopes will be stabilized and fortified. Dislocated materials will be collected and appropriately managed. Support of excavation structure will be inspected and fortified as necessary. Impacted stockpiles will be contained and damaged stockpile covers will be replaced. Stormwater control systems and structures will be inspected and maintained as necessary. If soil or fill materials are discharged off-site to adjacent properties, property owners and OER will be notified and corrective measure plan designed to remove and clean dislocated material will be submitted to OER and implemented following approval by OER and granting of Site access by the property owner. Impacted off-site areas may require characterization based on Site conditions, at the discretion of OER. If on-site petroleum spills are identified, a QEP will determine the nature and extent of the spill and report to NYS DEC's spill hotline at DEC 800-457-7362 within statutory defined timelines. If the source of the spill is ongoing and can be identified, it should be stopped if this can be done safely. Potential hazards will be addressed immediately, consistent with guidance issued by NYS DEC.

5.7.11 Storm Response Reporting

A Site inspection report will be submitted to OER at the completion of Site inspection. An inspection report established by OER is available on OER's website (www.nyc.gov/oer) and will be used for this purpose. Site conditions will be compared to the inventory of Site conditions and material performed prior to the storm event and significant differences will be noted. The Site inspection report will be sent to the OER project manager and will include the Site name, address, tax block and lot, Site primary and alternate contact name and phone number. Damage and soil release assessment will include: whether the project had stockpiles; whether stockpiles were damaged; photographs of damage and notice of plan for repair; report of whether soil from the Site was dislocated and whether any of the soil left the Site; estimates of the volume of soil that left the Site, nature of impact, and photographs; description of erosion damage; description of equipment damage; description of damage to the remedial program or the construction program, such as damage to the support of excavation; presence of on-site or off-site exposure pathways caused by the storm; presence of petroleum or other spills and status of spill reporting to NYS DEC; description of corrective actions; schedule for corrective actions. This report should be completed and submitted to OER Project Manager with photographs within 24 hours of the time of safe entry to the property after the storm event.

5.8 Traffic Control

Drivers of trucks leaving the Site with soil/fill will be instructed to proceed without stopping in the vicinity of the Site to prevent neighborhood impacts. The planned route on local roads for trucks leaving the Site is shown on Figure 7.

5.9 Demobilization

Demobilization will include:

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

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

5.10 Reporting and Record Keeping

5.10.1 Daily reports

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

- Project number and statement of the activities and an update of progress made and locations of excavation and other remedial work performed;
- Quantities of material imported and exported from the Site;
- Status of on-site soil/fill stockpiles;
- A summary of all citizen complaints, with relevant details (basis of complaint; actions taken; etc.);
- A summary of CAMP results noting all excursions. CAMP data may be reported; and
- Photograph of notable Site conditions and activities.

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

5.10.2 Record Keeping and Photo Documentation

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

5.11 Complaint Management

All complaints from citizens will be promptly reported to OER. Complaints will be addressed and outcomes will also be reported to OER in daily reports. Notices to OER will include the nature of the complaint, the party providing the complaint, and the actions taken to resolve any problems.

5.12 Deviations From The Remedial Action Work Plan

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

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

6.0 REMEDIAL ACTION REPORT

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

- Information required by this RAWP;
- Text description with thorough detail of all engineering and institutional controls;
- As-built drawings for all constructed remedial elements;
- Manifests for all soil or fill disposal;
- Photographic documentation of remedial work performed under this remedy;
- SMP;
- Description of any changes in the remedial action from the elements provided in this RAWP and associated design documents;
- Tabulated summary of all end-point sampling results (including all soil test results from the RI for soil that will remain on-site) and all soil/fill waste characterization results, QA/QC results for end-point sampling, and other sampling and chemical analysis performed as part of the remedial action;
- Test results or other evidence demonstrating that remedial systems are functioning properly;
- Account of the source area locations and characteristics of all soil or fill material removed from the Site including a map showing the location of these excavations and hotspots, tanks or other contaminant source areas;
- Full accounting of the disposal destination of all contaminated material removed from the Site. Documentation associated with disposal of all material will include transportation and disposal records, and letters approving receipt of the material;
- Account of the origin and required chemical quality testing for material imported onto the Site;
- Continue registration of the property with an E-Designation by the NYC Department of Buildings;
- The RAWP and the collaboration of Remedial Investigation reports will be included as appendices to the RAR; and
- Reports and supporting material will be submitted in digital form and final PDF's will include bookmarks for each appendix.
- Remedial Action Report Certification

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

I, _____, am currently a registered professional engineer licensed by the State of New York. I performed professional engineering services and had primary direct responsibility for implementation of the remedial program for the 146-148 and 150 Wooster Street Site, Site number _____. I certify to the following:

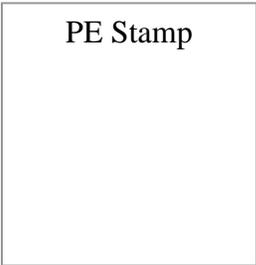
- I have reviewed this document, to which my signature and seal are affixed.
- Engineering Controls implemented during this remedial action were designed by me or a person under my direct supervision and achieve the goals established in the Remedial Action Work Plan for this Site.
- The Engineering Controls constructed during this remedial action were professionally observed by me or by a person under my direct supervision and (1) are consistent with the Engineering Control design established in the Remedial action Work Plan and (2) are accurately reflected in the text and drawings for as-built design reported in this Remedial Action Report.
- The OER-approved Remedial Action Work Plan dated February 2016 and Stipulations in a letter dated _____ were implemented and that all requirements in those documents have been substantively complied with. I certify that contaminated soil, fill, liquids or other material from the property were taken to facilities licensed to accept this material in full compliance with applicable laws and regulations.

Name

PE License Number

Signature

Date



PE Stamp

I, _____, am a Qualified Environmental Professional. I had primary direct responsibility for implementation of the remedial program for the 146-148 and 150 Wooster Street Site, Site number _____. I certify to the following:

- The OER-approved Remedial Action Work Plan dated February 2016 and Stipulations in a letter dated _____ were implemented and that all requirements in those documents have been substantively complied with. I certify that contaminated soil, fill, liquids or other material from the property were taken to facilities licensed to accept this material in full compliance with applicable laws and regulations.

QEP Name

QEP Signature

Date

7.0 SCHEDULE

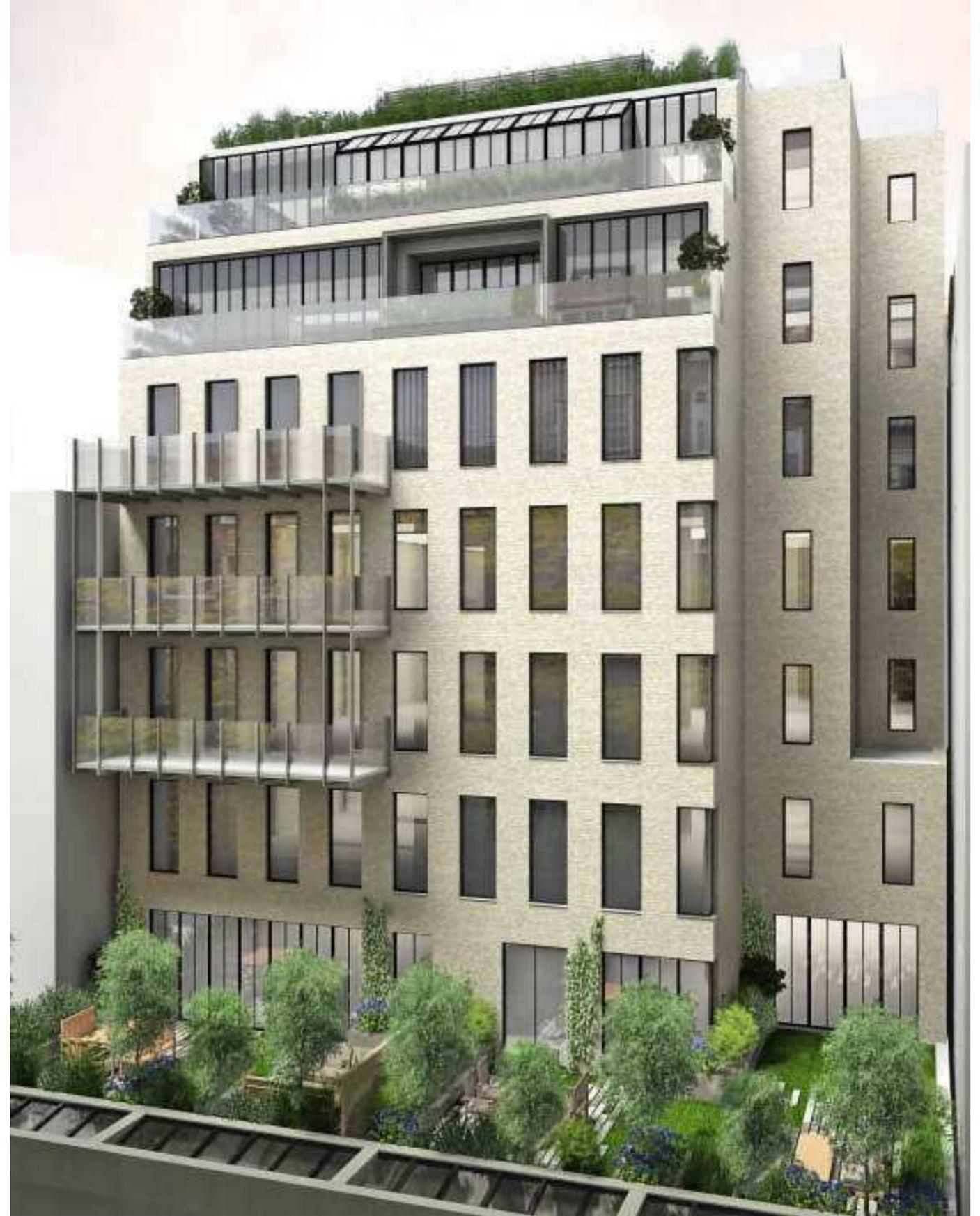
The table below presents a schedule for the proposed remedial action and reporting. If the schedule for remediation and development activities changes, it will be updated and submitted to OER. Currently, a 12 to 15 month remediation period is anticipated.

Schedule Milestone	Weeks from RAWP Approval	Duration (weeks)
OER Approval of RAWP	0	-
Fact Sheet 2 announcing start of remedy	0	-
Mobilization	6	2
Remedial Excavation	8	20-40
Demobilization	48	2
Submit Remedial Action Report	50-62	-

APPENDIX 1
PROPOSED DEVELOPMENT PLANS



STREET FACADE



REAR FACADE

APPENDIX 2
CONSTRUCTION HEALTH AND SAFETY PLAN

146-148 and 150 Wooster Street

NEW YORK, NEW YORK

Construction Health and Safety Plan

NYC VCP Project Number 16CVCP060M

OER Project Number 16TEMP046M

E-Designation E-369

CEQR Number 15DCP163M

NYSDEC Spill #11-10393

AKRF Project Number: 12094

Prepared for:

150 Wooster LLC
c/o KUB Capital LLC
134 Spring Street, Suite 305
New York, NY 10012

Prepared by:



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

MARCH 2016

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FIGURES

Figure 1 - Hospital Location Map

APPENDICES

- Appendix A - Potential Health Effects from On-site Contaminants
- Appendix B - Report Forms
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1.0 PURPOSE

This Construction Health and Safety Plan (CHASP) was prepared for the 146-148 and 150 Wooster Street site (the “Site”). The Site is located within the SoHo neighborhood of Manhattan. It consists of a paved parking lot at 146-148 Wooster Street and a one-story (plus partial basement) building occupied by a stroller store at 150 Wooster Street (Tax Block 514, Lots 7 and 9) in Manhattan. The surrounding area includes multistory residential, commercial and office buildings, most with ground-floor retail. A location map is provided as Figure 1.

The purpose of this CHASP is to assign responsibilities, establish personnel protection standards and mandatory safety practices and procedures, and provide for contingencies that may arise during construction at the Site. The CHASP is intended to minimize health and safety risks resulting from the known or potential presence of subsurface hazardous materials.

This plan is not designed to address geotechnical, mechanical or general construction safety concerns, nor to supersede or replace any OSHA regulation and/or local and state construction codes or regulations.

2.0 APPLICABILITY

Work subject to this CHASP includes all activities that disturb the existing soil on-site. The contractors and their subcontractors involved in the construction project will provide a copy of this CHASP to their employees whose work involves any potential exposure to on-site soil, and will complete all work in accordance with this CHASP.

3.0 SITE DESCRIPTION

3.1 General Information

The Site is identified as Tax Block 514, Lots 7 and 9. It is located on the east side of Wooster Street, between West Houston and Prince Streets, in the SoHo neighborhood of Manhattan, New York. It is also located in the SoHo-Cast Iron Historic District (the “Historic District”) in Manhattan Community District 2. The Site measures approximately 71 by 100 feet and is approximately 7,184 square feet. A map of the Site is shown on Figure 2. It currently consists of an asphalt-paved surface parking lot at 146-148 Wooster Street and a one-story (plus partial basement) brick and concrete building at 150 Wooster Street. The partial basement is beneath the front (western) portion of the building.

The Site is approximately 25 feet above mean sea level. Past subsurface investigations (environmental and geotechnical) encountered urban fill (sand, gravel and bricks) to depths of approximately 11 to 26.5 feet below grade, with a layer of clay with sand or silt extending to approximately 19 to 23 feet below grade, and sand with some silt below the clay layer. Bedrock was encountered during a past geotechnical investigation at 76 feet below grade. Based on USGS maps, bedrock is expected to be first encountered at approximately 65 feet below grade.

Past borings at 146-148 Wooster Street first encountered groundwater at approximately 24 to 30 feet below grade and at approximately 25 feet below grade in the (current and former) on-site monitoring wells. Groundwater monitoring for an off-site spill (former Mobil filling station, Spill #8803871) indicated that groundwater flow in the vicinity of the Site has varied from a southeasterly direction to a westerly direction, with flow in a south-southwesterly or west-southwesterly direction during the most recent monitoring events. Groundwater flow may well be affected by factors including past filling activities, underground utilities (especially reconstruction beneath Houston Street), other subsurface openings or obstructions such as basements, underground parking garages, subway tunnels (the B/D/F/V tunnels are approximately

200 feet to the north and the N/Q/R/W tunnels are approximately 600 feet to the east), and other factors. Groundwater in Manhattan is not used as a source of potable water.

A map showing the Site location and the route to the nearest hospital is provided as Figure 1.

3.2 Hazard Potential

The hazard potential at the Site was evaluated based on findings of the following: *Phase I Environmental Site Assessment (ESA) – 146-148 and 150 Wooster Street, New York, NY*, (AKRF, March 2010); *Site Status Update Reports – Former Mobil Service Station No. 17, KHB, 37 West Houston Street, New York, NY* (Kleinfelder, 2010-2011); *Subsurface (Phase II) Investigation – 146-148 and 150 Wooster Street, New York, NY* (AKRF, February 2012); *Delineation Report – 146-148 and 150 Wooster Street, New York, NY* (AKRF, April 2012); *Supplemental Remedial Investigation Report – 146-148 and 150 Wooster Street, New York, NY* (AKRF, February 2016).

Prior to its current uses, the Site was occupied by four to five-story (plus basement) commercial, residential, and light manufacturing buildings. The present building at 150 Wooster Street was built prior to 1940, and historically included a garage with a buried gasoline tank, a fuel oil tank reportedly removed during the excavation of the partial basement in 1989, a club, a restaurant and a condo showroom. The present parking lot included a service station with parking by approximately 1959, but had been removed by 1979.

146-148 and 150 Wooster Street, New York, NY, Phase I ESA, AKRF, March 2010

A March 2010 *Phase I Environmental Site Assessment (ESA)* found no information regarding whether any gasoline tanks remained beneath the Site. A geophysical investigation in the mid-2000s, conducted as part of the investigation of off-site Spill #8803871, indicated no evidence of buried tanks beneath the parking lot; however, the investigation was limited due to the presence of cars and hydraulic lifts. Spill #8803871 occurred at a former Mobil filling station approximately 145 feet northeast of the Site at 37 West Houston Street. Remedial activities included contaminated soil excavation in 2003 and chemical oxidation compound injections in 2006 to 2009. As part of the spill investigation, groundwater monitoring wells (GMW-16 and GMW-17) were installed on the Site at 146-148 Wooster Street in 2004 and 2005. Soil samples collected near the groundwater interface during their installation exhibited elevated photoionization detector (PID) readings, which suggested volatile organic compounds (VOCs), but laboratory analysis identified only trace concentrations of VOCs in the soil samples.

Subsequent groundwater monitoring indicated gasoline-related VOCs at levels exceeding New York State Department of Environmental Conservation (NYSDEC) Class GA Ambient Water Quality Standards (AWQS) (drinking water standards) in groundwater beneath the Site and in monitoring wells at 37 West Houston Street and 152 Wooster Street (north-adjacent to the Site). Based on the groundwater flow direction delineated during the Spill #8803871 investigation, the VOCs appeared to be migrating onto the Site from the former Mobil filling station. No free-phase product was ever noted in the on-site wells.

These groundwater monitoring results indicated that methyl tert-butyl ether (MTBE) was detected at the former Mobil filling station location and in both GMW-16 and GMW-17. Since the historical service station at the Site was closed prior to the widespread use of MTBE as a gasoline additive, and no MTBE has been found in on-site soil samples, it is reasonable to assume that the detection of MTBE in on-site monitoring wells indicates that off-site Spill #8803871 has, at a minimum, contributed to groundwater contamination beneath the Site.

The Phase I ESA additionally identified the following listed below:

- A stroller maintenance room in the on-site building contained maintenance chemicals (enamels, paints etc.) in containers less than a gallon in size. The chemicals were neatly stored and labeled, and no staining or odors were noted in the storage area.
- A slight petroleum sheen was noted on rainwater in the parking lot, likely due to minor leaks from parked cars. The parking lot pavement was generally in good condition, and no storm drains were noted. The minor leaks were thus unlikely to affect subsurface conditions beneath the Site.
- Hydraulic car lifts were observed on the parking lot. If the car lifts were installed prior to 1979, the associated aboveground hydraulic tanks may utilize polychlorinated biphenyl (PCB) containing hydraulic fluid.

A RI was performed and the results are documented in companion documents Subsurface (Phase II) Investigation Report, Delineation Report, and Supplemental Remedial Investigation. In addition, investigations related to offsite Spill #8803871 were performed at the Site. The following provide summaries of these:

Former Mobil Service Station No. 17 – KHB, 37 West Houston Street, New York, New York, Site Status Update Reports, Kleinfelder East Inc., 2010-2011, Spill #8803871

Quarterly groundwater monitoring reports for the Spill #8803871 investigation were reviewed following the completion of AKRF's March 2010 Phase I ESA, indicated that the Site wells had been most recently sampled in September 2011. At that time, on-site monitoring well GMW-16 contained concentrations of gasoline-related VOCs benzene, toluene, ethylbenzene and xylene (collectively BTEX) and MTBE, a historical gasoline additive, in exceedance of Class GA standards and/or guidance values. No BTEX had been detected in on-site well GMW-17 since December 2009. The MTBE concentration in GMW-17 had generally exceeded the Class GA guidance value (10 micrograms per liter or µg/L) during previous sampling events, and MTBE was detected at 10 µg/L in September 2011. Concentrations of BTEX and MTBE in off-site monitoring wells to the north and northeast remained elevated.

Overall, BTEX and MTBE concentrations in both Site wells fluctuated over the years, but generally decreased with time, possibly due to remedial activities at the former filling station and/or natural attenuation. No free-phase gasoline was noted in the Site wells during any monitoring events. The quarterly reports noted that although a general downward trend in groundwater contaminants at the former Mobil filling station and in the vicinity was noted following remedial activities, elevated contaminant concentrations persisted due to residual soil contamination at the Mobil filling station, and feasibility studies for further remediation (groundwater and vapor recovery) were in progress.

146-148 and 150 Wooster Street, New York, New York - Subsurface (Phase II) Investigation, AKRF, February 2012

A subsurface investigation was conducted at the Site intended to determine whether current or former on- or off-site activities had adversely affected subsurface conditions. It included: a geophysical investigation to search for potential buried tanks; the advancement of four borings with the collection and laboratory analysis of eight soil samples; and the collection of two groundwater samples from the existing monitoring wells (GMW-16 and GMW-17). This scope was based on the findings of the Phase I ESA.

During the advancement of SB-4 (in the southwest corner of the Site), evidence of potential contamination [petroleum-like odors and elevated photoionization detector (PID) readings] was encountered at depths from approximately 17 to 27 feet below grade i.e., starting approximately 9 feet above the water table. As a result, a potential petroleum release was reported to NYSDEC and was assigned Spill #1110393. Consistent with the field observations, the laboratory analyses

did not identify any evidence of petroleum contamination except in soil sample SB-4 (20'), collected at the depth of the highest PID readings. This sample contained VOCs typically associated with gasoline, with seven VOCs exceeding their NYSDEC Part 375 Soil Cleanup Objectives for Unrestricted Use (USCOs), and two VOCs (1,2,4-trimethylbenzene and p/m-xylene) also exceeding Restricted Residential Use Soil Cleanup Objectives (RRSCOs). Notably, MTBE was not detected in this sample.

Gasoline-related VOCs were detected in the groundwater samples collected from the two existing wells, with ten VOCs in GMW-16 and MTBE in GMW-17 exceeding NYSDEC Class GA Ambient Water Quality Standards (AWQS) or guidance values. The semi-volatile organic compounds (SVOCs) and metals detected in the soil samples appeared to be typical of New York City urban fill materials and did not appear to be related to petroleum contamination. No SVOCs were detected in the groundwater samples in exceedance of Class GA standards.

The geophysical survey identified no suspect buried tanks at the Site. However, the survey did identify a buried reinforced concrete pad, approximately 10 by 15 feet in size at approximately one foot below grade, in the vicinity of SB-4. This pad may have been associated with former buried tanks.

146-148 and 150 Wooster Street, New York, New York - Delineation Report, AKRF, April 2012

A second subsurface investigation was performed to delineate the potential release (Spill #1110393). Five borings were advanced in the vicinity of SB-4 and the concrete pad with the collection of ten soil samples. All five borings encountered evidence of petroleum contamination above the groundwater table, but no floating product. Since petroleum contamination was identified, groundwater samples were collected from temporary wells installed in each boring.

Seven of the ten soil samples detected VOCs at concentrations above USCOs and certain VOCs (1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, ethylbenzene, p/m-xylene) also exceeded RRSCOs. SVOCs were detected in the soil samples at generally low levels (below both USCOs and RRSCOs) that appeared to be related to urban fill materials rather than petroleum contamination. Two soil samples contained naphthalene at concentrations exceeding its USCO, but well below its RRSCO, which may be attributable to the petroleum contamination and/or fill materials.

Groundwater samples from four of the five temporary wells contained concentrations of VOCs (including naphthalene) typically associated with gasoline in exceedance of Class GA standards. MTBE was not detected in the groundwater samples; however, the MTBE detection limits were elevated above the concentration of MTBE detected in well GMW-17 in November 2011 (12 micrograms per liter or $\mu\text{g/L}$). Therefore, it is possible that MTBE might have in fact been present in the groundwater samples at comparable concentrations to those in GMW-17. One groundwater sample contained SVOC and metal concentrations commonly associated with urban fill materials, exceeding their Class GA standards, likely due to soil particles entrained in the sample.

146-148 and 150 Wooster Street, New York, New York – Supplemental Remedial Investigation Report, AKRF, February 2016

This subsurface investigation was in response to prior Subsurface Investigation findings, per an NYCOER email dated October 8, 2015, and the proposed redevelopment project at the Site. It included soil, groundwater, and soil vapor investigation. No evidence of contamination (odors, staining or elevated PID readings) was noted in any of the three soil borings. However, soil cuttings generated during the installation of MW-1 exhibited evidence of petroleum contamination at approximately 20 to 30 feet below grade, i.e., starting 5 feet above the water

table. Though not specified in the Supplemental Remedial Investigation Workplan, an additional sample was collected for VOC and SVOC analysis.

In one of the seven soil samples [MW-1 (20-30)], VOCs, typically associated with gasoline, exceeded their respective USCOS. The remaining soil samples did not detect VOCs in exceedance of USCOS or RRSCOs. The gasoline additive MTBE was not detected in any of the soil samples. SVOCs exceeded USCOS and/or RRSCOs in two of the seven soil samples, while certain metals exceeded USCOS and/or RRSCOs in four of the six soil samples. The SVOCs and metals are likely attributable to urban fill materials, which often contain highly variable concentrations, rather than a Site release.

Six VOCs, typically associated with gasoline, exceeded Class GA standards in one of the two groundwater samples (MW-1). MTBE was not detected in these samples.

No VOCs exceeded, New York State Department of Health (NYSDOH) Air Guideline Values (AGVs) in the three soil vapor samples. However, there are no AGVs for gasoline-related compounds and several VOCs exceeded the typical indoor air background levels presented in Appendix C of NYSDOH's Vapor Intrusion Guidance document.

For more detailed results, consult the Subsurface (Phase II) Investigation Report, Delineation Report, and Supplemental Remedial Investigation. Based on an evaluation of the data and information from the RI, disposal of hazardous waste is not anticipated at this site (petroleum is not a hazardous waste). Soil disposal characterization testing will be performed prior to redevelopment activities.

3.3 Hazard Evaluation

The most likely routes of exposure are breathing of VOCs and SVOCs or particulate-laden air released during soil disturbing activities, dermal contact, and accidental ingestion. Appendix A includes specific health effects from chemicals present or potentially present on-site. Although some of the chemicals of concern listed in the sections below were not detected during the subsurface investigation, they are included here as a precaution. The remaining sections of this CHASP address procedures (including training, air monitoring, work practices and emergency response) to reduce the potential for unnecessary and unacceptable exposure to these contaminants.

The potential adverse health effects from these detected contaminants are diverse. Many of these compounds are known or suspected to result in chronic illness from long-term exposures. However, due to the limited nature of the proposed construction, only acute effects are a potential concern.

This CHASP addresses potential environmental hazards from the presence of hazardous materials. It is not intended to address the normal hazards of construction work, which are separately covered by OSHA regulations and/or local and state construction codes and regulations.

3.3.1 Hazards of Concern

Check all that apply		
<input checked="" type="checkbox"/> Organic Chemicals	<input checked="" type="checkbox"/> Inorganic Chemicals	<input type="checkbox"/> Radiological
<input type="checkbox"/> Biological	<input type="checkbox"/> Explosive/Flammable	<input type="checkbox"/> Oxygen Deficient Atm.
<input checked="" type="checkbox"/> Heat Stress	<input checked="" type="checkbox"/> Cold Stress	<input type="checkbox"/> Other
Comments: No personnel are permitted to enter permit confined spaces		

3.3.2 Physical Characteristics

Check all that apply		
<input checked="" type="checkbox"/> Liquid	<input checked="" type="checkbox"/> Solid	<input type="checkbox"/> Sludge
<input checked="" type="checkbox"/> Vapors	<input type="checkbox"/> Unknown	<input type="checkbox"/> Other
Comments:		

3.3.3 Hazardous Materials

Check all that apply					
Chemicals	Solids	Sludges	Solvents	Oils	Other
<input type="checkbox"/> Acids	<input type="checkbox"/> Ash	<input type="checkbox"/> Paints	<input type="checkbox"/> Halogens	<input type="checkbox"/> Transformer	<input type="checkbox"/> Lab
<input type="checkbox"/> Caustics	<input type="checkbox"/> Asbestos	<input type="checkbox"/> Metals	<input type="checkbox"/> Petroleum	<input type="checkbox"/> Other DF	<input type="checkbox"/> Pharm.
<input type="checkbox"/> Pesticides	<input type="checkbox"/> Tailings	<input type="checkbox"/> POTW	<input type="checkbox"/> Other	<input type="checkbox"/> Motor or Hydraulic Oil	<input type="checkbox"/> Hospital
<input checked="" type="checkbox"/> Petroleum	<input checked="" type="checkbox"/> Other: Fill Material	<input type="checkbox"/> Other – Tars & Other NAPL		<input checked="" type="checkbox"/> Gasoline	<input type="checkbox"/> Rad.
<input type="checkbox"/> Inks				<input checked="" type="checkbox"/> Fuel Oil	<input type="checkbox"/> MGP
<input type="checkbox"/> PCBs					<input type="checkbox"/> Mold
<input checked="" type="checkbox"/> Metals					<input type="checkbox"/> Cyanide
<input checked="" type="checkbox"/> Other: VOCs, SVOCs					

3.3.4 Chemicals of Concern

Chemicals	REL/PEL/STEL (ppm)	Health Hazards
Arsenic	REL = 0.002 mg/m ³ PEL = 0.01 mg/m ³	Ulceration of nasal septum, dermatitis, gastrointestinal disturbances, peripheral neuropathy, resp irritation, hyperpigmentation of skin; potential occupational carcinogen.
Benzene	REL = 0.1 ppm PEL = 1 ppm STEL = 5 ppm	Irritation eyes, skin, nose, respiratory system; dizziness; headache, nausea, staggered gait; anorexia, lassitude, dermatitis; bone marrow depression, potential occupational carcinogen.
Toluene	REL = 100 ppm PEL = 200 ppm STEL = 300 ppm	Irritation eyes, nose; lassitude, confusion, euphoria, dizziness, headache; dilated pupils, lacrimation (discharge of tears); anxiety, muscle fatigue, insomnia; paresthesia; dermatitis; liver, kidney damage.
Ethylbenzene	REL = 100 ppm PEL = 100 ppm	Irritation eyes, skin, mucous membrane; headache; dermatitis; narcosis, coma.
Xylenes	REL = 100 ppm PEL = 100 ppm	Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis
Benzo(a)pyrene	PEL = 0.1 mg/m ³ REL = 0.2 mg/m ³	Dermatitis, bronchitis, potential occupational carcinogen.
Copper	REL = 1 mg/m ³ PEL = 1 mg/m ³	Irritation eyes, nose, pharynx; nasal septum perforation; metallic taste; dermatitis; in animals: lung, liver, kidney damage; anemia
Naphthalene	REL = 10 ppm PEL = 10 ppm	Irritation eyes; headache, confusion, excitement, malaise; nausea, vomiting, abdominal pain; irritation bladder; profuse sweating; jaundice; hematuria (blood in the urine), renal shutdown; dermatitis, optical neuritis, corneal damage
Fuel Oil	REL = 350 mg/m ³ PEL = 400 ppm	Nausea, irritation – eyes, hypertension, headache, light-headedness, loss of appetite, poor coordination; long-term exposure – kidney damage, blood clotting problems; potential carcinogen.
Lead	REL = 0.1 mg/m ³ PEL = 0.05 mg/m ³	Weak, lassitude, insomnia; facial pallor, pale eye, anorexia, low-weight, malnutrition, constipation, abdominal pain, colic; anemia; gingival lead line; tremors, paralysis wrists and ankles; encephalopathy; kidney disease; irritation eyes; hypotension.
Mercury	REL = 0.05 mg/m ³ PEL = 0.1 mg/m ³	Irritation eyes, skin; cough, chest pain, dyspnea (breathing difficulty), bronchitis, pneumonitis; tremor, insomnia, irritability, indecision, headache, lassitude (weakness, exhaustion); stomatitis, salivation; gastrointestinal disturbance, anorexia, weight loss; proteinuria
Polycyclic Aromatic Hydrocarbons (PAHs)	REL = 0.1 mg/m ³ PEL = 0.2 mg/m ³	Irritation skin, body fluids; reduced ability to fight disease; birth defects; carcinogen
MTBE	REL = NA PEL = NA	Inhalation or contact with material may irritate or burn skin and eyes. Fire may produce irritating, corrosive and/or toxic gases. Vapors may cause dizziness or suffocation.
Particulate	PEL = 15 mg/m ³ (total) PEL = 5 mg/m ³ (respirable)	Irritation eyes, skin, throat, upper respiratory system
Comments: REL = NIOSH Recommended Exposure Limit PEL = OSHA Permissible Exposure Limit STEL = OSHA Short Term Exposure Limit mg/m ³ = milligrams per cubic meter ppm = parts per million		

4.0 HEALTH AND SAFETY OFFICER

The contractor or engineer will designate one of its personnel as the Site Safety Officer (SSO). The SSO will be a competent person responsible for the implementation of this plan. The SSO will have completed a 40-hour training course (updated by an annual refresher) that meets OSHA requirements of 29 CFR Part 1910, Occupational Safety and Health Standards. The SSO has stop-work authorization, which he/she will execute on his/her determination of an imminent safety hazard, emergency situation, or other potentially dangerous situation. If the SSO must be absent from the Site, he/she will designate a suitably qualified replacement that is familiar with the CHASP.

5.0 TRAINING

If evidence of contamination is found, all those who enter the work area where the contamination is present while intrusive activities are being performed must recognize and understand the potential hazards to health and safety. All construction personnel upon entering the Site must attend a brief training meeting, its purpose being to:

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

Each member of the construction crew will be instructed in these objectives before he/she goes onto the Site. Construction personnel will be responsible for identifying potential hazards in the work zone. The SSO or other suitably trained individual will be responsible for conducting the training program. Others who enter the Site must be accompanied by a suitably-trained construction worker.

6.0 GENERAL WORK PRACTICES

To protect the health and safety of the field personnel, all field personnel will adhere to the guidelines listed below during activities involving subsurface disturbance in contaminated areas.

- Eating, drinking, chewing gum or tobacco, and smoking are prohibited, except in designated areas on the Site. These areas will be designated by the SSO.
- Workers must wash their hands and face thoroughly on leaving the work area and before eating, drinking, or any other such activity. The workers should shower as soon as possible after leaving the Site.
- Contact with contaminated or suspected surfaces should be avoided.
- The buddy system should always be used; each buddy should watch for signs of fatigue, exposure, and heat stress.

7.0 PERSONAL PROTECTIVE EQUIPMENT & AIR MONITORING

7.1 Personal Protective Equipment

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

During the implementation of air monitoring, if deemed appropriate by the SSO, site personnel will wear, at a minimum, Level D personal protective equipment. The protection will be based on the air monitoring described in Section 7.2.

Level of Protection Summary

LEVEL OF PROTECTION & PPE		1 – Excavation	2 – Other Earth Moving Activities
Level D (x) Steel Toe Shoes (x) Hard Hat (x) Work Gloves	(x) Safety Glasses () Face Shield (x) Ear Plugs (within 25 ft of drill rig/excavator) () Latex Gloves	Yes	Yes
Level D – Modified <i>(in addition to Level D)</i> (x) Tyvek Coveralls	(x) Nitrile Gloves () Overboots () Saranex Coveralls	As Necessary	As Necessary
Level C (in addition to Level D – Modified) (x) Half-Face Respirator & (x) Safety Glasses OR (x) Full Face Respirator () Full-Face PAPR	() Particulate Cartridge () Organic Cartridge (x) Dual Organic/Particulate Cartridge	If PID > 10 ppm (breathing zone)	If PID > 10 ppm (breathing zone)
Comments: Cartridges to be changed out at least once per shift unless warranted beforehand (e.g., more difficult to breathe or any odors detected).			

7.2 Work Zone Air Monitoring

Monitoring with a particulate air monitor will be conducted during excavation and other earth moving activities only in the event that contamination is encountered. Real time air monitoring will be performed with a photoionization detector (PID) during sampling and excavation work in areas where petroleum or other volatile organic compounds are detected. Measurements would be taken prior to commencement of work and continuously during the work as outlined in the following table. Measurements will be made as close to the workers as practicable and at the breathing height of the workers. The SSO will set up the equipment and confirm that it is working properly. His/her designee may oversee the air measurements during the day. The initial measurement for the day will be performed before the start of work and will establish the background level for that day. The final measurement for the day will be performed after the end of work. The action levels and required responses are listed in the following table.

Action Levels and Required Safety Response Actions

Instrument	Task to be Monitored	Action Level	Response Action
PID (OVM 580B or equivalent)	Excavation activities disturbing contaminated soil	Less than 10 ppm in breathing zone.	Level D or D-Modified
		Between 10 and 20 ppm	Level C
		More than 20 ppm	Stop work. Resume work when readings are less than 20 ppm.
Particulate monitor (MIE 1000 Personal DataRam or equivalent)	Excavation activities disturbing contaminated soil	Less than 5 mg/m ³	Level D
		Between 5 mg/m ³ and 125 mg/m ³	Level C. Apply dust suppression measures. If < 2.5 mg/m ³ , resume work using Level D. Otherwise, use Level C.
		Above 125 mg/m ³	Stop work. Apply additional dust suppression measures. Resume work when less than 125 mg/m ³ .

Field personnel will be trained in the proper operation of all field instruments at the start of the field program. Instruction manuals for the equipment will be on file at the Site for referencing proper operation, maintenance and calibration procedures.

The equipment will be calibrated according to manufacturer specifications at the start of each day of fieldwork. If an instrument fails calibration, the project manager will be contacted immediately to obtain a replacement instrument and arrange for repairs. A calibration log will be maintained to record the date of each calibration, any failure to calibrate and corrective actions taken. The PID will be calibrated each day using 100 parts per million (ppm) isobutylene standard gas.

8.0 DECONTAMINATION PROCEDURES

8.1 Personnel Decontamination

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

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

8.2 Sampling Equipment Decontamination

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

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

8.3 Heavy Equipment Decontamination

If heavy equipment comes in contact with contaminated materials, it will be decontaminated prior to being relocated to a clean area or leaving the Site. A designated decontamination pad will be constructed, where soil, dust, or oil will be washed off the exterior, undercarriage, and wheels or tracks of the equipment. Wash water will be collected for treatment and/or disposal.

9.0 EMERGENCY RESPONSE**9.1 Emergency Procedures**

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

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

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

9.1.1 Chemical Exposure

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

- Another team member (buddy) should remove the individual from the immediate area of contamination. The buddy should communicate to the SSO (via voice and hand signals) of the chemical exposure. The SSO should contact the appropriate emergency response agency.
- Precautions should be taken to avoid exposure of other individuals to the chemical.
- If the chemical is on the individual's clothing, the chemical should be neutralized or removed if it is safe to do so.
- If the chemical has contacted the skin, the skin should be washed with copious amounts of water.

-
- In case of eye contact, an emergency eye wash should be used. Eyes should be washed for at least 15 minutes.
 - All chemical exposure incidents must be reported in writing to the Project Manager. The SSO is responsible for completing the Incident Report Form.

9.1.2 Personal Injury

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

- Another team member (buddy) should signal the SSO that an injury has occurred.
- A field team member trained in first aid can administer treatment to an injured worker.
- If deemed necessary, the victim should then be transported to the nearest hospital or medical center. If necessary, an ambulance should be called to transport the victim.
- The SSO is responsible for making certain that an Incident Report Form is completed. This form is to be submitted to the AKRF Health and Safety Officer. Follow-up action should be taken to correct the situation that caused the accident.
- Any incident (near miss, property damage, first aid, medical treatment, etc.) must be reported.

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

9.1.3 Evacuation Procedures

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

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

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

9.1.5 Spill Response

All personnel must take every precaution to minimize the potential for spills during site operations. Any spill will be reported immediately to the SSO. The SSO will then determine and report any required spills to the NYCDEP and/or NYSDEC Hotlines. Spill control apparatus (sorberent materials) will be located on-site. All materials used for the

cleanup of spills will be containerized and labeled separately from other wastes. The SSO, in consultation with the Project Manager, will determine if additional spill response measures are required.

9.2 Hospital Directions

The **Mount Sinai Beth Israel Hospital** is located at First Avenue and 16th Street in Manhattan, as shown on Figure 1.

Hospital Information and Directions

Hospital Name:	Mount Sinai Beth Israel Hospital
Phone Number:	(212) 420-2000
Address/Location:	First Avenue at 16th Street – New York, New York (the emergency entrance is on East 16 th Street between Nathan D Perlman Place and First Avenue)
Directions:	<ol style="list-style-type: none"> 1. Travel <i>south</i> on Wooster Street. 2. Turn <i>right</i> onto Prince Street. 3. Turn <i>right</i> onto West Broadway. 4. Turn <i>right</i> onto Houston Street. 5. Turn <i>left</i> onto 1st Avenue. 6. Turn <i>left</i> onto East 16th Street. <p>The emergency entrance is on the right.</p>

9.3 CHASP Contact Information

AKRF Project Manager – Marcus Simons	(646) 388-9527 (office)
AKRF Assistant Project Manager – Kenneth Wiles	(646) 388-9528 (office)
Site Safety Officer (SSO) – Marco Balletta.....	(646) 388-9514 (office) (646) 270-7195 (cell)
150 Wooster LLC, Inc. Representative – Roger Bittenbender.	(212) 219-9902 (office)
Ambulance, Fire and Police Departments.....	911
Local Poison Control	(212) 764-7667 pm/weekend (212) 340-4494
NYSDEC Spill Response Team.....	(800) 457-7362
NYCDEP Hotline	(718) DEP-HELP

10.0 APPROVAL & ACKNOWLEDGMENTS OF CHASP

APPROVAL

Signed: _____ Date: _____

Project Manager

Signed: _____ Date: _____

Health and Safety Officer

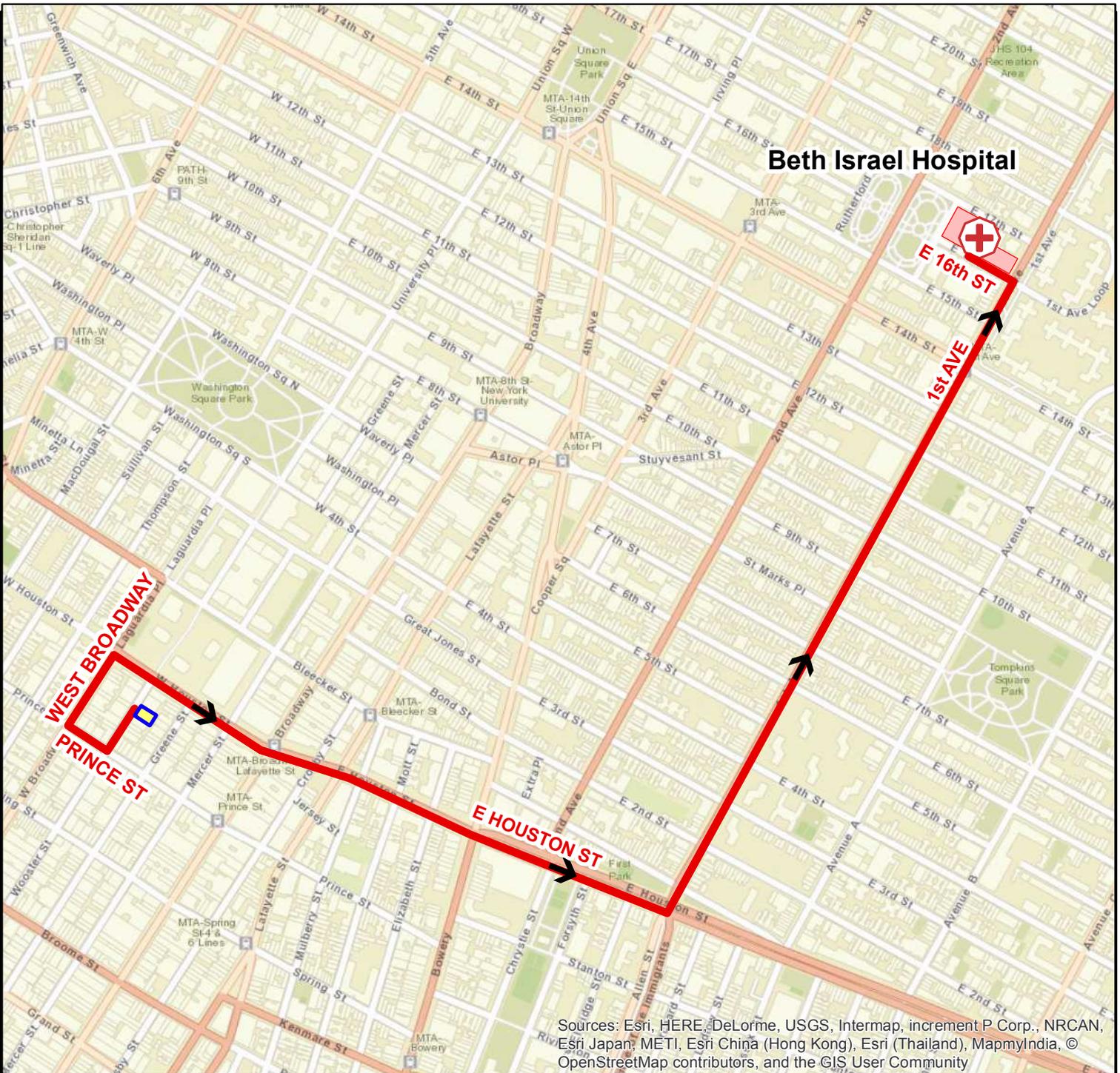
Below is an affidavit that must be signed by all workers who enter the Site. A copy of the CHASP must be on-site at all times and will be kept by the SSO.

AFFIDAVIT

I, _____ (name), of _____ (company name), have read the Construction Health and Safety Plan (CHASP) for the 150 Wooster Street Site in New York, New York. I agree to conduct all on-site work in accordance with the requirements set forth in this CHASP and understand that failure to comply with this CHASP could lead to my removal from the Site.

Signed: _____ Company: _____ Date: _____

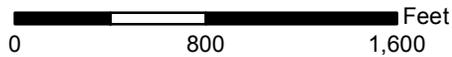
FIGURES



Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Legend

-  Project Site Location
-  Route to Hospital
-  Hospital Location



Beth Israel Hospital (ER)
 East 16th Street
 New York, NY 10016

146-148 and 150 Wooster Street
 New York, New York



DATE
2/18/2016

PROJECT No.
12094

HOSPITAL LOCATION MAP

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

FIGURE
1

APPENDIX A
POTENTIAL HEALTH EFFECTS FROM ON-SITE CONTAMINANTS

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

HIGHLIGHTS: Exposure to higher than average levels of arsenic occurs mostly in the workplace, near hazardous waste sites, or in areas with high natural levels. At high levels, inorganic arsenic can cause death. Exposure to lower levels for a long time can cause a discoloration of the skin and the appearance of small corns or warts. Arsenic has been found at 1,014 of the 1,598 National Priority List sites identified by the Environmental Protection Agency (EPA).

What is arsenic?

Arsenic is a naturally occurring element widely distributed in the earth's crust. In the environment, arsenic is combined with oxygen, chlorine, and sulfur to form inorganic arsenic compounds. Arsenic in animals and plants combines with carbon and hydrogen to form organic arsenic compounds.

Inorganic arsenic compounds are mainly used to preserve wood. Organic arsenic compounds are used as pesticides, primarily on cotton plants.

What happens to arsenic when it enters the environment?

- Arsenic cannot be destroyed in the environment. It can only change its form.
- Arsenic in air will settle to the ground or is washed out of the air by rain.
- Many arsenic compounds can dissolve in water.
- Fish and shellfish can accumulate arsenic, but the arsenic in fish is mostly in a form that is not harmful.

How might I be exposed to arsenic?

- Eating food, drinking water, or breathing air containing arsenic.
- Breathing contaminated workplace air.
- Breathing sawdust or burning smoke from wood treated with arsenic.
- Living near uncontrolled hazardous waste sites containing arsenic.
- Living in areas with unusually high natural levels of arsenic in rock.

How can arsenic affect my health?

Breathing high levels of inorganic arsenic can give you a sore throat or irritated lungs. Ingesting high levels of inorganic arsenic can result in death. Lower levels of arsenic can cause nausea and vomiting, decreased production of red and white blood cells, abnormal heart rhythm, damage to blood vessels, and a sensation of "pins and needles" in hands and feet.

Ingesting or breathing low levels of inorganic arsenic for a long time can cause a darkening of the skin and the

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appearance of small “corns” or “warts” on the palms, soles, and torso.

Skin contact with inorganic arsenic may cause redness and swelling.

Organic arsenic compounds are less toxic than inorganic arsenic compounds. Exposure to high levels of some organic arsenic compounds may cause similar effects as inorganic arsenic.

How likely is arsenic to cause cancer?

Several studies have shown that inorganic arsenic can increase the risk of lung cancer, skin cancer, bladder cancer, liver cancer, kidney cancer, and prostate cancer. The World Health Organization (WHO), the Department of Health and Human Services (DHHS), and the EPA have determined that inorganic arsenic is a human carcinogen.

How can arsenic affect children?

We do not know if exposure to arsenic will result in birth defects or other developmental effects in people. Birth defects have been observed in animals exposed to inorganic arsenic.

It is likely that health effects seen in children exposed to high amounts of arsenic will be similar to the effects seen in adults.

How can families reduce the risk of exposure to arsenic?

- If you use arsenic-treated wood in home projects, you should wear dust masks, gloves, and protective clothing to decrease exposure to sawdust.
- If you live in an area with high levels of arsenic in water or soil, you should use cleaner sources of water and limit contact with soil.

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

There are tests to measure the level of arsenic in blood, urine, hair, or fingernails. The urine test is the most reliable test for arsenic exposure within the last few days. Tests on hair and fingernails can measure exposure to high levels of arsenic over the past 6-12 months. These tests can determine if you have been exposed to above-average levels of arsenic. They cannot predict how the arsenic levels in your body will affect your health.

Has the federal government made recommendations to protect human health?

EPA has set limits on the amount of arsenic that industrial sources can release to the environment and has restricted or canceled many uses of arsenic in pesticides. EPA has set a limit of 0.01 parts per million (ppm) for arsenic in drinking water.

The Occupational Safety and Health Administration has set limits of 10 µg arsenic per cubic meter of workplace air (10 µg/m³) for 8 hour shifts and 40 hour work weeks.

Source of Information

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

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



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

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

What is benzene?

(Pronounced bĕn'zĕn')

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

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

What happens to benzene when it enters the environment?

- Industrial processes are the main source of benzene in the environment.
- Benzene can pass into the air from water and soil.
- It reacts with other chemicals in the air and breaks down within a few days.
- Benzene in the air can attach to rain or snow and be carried back down to the ground.

- It breaks down more slowly in water and soil, and can pass through the soil into underground water.
- Benzene does not build up in plants or animals.

How might I be exposed to benzene?

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

How can benzene affect my health?

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

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

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

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

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

How likely is benzene to cause cancer?

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

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

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

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

Has the federal government made recommendations to protect human health?

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

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

Glossary

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

Carcinogen: A substance with the ability to cause cancer.

CAS: Chemical Abstracts Service.

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

Metabolites: Breakdown products of chemicals.

Milligram (mg): One thousandth of a gram.

Pesticide: A substance that kills pests.

References

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

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-498-0093. ToxFAQs Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaq.html> ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.



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

HIGHLIGHTS: Copper is a reddish metal that occurs naturally in the environment. It also occurs naturally in plants and animals. Low levels of copper are essential for maintaining good health. High levels can cause harmful effects such as irritation of the nose, mouth and eyes, vomiting, diarrhea, stomach cramps, and nausea. Copper has been found in at least 884 of the 1,613 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is copper?

Copper is a reddish metal that occurs naturally in rocks, soil, water, and air. Copper also occurs naturally in plants and animals.

Metallic copper can be easily molded or shaped. Metallic copper can be found in the U.S. penny, electrical wiring, and some water pipes. Metallic copper is also found in mixtures (called alloys) with other metals such as brass and bronze. Copper is also found as part of other compounds forming salts. Copper salts occur naturally, but are also manufactured. The most common copper salt is copper sulfate. Most copper compounds are blue-green in color. Copper compounds are commonly used in agriculture to treat plant diseases like mildew, for water treatment and, as preservatives for wood, leather, and fabrics.

What happens to copper when it enters the environment?

- Copper can enter the environment from the mining of copper and other metals and from factories that make or use metallic copper or copper compounds.
- It can also enter the environment through domestic waste water, combustion of fossil fuels and wastes, wood production, phosphate fertilizer production, and natural sources (e.g., windblown dust from soils, volcanoes, decaying vegetation, forest fires, and sea spray).
- Copper in soil strongly attaches to organic material and minerals.

- Copper that dissolves in water becomes rapidly bound to particles suspended in the water.
- Copper does not typically enter groundwater.
- Copper carried by particles emitted from smelters and ore processing plants is carried back to the ground by gravity or in rain or snow.
- Copper does not break down in the environment.

How might I be exposed to copper?

- Breathing air, drinking water, eating food, and by skin contact with soil, water, or other copper-containing substances.
- Some copper in the environment can be taken up by plants and animals.
- Higher exposure may occur if your water is corrosive and you have copper plumbing and brass water fixtures. You may be exposed to higher amounts of copper if you drink water or swim in lakes or reservoirs recently treated with copper to control algae or receive cooling water from a power plant that may have high amounts of dissolved copper.
- Using some garden products (e.g., fungicides) to control plant diseases.
- Living near bronze and brass production facilities may expose you to higher copper levels in soil.
- You may breathe copper-containing dust or have skin contact if you work in the industry of mining copper or

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processing the ore. You may breathe high levels if you grind or weld copper metal.

How can copper affect my health?

Copper is essential for good health, but high amounts can be harmful. Long-term exposure to copper dust can irritate your nose, mouth, and eyes, and cause headaches, dizziness, nausea, and diarrhea.

Drinking water with higher than normal levels of copper may cause vomiting, diarrhea, stomach cramps, and nausea. Intentionally high intakes of copper can cause liver and kidney damage and even death.

How likely is copper to cause cancer?

We do not know whether copper can cause cancer in humans. The EPA has determined that copper is not classifiable as to carcinogenicity.

How can copper affect children?

Exposure to high levels of copper will result in the same type of effects in children and adults. Studies in animals suggest that the young children may have more severe effects than adults; we do not know if this would also be true in humans. There is a very small percentage of infants and children who are unusually sensitive to copper.

We do not know if copper can cause birth defects or other developmental effects in humans. Studies in animals suggest that ingestion of high levels of copper may cause a decrease in fetal growth.

How can families reduce the risk of exposure to copper?

- The greatest potential source of copper exposure is through drinking water, especially in water that is first drawn in the morning after sitting in copper pipes and brass faucets overnight.
- To reduce exposure, run the water for at least 15-30 seconds before using it.
- If you are exposed to copper at work, you may carry

copper home on your skin, clothes, or tools. You can avoid this by showering, and changing clothing before leaving work, and your work clothes should be kept separate from other clothes and laundered separately.

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

Copper is normally found in all tissues of the body, blood, urine, feces, hair, and nails. High levels of copper in these samples can show that you have been exposed to higher than normal levels of copper. Tests to measure copper levels in the body are not routinely available at the doctor's office because they require special equipment. These tests cannot tell the extent of exposure or whether you will experience harmful effects.

Has the federal government made recommendations to protect human health?

The EPA has determined that drinking water should not contain more than 1.3 milligrams of copper per liter of water (1.3 mg/L).

The Occupational Safety and Health Administration (OSHA) has set a limit of 0.1 mg per cubic meter (0.1 mg/m³) of copper fumes (vapor generated from heating copper) and 1 mg/m³ of copper dusts (fine metallic copper particles) and mists (aerosol of soluble copper) in workroom air during an 8-hour work shift, 40-hour workweek.

The Food and Nutrition Board of the Institute of Medicine recommends dietary allowances (RDAs) of 340 micrograms (340 µg) of copper per day for children aged 1-3 years, 440 µg/day for children aged 4-8 years, 700 µg/day for children aged 9-13 years, 890 µg/day for children aged 14-18 years, and 900 µg/day for adults.

References

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

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



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

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

What is ethylbenzene?

(Pronounced ĕth' əl bĕn' zĕn')

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

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

What happens to ethylbenzene when it enters the environment?

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

How might I be exposed to ethylbenzene?

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

How can ethylbenzene affect my health?

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

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

How likely is ethylbenzene to cause cancer?

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

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

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

How can ethylbenzene affect children?

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

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

How can families reduce the risk of exposure to ethylbenzene?

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

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

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

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

Ethylbenzene is found in the blood, urine, breath, and

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

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

Has the federal government made recommendations to protect human health?

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

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

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

References

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

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



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

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

What are fuel oils?

(Pronounced fyoo'el oilz)

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

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

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

What happens to fuel oils when they enter the environment?

- Some chemicals found in fuel oils may evaporate into the air from open containers or contaminated soil or water.
- Some chemicals found in fuel oils may dissolve in water after spills to surface waters or leaks from underground storage tanks.

- Some chemicals found in fuel oils may stick to particles in water, which will eventually cause them to settle to the bottom sediment.
- Some of the chemicals found in fuel oils may be broken down slowly in air, water, and soil by sunlight or small organisms.
- Some of the chemicals found in fuel oils may build up significantly in plants and animals.

How might I be exposed to fuel oils?

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

How can fuel oils affect my health?

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

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

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

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

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

How likely are fuel oils to cause cancer?

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

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

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

There is no medical test that shows if you have been exposed to fuel oils. Tests are available to determine if some of

the chemicals commonly found in fuel oils are in your blood. However, the presence of these chemicals in blood may not necessarily mean that you have been exposed to fuel oils.

Has the federal government made recommendations to protect human health?

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

The National Institute for Occupational Safety and Health (NIOSH) recommends that average workplace air levels not exceed 350 milligrams of petroleum distillates per cubic meter of air (350 mg/m³) for a 40-hour workweek.

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

Glossary

Carcinogenic: Able to cause cancer.

CAS: Chemical Abstracts Service.

Evaporate: To change into a vapor or a gas.

Hydrocarbon: Any compound made up of hydrogen and carbon.

Milligram (mg): One thousandth of a gram.

ppm: Parts per million.

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

References

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

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-498-0093. ToxFAQs Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaq.html> ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.



This fact sheet answers the most frequently asked health questions (FAQs) about lead. For more information, call the ATSDR Information Center at 1-800-232-4636. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to lead can happen from breathing workplace air or dust, eating contaminated foods, or drinking contaminated water. Children can be exposed from eating lead-based paint chips or playing in contaminated soil. Lead can damage the nervous system, kidneys, and reproductive system. Lead has been found in at least 1,272 of the 1,684 National Priority List sites identified by the Environmental Protection Agency (EPA).

What is lead?

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

Lead has many different uses. It is used in the production of batteries, ammunition, metal products (solder and pipes), and devices to shield X-rays. Because of health concerns, lead from paints and ceramic products, caulking, and pipe solder has been dramatically reduced in recent years. The use of lead as an additive to gasoline was banned in 1996 in the United States.

What happens to lead when it enters the environment?

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

How might I be exposed to lead?

- Eating food or drinking water that contains lead. Water pipes in some older homes may contain lead solder. Lead can leach out into the water.

- Spending time in areas where lead-based paints have been used and are deteriorating. Deteriorating lead paint can contribute to lead dust.

- Working in a job where lead is used or engaging in certain hobbies in which lead is used, such as making stained glass.

- Using health-care products or folk remedies that contain lead.

How can lead affect my health?

The effects of lead are the same whether it enters the body through breathing or swallowing. Lead can affect almost every organ and system in your body. The main target for lead toxicity is the nervous system, both in adults and children. Long-term exposure of adults can result in decreased performance in some tests that measure functions of the nervous system. It may also cause weakness in fingers, wrists, or ankles. Lead exposure also causes small increases in blood pressure, particularly in middle-aged and older people and can cause anemia. Exposure to high lead levels can severely damage the brain and kidneys in adults or children and ultimately cause death. In pregnant women, high levels of exposure to lead may cause miscarriage. High-level exposure in men can damage the organs responsible for sperm production.

How likely is lead to cause cancer?

We have no conclusive proof that lead causes cancer in humans. Kidney tumors have developed in rats and mice that had been given large doses of some kind of lead compounds. The Department of Health and Human Services

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(DHHS) has determined that lead and lead compounds are reasonably anticipated to be human carcinogens and the EPA has determined that lead is a probable human carcinogen. The International Agency for Research on Cancer (IARC) has determined that inorganic lead is probably carcinogenic to humans and that there is insufficient information to determine whether organic lead compounds will cause cancer in humans.

How can lead affect children?

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

Children are more vulnerable to lead poisoning than adults. A child who swallows large amounts of lead may develop blood anemia, severe stomachache, muscle weakness, and brain damage. If a child swallows smaller amounts of lead, much less severe effects on blood and brain function may occur. Even at much lower levels of exposure, lead can affect a child's mental and physical growth.

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

How can families reduce the risks of exposure to lead?

- Avoid exposure to sources of lead.
- Do not allow children to chew on mouth surfaces that may have been painted with lead-based paint.
- If you have a water lead problem, run or flush water that has been standing overnight before drinking or cooking with it.
- Some types of paints and pigments that are used as make-up or hair coloring contain lead. Keep these kinds of products away from children
- If your home contains lead-based paint or you live in an area contaminated with lead, wash children's hands and faces

often to remove lead dusts and soil, and regularly clean the house of dust and tracked in soil.

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

A blood test is available to measure the amount of lead in your blood and to estimate the amount of your recent exposure to lead. Blood tests are commonly used to screen children for lead poisoning. Lead in teeth or bones can be measured by X-ray techniques, but these methods are not widely available. Exposure to lead also can be evaluated by measuring erythrocyte protoporphyrin (EP) in blood samples. EP is a part of red blood cells known to increase when the amount of lead in the blood is high. However, the EP level is not sensitive enough to identify children with elevated blood lead levels below about 25 micrograms per deciliter ($\mu\text{g}/\text{dL}$). These tests usually require special analytical equipment that is not available in a doctor's office. However, your doctor can draw blood samples and send them to appropriate laboratories for analysis.

Has the federal government made recommendations to protect human health?

The Centers for Disease Control and Prevention (CDC) recommends that states test children at ages 1 and 2 years. Children should be tested at ages 3–6 years if they have never been tested for lead, if they receive services from public assistance programs for the poor such as Medicaid or the Supplemental Food Program for Women, Infants, and Children, if they live in a building or frequently visit a house built before 1950; if they visit a home (house or apartment) built before 1978 that has been recently remodeled; and/or if they have a brother, sister, or playmate who has had lead poisoning. CDC considers a blood lead level of 10 $\mu\text{g}/\text{dL}$ to be a level of concern for children.

EPA limits lead in drinking water to 15 μg per liter.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2007. Toxicological Profile for lead (Update). Atlanta, GA: U.S. Department of Public Health and Human Services, Public Health Service.

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



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

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

What is mercury?

(Pronounced mŭr/kyə-rē)

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

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

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

What happens to mercury when it enters the environment?

- Inorganic mercury (metallic mercury and inorganic mercury compounds) enters the air from mining ore deposits, burning coal and waste, and from manufacturing plants.
- It enters the water or soil from natural deposits, disposal of wastes, and volcanic activity.

- Methylmercury may be formed in water and soil by small organisms called bacteria.
- Methylmercury builds up in the tissues of fish. Larger and older fish tend to have the highest levels of mercury.

How might I be exposed to mercury?

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

How can mercury affect my health?

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

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

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

How likely is mercury to cause cancer?

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

How can mercury affect children?

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

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

How can families reduce the risk of exposure to mercury?

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

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

Pregnant women and children should keep away from

rooms where liquid mercury has been used.

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

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

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

Has the federal government made recommendations to protect human health?

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

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

The Occupational Safety and Health Administration (OSHA) has set limits of 0.1 milligram of organic mercury per cubic meter of workplace air (0.1 mg/m³) and 0.05 mg/m³ of metallic mercury vapor for 8-hour shifts and 40-hour work weeks.

References

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

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



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

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

What is methyl *tert*-butyl ether?

(Pronounced mĕth/əl tŭr/shĕ-ĕr'ĕ byōōt/l ĕ/thər)

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

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

What happens to MTBE when it enters the environment?

- MTBE quickly evaporates from open containers and surface water, so it is commonly found as a vapor in the air.
- Small amounts of MTBE may dissolve in water and get into underground water.
- It remains in underground water for a long time.

- MTBE may stick to particles in water, which will cause it to eventually settle to the bottom sediment.
- MTBE may be broken down quickly in the air by sunlight.
- MTBE does not build up significantly in plants and animals.

How might I be exposed to MTBE?

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

How can MTBE affect my health?

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

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

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

How likely is MTBE to cause cancer?

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

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

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

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

Has the federal government made recommendations to protect human health?

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

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

Glossary

Carcinogenicity: Ability to cause cancer.

CAS: Chemical Abstracts Service.

Evaporate: To change into a vapor or gas.

Milligram (mg): One thousandth of a gram.

ppm: Parts per million.

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

References

This ToxFAQs information is taken from the 1996 Toxicological Profile for Methyl *tert*-Butyl Ether produced by the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services, Public Health Service in Atlanta, GA.

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



This fact sheet answers the most frequently asked health questions (FAQs) about naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because these substances may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

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

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

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

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

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

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

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

1-Methylnaphthalene and 2-methylnaphthalene are expected to act like naphthalene in air, water, or soil because they have similar chemical and physical properties.

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

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

How can naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene affect my health?

Exposure to large amounts of naphthalene may damage or destroy some of your red blood cells. This could cause you to have too few red blood cells until your body replaces the destroyed cells. This condition is called hemolytic anemia. Some symptoms of hemolytic anemia are fatigue, lack of appetite, restlessness, and pale skin. Exposure to large amounts of naphthalene may also cause nausea, vomiting, diarrhea, blood in the urine, and a yellow color to the skin. Animals sometimes develop cloudiness in their eyes after swallowing high amounts of naphthalene. It is not clear whether this also develops in people. Rats and mice that breathed naphthalene vapors daily for a lifetime developed irritation and inflammation of their nose and lungs. It is unclear if naphthalene

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

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

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

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

There is no direct evidence in humans that naphthalene, 1-methylnaphthalene, or 2-methylnaphthalene cause cancer.

However, cancer from naphthalene exposure has been seen in animal studies. Some female mice that breathed naphthalene vapors daily for a lifetime developed lung tumors. Some male and female rats exposed to naphthalene in a similar manner also developed nose tumors.

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

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

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

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

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

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

❑ Families can reduce the risks of exposure to naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene by avoiding smoking tobacco, generating smoke during cooking, or using

fireplaces or heating appliances in their homes.

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

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

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

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

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

Has the federal government made recommendations to protect human health?

The EPA recommends that children not drink water with over 0.5 parts per million (0.5 ppm) naphthalene for more than 10 days or over 0.4 ppm for any longer than 7 years. Adults should not drink water with more than 1 ppm for more than 7 years. For water consumed over a lifetime (70 years), the EPA suggests that it contain no more than 0.1 ppm naphthalene.

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

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2005. Toxicological Profile for Naphthalene, 1-Methylnaphthalene, and 2-Methylnaphthalene (Update). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

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



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

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

What are polycyclic aromatic hydrocarbons?

(Pronounced pŏl'ī-sī'klīk ār'ə-măt'īk hī'drə-kar'bənz)

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

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

What happens to PAHs when they enter the environment?

- PAHs enter the air mostly as releases from volcanoes, forest fires, burning coal, and automobile exhaust.
- PAHs can occur in air attached to dust particles.
- Some PAH particles can readily evaporate into the air from soil or surface waters.
- PAHs can break down by reacting with sunlight and other chemicals in the air, over a period of days to weeks.

- PAHs enter water through discharges from industrial and wastewater treatment plants.
- Most PAHs do not dissolve easily in water. They stick to solid particles and settle to the bottoms of lakes or rivers.
- Microorganisms can break down PAHs in soil or water after a period of weeks to months.
- In soils, PAHs are most likely to stick tightly to particles; certain PAHs move through soil to contaminate underground water.
- PAH contents of plants and animals may be much higher than PAH contents of soil or water in which they live.

How might I be exposed to PAHs?

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

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

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

How can PAHs affect my health?

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

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

How likely are PAHs to cause cancer?

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

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

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

In the body, PAHs are changed into chemicals that can attach to substances within the body. There are special tests that can detect PAHs attached to these substances in body tissues or blood. However, these tests cannot tell whether any

health effects will occur or find out the extent or source of your exposure to the PAHs. The tests aren't usually available in your doctor's office because special equipment is needed to conduct them.

Has the federal government made recommendations to protect human health?

The Occupational Safety and Health Administration (OSHA) has set a limit of 0.2 milligrams of PAHs per cubic meter of air (0.2 mg/m³). The OSHA Permissible Exposure Limit (PEL) for mineral oil mist that contains PAHs is 5 mg/m³ averaged over an 8-hour exposure period.

The National Institute for Occupational Safety and Health (NIOSH) recommends that the average workplace air levels for coal tar products not exceed 0.1 mg/m³ for a 10-hour workday, within a 40-hour workweek. There are other limits for workplace exposure for things that contain PAHs, such as coal, coal tar, and mineral oil.

Glossary

Carcinogen: A substance that can cause cancer.

Ingest: Take food or drink into your body.

References

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

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



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

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

What is toluene?

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

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

What happens to toluene when it enters the environment?

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

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

Toluene does not usually stay in the environment long.

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

How might I be exposed to toluene?

Breathing contaminated workplace air or automobile exhaust.

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

Drinking contaminated well-water.

Living near uncontrolled hazardous waste sites containing toluene products.

How can toluene affect my health?

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

ToxFAQs™ Internet address is <http://www.atsdr.cdc.gov/toxfaq.html>

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

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

High levels of toluene may affect your kidneys.

How likely is toluene to cause cancer?

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

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

How can toluene affect children?

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

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

How can families reduce the risk of exposure to toluene?

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

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

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

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

Has the federal government made recommendations to protect human health?

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

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

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

References

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

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



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

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

What is xylene?

(Pronounced zī'lēn)

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

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

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

What happens to xylene when it enters the environment?

- Xylene has been found in waste sites and landfills when discarded as used solvent, or in varnish, paint, or paint thinners.
- It evaporates quickly from the soil and surface water into the air.

- In the air, it is broken down by sunlight into other less harmful chemicals.
- It is broken down by microorganisms in soil and water.
- Only a small amount of it builds up in fish, shellfish, plants, and animals living in xylene-contaminated water.

How might I be exposed to xylene?

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

How can xylene affect my health?

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

ToxFAQs Internet home page via WWW is <http://www.atsdr.cdc.gov/toxfaq.html>

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

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

How likely is xylene to cause cancer?

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

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

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

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

Has the federal government made recommendations to protect human health?

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

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

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

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

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

Glossary

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

Carcinogenic: Having the ability to cause cancer.

CAS: Chemical Abstracts Service.

ppm: Parts per million.

Solvent: A liquid that can dissolve other substances.

References

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

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-498-0093. ToxFAQs Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaq.html> ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.



APPENDIX B
REPORT FORMS

WEEKLY SAFETY REPORT FORM

Week Ending: _____ Project Name/Number: _____

Report Date: _____ Project Manager Name: _____

Summary of any violations of procedures occurring that week:

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

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

Comments:

Name: _____ Company: _____

Signature: _____ Title: _____

INJURED - ILL:

Name: _____ SSN: _____

Address: _____ Age: _____

Length of Service: _____ Time on Present Job: _____

Time/Classification: _____

SEVERITY OF INJURY OR ILLNESS:

___ Disabling ___ Non-disabling ___ Fatality

___ Medical Treatment ___ First Aid Only

ESTIMATED NUMBER OF DAYS AWAY FROM JOB: _____

NATURE OF INJURY OR ILLNESS: _____

CLASSIFICATION OF INJURY:

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

Part of Body Affected: _____

Degree of Disability: _____

Date Medical Care was Received: _____

Where Medical Care was Received: _____

Address (if off-site): _____

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

PROPERTY DAMAGE:

Description of Damage: _____

Cost of Damage: \$ _____

ACCIDENT/INCIDENT LOCATION: _____

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

Was weather a factor?: _____

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

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

ON-SITE ACCIDENTS/INCIDENTS:

Level of personal protection equipment required in Site Safety Plan:

Modifications:

Was injured using required equipment?:

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

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

ACCIDENT/INCIDENT REPORT REVIEWED BY:

SSO Name Printed

SSO Signature

OTHERS PARTICIPATING IN INVESTIGATION:

Signature

Title

Signature

Title

Signature

Title

ACCIDENT/INCIDENT FOLLOW-UP: Date: _____

Outcome of accident/incident: _____

Physician's recommendations: _____

Date injured returned to work: _____
Follow-up performed by: _____

Signature

Title

ATTACH ANY ADDITIONAL INFORMATION TO THIS FORM

APPENDIX C
EMERGENCY HAND SIGNALS

EMERGENCY SIGNALS

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

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

EMERGENCY HAND SIGNALS

OUT OF AIR, CAN'T BREATHE!



Hand gripping throat

**LEAVE AREA IMMEDIATELY,
NO DEBATE!**

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

NEED ASSISTANCE!



Hands on top of head

OKAY! – I'M ALL RIGHT!

- I UNDERSTAND!



Thumbs up

NO! - NEGATIVE!



Thumbs down

APPENDIX 3
CITIZEN PARTICIPATION PLAN

APPENDIX 3

CITIZEN PARTICIPATION PLAN

The NYC Office of Environmental Remediation and 150 Wooster LLC have established this Citizen Participation Plan because the opportunity for citizen participation is an important component of the NYC Voluntary Cleanup Program. This Citizen Participation Plan describes how information about the project will be disseminated to the Community during the remedial process. As part of its obligations under the NYC VCP, 150 Wooster LLC will maintain a repository for project documents and provide public notice at specified times throughout the remedial program. This Plan also takes into account potential environmental justice concerns in the community that surrounds the project Site. Under this Citizen Participation Plan, project documents and work plans are made available to the public in a timely manner. Public comment on work plans is strongly encouraged during public comment periods. Work plans are not approved by the NYC Office of Environmental Remediation (OER) until public comment periods have expired and all comments are formally reviewed. An explanation of cleanup plans in the form of a public meeting or informational session is available upon request to OER's Project Manager assigned to this Site, Katherine Glass, who can be contacted about these issues or any others questions, comments or concerns that arise during the remedial process at (212) 788-8841.

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

Repositories: A document repository is maintained online. Internet access to view OER's document repositories is available at public libraries. This document repository is intended to house, for community review, all principal documents generated during the cleanup program including Remedial Investigation plans and reports, Remedial Action Work Plans and reports, and all public notices and fact sheets produced during the lifetime of the remedial project. The library nearest the Site is:

New York Public Library Mulberry Street Branch
10 Jersey St, New York, NY 10012
(212) 966-3424

Repository Hours of Operation:
Monday and Wednesday 11AM–7PM, Tuesday and Thursday 10AM–7PM,
Friday and Saturday 10AM–5PM, Sunday Closed

Digital Documentation: NYC OER requires the use of digital documents in our repository as a means of minimizing paper use while also increasing convenience in access and ease of use.

Issues of Public Concern: None

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

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

Citizen Participation Milestones: Public notice and public comment activities occur at several steps during a typical NYC VCP project. These steps include:

- **Public Notice of the availability of the Remedial Investigation Report and Remedial Action Work Plan and a 30-day public comment period on the Remedial Action Work Plan:** Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the availability of the Remedial Investigation Report and Remedial Action Work Plan and the initiation of a 30-day public comment period on the Remedial Action Work Plan. The Fact Sheet summarizes the findings of the RIR and provides details of the RAWP. The public comment period will be extended an additional 15 days upon public request. A public meeting or informational session will be conducted by OER upon request.
- **Public Notice announcing the approval of the RAWP and the start of remediation:** Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the approval of the RAWP and the start of remediation.
- **Public Notice announcing the completion of remediation, designation of Institutional and Engineering Controls and issuance of the Notice of Completion:** Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the completion of remediation, providing a list of all Institutional and Engineering Controls implemented for to the Site and announcing the issuance of the Notice of Completion.

APPENDIX 4
SUSTAINABILITY STATEMENT

APPENDIX 4

SUSTAINABILITY STATEMENT

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

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

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

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

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

The following energy conservation measures are being considered for the planned development:

- High efficiency glazing (low “e”) windows
- High efficiency water-cooled air conditioning units
- High efficiency electric heat pumps and radiant heating through hydronic gas fired boilers for domestic hot water and space heating
- Heat recovery wheel and heat recovery of toilet exhaust
- Variable frequency devices (VFDs) and premium efficiency motors on fans and pumps
- Energy Star appliances
- Carbon monoxide (CO) sensor in garage to control exhaust ventilation
- High efficiency LED lights
- Energy Star certified light fixtures
- Occupancy sensors in corridors, public spaces, and stairs
- Low VOC paints and sealants (where possible)
- Sustainable wood (where possible)

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

Natural gas is anticipated to be utilized in the new building. If it natural gas is utilized, an estimate of the volume of clean fuels used during remedial activities will be quantified and reported in the RAR.

Recontamination Control: Recontamination after cleanup and redevelopment is completed undermines the value of work performed, may result in a property that is less protective of public health or the environment, and may necessitate additional cleanup work later or impede future redevelopment.

Recontamination can arise from future releases that occur within the property or by influx of contamination from off-site.

Measures to limit the potential for recontamination include composite cover system capping of residual fill materials with building foundations and the use of a vapor barrier/SSDS to limit the migration of soil vapor contamination. An estimate of the area of the Site that utilizes recontamination controls under this plan will be reported in the RAR in square feet.

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

An estimate of the enhanced stormwater retention capability of the redevelopment project will be included in the RAR.

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

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

Paperless Voluntary Cleanup Program: 150 Wooster LLC is participating in OER's Paperless Voluntary Cleanup Program. Under this program, submission of electronic documents will replace submission of hard copies for the review of project documents, communications and milestone reports.

Low-Energy Project Management Program: 150 Wooster LLC is participating in OER's low-energy project management program. Under this program, whenever possible, meetings are held using remote communication technologies, such as videoconferencing and teleconferencing to reduce energy consumption and traffic congestion associated with personal transportation.

Trees and Plantings: Trees and other plantings provide habitat and add to NYC's environmental quality in a wide variety of ways. Native plant species and native habitat provide optimal support to local fauna, promote local biodiversity, and require less maintenance. No landscaping is planned as part of on-site development; however, trees will be planted in tree pits in the sidewalks along Wooster Street.

APPENDIX 5
SOIL/MATERIALS MANAGEMENT PLAN

APPENDIX 5

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 remedial report. Soil screening will be performed during invasive work performed during the remedy and development phases prior to issuance of final signoff by OER.

1.2 Stockpile Methods

Excavated soil from suspected areas of contamination (e.g., hot spots, USTs, drains, etc.) will be stockpiled separately and will be segregated from clean soil and construction materials. Stockpiles will be used only when necessary and will be removed as soon as practicable. While stockpiles are in place, they will be inspected daily, and before and after every storm event. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by OER. Excavated soil 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 soil 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. Soil proposed for reuse on-site will be managed as defined in this plan.

1.4 Materials Excavation, Load-Out, and Departure

The PE/QEP overseeing the remedial action will:

- Oversee remedial work and the excavation and load-out of excavated material;
- Ensure that there is a party responsible for the safe execution of invasive and other work performed under this work plan;
- Ensure that Site development activities and development-related grading cuts will not interfere with, or otherwise impair or compromise the remedial activities proposed in this RAWP;
- Ensure that the presence of utilities and easements on the Site has been investigated and that any identified risks from work proposed under this plan are properly addressed by appropriate parties;
- Ensure that all loaded outbound trucks are inspected and cleaned if necessary before leaving the Site; and
- 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 urban fill and contaminated soil on-site will not be performed without prior OER approval.

1.5 Off-site Materials Transport

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

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

1.6 Materials Disposal Off-site

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

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

All contaminated 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. Urban 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 final remedial report. A manifest system for off-site transportation of exported materials will be employed. Manifest information will be reported in the final remedial report. Hazardous wastes derived from on-site will be stored, transported, and disposed of in compliance with applicable laws and regulations.

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

1.7 Materials Reuse On-site

Soil and fill that is derived from the property that meets the NYSDEC Restricted Residential SCOs may be reused on-site. The SCOs for on-site reuse are listed in Section 4.2 of this cleanup plan. '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 land with comparable levels of contaminants in soil/fill material, compliant with applicable laws and regulations, and addressed pursuant to the NYC VCP agreement subject to Engineering and Institutional Controls. The PE/QEP will ensure that reused materials are segregated from other materials to be exported from the Site and that procedures defined for material reuse in this remedial plan are followed.

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 SMP; or (2) a land survey of the top elevation of residual soil/fill before the placement of cover soils, pavement and associated sub-soils, or other materials or structures or, (3) all materials beneath the approved cover will be considered impacted and subject to Site management after the remedy is complete. Demarcation may be established by one or any combination of these three methods. As appropriate, a map showing the method of demarcation for the Site and all associated documentation will be presented in the RAR.

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

1.9 Import of Backfill Soil From Off-site Sources

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 soil will meet OER-approved backfill and cover soil quality objectives for this Site. Imported soil will not exceed groundwater protection standards established in Part 375. Imported soil for Track 1 remedial action projects will not exceed Track 1 SCO's.

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:

- 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 final remedial report. 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 Stormwater Pollution Prevention

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

1.12 Contingency Plan for Unknown Contamination Sources

This contingency plan is developed for the remedial construction to address the discovery of unknown structures or contaminated media during excavation. Identification of unknown contamination source areas during invasive Site work will be promptly communicated to OER's Project Manager. Petroleum spills will be reported to the NYS DEC Spill Hotline. These findings will be included in the daily report. If previously unidentified contaminant sources are

found during on-site remedial excavation or development-related excavation, sampling will be performed on contaminated source material and surrounding soil and reported to OER.

Chemical analytical testing will be performed for TAL metals, TCL volatiles and semi-volatiles, TCL pesticides and PCBs, as appropriate.

1.13 Odor, Dust, and Nuisance Control

1.13.1 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 soil. If odors develop and cannot otherwise be controlled, additional means to eliminate odor nuisances will include: (d) direct load-out of soil to trucks for off-site disposal; and (e) use of chemical odorants in spray or misting systems.

This odor control plan is capable of controlling emissions of nuisance odors. If nuisance odors are identified, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. OER and 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 this remedial plan.

1.13.2 Dust Control

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

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

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

1.13.3 Other Nuisances

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

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

APPENDIX 6

VAPOR BARRIER/SUB-SLAB DEPRESSURIZATION SYSTEM DESIGN DIAGRAMS