

**MAPES EAST 182 STREET
BRONX, NEW YORK**

Supplemental Remedial Investigation Work Plan

**NYSDEC BCP Site No.: C203149
AKRF Project Number: 210138**

Prepared For:

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1.0 INTRODUCTION

This Supplemental Remedial Investigation Work Plan (SRIWP) has been prepared by AKRF, Inc. (AKRF) on behalf of East 182 Street Associates, LLC (the Volunteer), for the property located at 820 East 182nd Street in the Belmont section of the Bronx, New York, hereafter referred to as the “Site.” The Site is identified by the City of New York as Borough of the Bronx, Tax Block 3111, Lot 59.

Currently, the Site is unoccupied and contains a former Sunoco[®] gasoline station and a single-story building that formerly housed an auto repair shop and adjoining convenience store. The former pump island, located in the eastern portion of the lot, was supplied by five 4,000-gallon gasoline underground storage tanks (USTs) located in the northern portion of the Site. In addition, an 1,000-gallon waste oil UST was previously located in the northwestern portion of the Site, abutting the auto repair shop. The pump island was disconnected in May 2021 and the USTs were emptied and taken out-of-service in October 2021. The USTs and pump island were removed from the Site between March 1 and 9, 2023 as part of an Interim Remedial Measure (IRM). Exterior portions of the Site, post-IRM, are a combination of exposed clean backfill and asphalt pavement. The Site location and topography of the Site and surrounding area are shown on Figure 1, and the Site layout is shown on Figure 2.

The Site is abutted to the north by East 182nd Street, followed by a multi-story apartment building; to the south by multi-story apartment buildings; to the east by the intersection of Southern Boulevard, East 182nd Street, and Crotona Parkway, followed by the Bronx Zoo; and to the west by a multi-tenant commercial building consisting of a deli/grocery, restaurant, and beauty spa. The surrounding area comprises predominantly residential and commercial uses. A Site Location Map is provided as Figure 1, and a Site Plan is provided as Figure 2.

A Remedial Investigation (RI) was performed at the Site in February 2024. The RI identified elevated levels of petroleum-related volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), and select metals in soil and groundwater, and petroleum-related VOCs in soil vapor. The highest detections were located beneath the former UST grave and former pump island. This SRIWP describes the procedures to be used to further define the nature and extent of contamination at the Site. The data compiled from the Supplemental Remedial Investigation (SRI), as described in this SRIWP, will be used to update the January 2025 draft RI Report (RIR). All work will be completed in accordance with this SRIWP, which includes a Quality Assurance Project Plan (QAPP) (Appendix A) and a Health and Safety Plan (HASP) (Appendix B) and Community Air Monitoring Plan (CAMP) (Appendix C). The CAMP will be implemented during all subsurface investigation activities involving soil disturbance at the Site.

Contact information for the parties responsible for the work described in this SRIWP are included in Table 1:

Table 1
Supplemental Remedial Investigation Personnel Contact Information

Company	Individual Name	Title	Contact Number
NYSDEC	Rafi Alam	Project Manager	(518) 402-8606
NYSDOH	Johnathan Robinson	Project Manager	(518) 402-7881
AKRF	Deborah Shapiro	Project Director, QEP	(646) 388-9544
	Adrianna Bosco	Project Manager	(646) 388-9576
	Brian Quinn	Field Team Leader/Site Safety Officer (SSO)	(201) 314-8032 (cell)
	Mackenzie Miller	Alternate Field Team Leader/SSO	(631) 357-9404 (cell)

Table 1
Supplemental Remedial Investigation Personnel Contact Information

Company	Individual Name	Title	Contact Number
East 182 Street Associates LLC	Kelly Biscuso	Volunteer's Representative	(212) 243-9090

2.0 SITE DESCRIPTION AND HISTORY

2.1 Site Description and Surrounding Land Use

The Site consists of an approximately 0.16-acre parcel located at 820 East 182nd Street in the Belmont section of the Bronx, New York, and is identified by the City of New York as Borough of Bronx Tax Block 3111, Lot 59. Currently, the Site is unoccupied and developed with a former Sunoco[®] gasoline station and a vacant single-story building that formerly housed an auto repair shop and adjoining convenience store. The exterior portion of the Site consists of exposed clean backfill and asphalt-paved surfaces. The surrounding area comprises predominantly residential and commercial uses. A surrounding land use map is provided as Figure 3.

2.2 Site Geology, Hydrogeology, and Subsurface Characteristics

Based on a February 2024 survey of the Site by Fehring Surveying, PC, the Site lies at an elevation between 79.97 and 81.79 feet above the North American Vertical Datum of 1988 (NAVD88). Based on the U.S. Geological Survey, Central Park, NY Quadrangle (2013), the surrounding area topography slopes down in a southerly direction.

During the RI, groundwater beneath the Site ranged from elevation 63.74 to elevation 70.68 (NAVD88), or 9.29 (RI-MW-01) to 17.64 (RI-MW-07) feet below ground surface (bgs) across the Site. Based on the well elevation survey, groundwater flows in a generally easterly direction beneath the Site. The actual groundwater flow direction can be affected by other factors including bedrock geology, or subsurface openings or obstructions. Groundwater in the Bronx is not used as a source of potable water (the municipal water supply uses upstate reservoirs).

The stratigraphy beneath the Site generally consists of fill material (sand, gravel, silt, concrete, brick, ash and asphalt) between just bgs to approximately 3 to 10 feet bgs. The fill material was underlain by apparent native soil (generally sand, silt, and gravel) to 23 feet below grade (the maximum boring terminus). A lens of grey clay with trace silt and gravel was encountered between approximately 5 to 9 feet bgs on the eastern-central portion of the Site. Presumed weathered bedrock was encountered between approximately 6 feet bgs and 23 feet bgs.

2.3 Proposed Development Plan

Redevelopment plans are still being prepared; however, the anticipated use post-remediation will include rental housing affordable for a range of household incomes from formerly homeless families to households with income at or below 100% of Area Median Income (AMI). The Volunteer is in the process of rezoning the Site, the adjacent parcels, and select lots in the surrounding neighborhood to R8A (residential) and C2-4 (commercial).

2.4 Site History

Available records indicated that the Site was developed with a dwelling and unspecified structure as early as 1901. By 1915, a one- to two-story building, identified as Boulevard Inn, was located in the eastern portion of the Site, in place of the former structures. Stores, dwellings, and an auto garage were present on the Site circa 1950. By 1977, the former structures were demolished, and the Site was developed with one building identified as a gasoline filling station. Historic City Directories indicated that the Site was operated by various automotive-related uses between 1956 and 2017, including Pete's Tune Up Service, Bronx Park Esso Station, Herlan Enterprises, R & O Auto Parts, Gaseteria Oil, Calcano's Service Station Inc., Calcano's Domestic & Foreign Auto Repair, and BP Station. The Volunteer has owned the Site since the Site became vacant on May 20, 2021.

3.0 PREVIOUS ENVIRONMENTAL REPORTS

Copies of previous reports prepared for the Site are included in Appendix D, and summarized below:

Phase I Environmental Site Assessment, 95-04 & 95-25 149th Street, 820 East 182nd Street, Bronx, New York, AKRF, Inc., April 2021

AKRF prepared a Phase I ESA for the Site in April 2021, in accordance with American Society for Testing and Materials (ASTM) Standard E1527-13, prior to the Volunteer taking ownership of the Site. The Phase I ESA included a review of current and historical Sanborn Fire Insurance maps; state and federal environmental regulatory databases; local records; and reconnaissance of the Site and its surroundings. Based on the findings of the Phase I ESA, the following Recognized Environmental Conditions (RECs)/Historic RECs (HRECs) were identified:

RECs

- The Site was listed as various auto repair facilities and gasoline stations on City Directories and Sanborn maps as early as 1956. The Site was also listed under the EDR US Historic Auto Station database as various auto repair facilities and gasoline stations between 1969 and 2014, the Resource Conservation and Recovery Act (RCRA) database as a non-generator and historic Conditionally Exempt Small Quantity Generator (CESQG) of ignitable waste, the US Aerometric Information Retrieval System (AIRS) database as a minor air pollution source, the Facility Index System (FINDS) database, and the Enforcement and Compliance History Information (ECHO) database with no reported violations, and the NYSDEC Petroleum Bulk Storage (PBS) database under PBS ID 2-188964. The PBS registration listed five in-service 4,000-gallon gasoline USTs installed in 1984, one in-service 1,000-gallon waste oil/used oil UST installed in 1985, one temporarily out of service 1,000-gallon No. 2 fuel oil UST, one 1,000-gallon UST converted to non-regulated use (product stored unknown), and 11 550-gallon USTs closed prior to micro-conversion (product stored unknown). During the reconnaissance, petroleum-like staining was observed throughout the surface of the Site and several unlabeled 55-gallon drums were noted to be in poor condition.
- Database records and City Directories identified a historical dry cleaner, located at 814 East 182nd Street, west-adjacent to the Site. The dry cleaner was identified on the registered and historical dry cleaners database, and RCRA database from 1999 to 2011.
- Sanborn maps and City Directories identified additional proximal automotive, industrial, and dry cleaner uses between 1915 and 2005, including: F&J Service Radio & Television, Crestliner TV & Auto Radio, Gallant Manufacturing Co., C & H Electric Motor Service, Fischer Alfred French Dry Cleaners, Gil's Tire Service, a print shop, a woodworking facility, and a marble works.

HRECs

- The Site was listed with two closed Spills listings: Spill No. 9005411 was reported in July 1990 due to a tank overflow. Contaminated soil was reportedly encountered during the removal of a 550-gallon tank. The listing indicated that the soil would be analyzed and disposed of, but no further pertinent details were provided. The spill was closed in May 1991. Spill No. 9306408 was reported in August 1993. Approximately 3 gallons of gasoline was spilled due to a submerged turbine pump failure. Gasoline was noted on water in one of the manways and was reportedly pumped out. The spill listing also noted further investigation was to be conducted; however, no additional details were provided. The spill was closed in October 1993.

Phase II Environmental Site Assessment, 820 East 182nd Street, Bronx, New York, AKRF, Inc., May 2021

AKRF was retained by the Volunteer to conduct a Phase II ESA in March 2021, prior to acquisition of the Site. The scope of work was based on the findings of the April 2021 Phase I ESA prepared by AKRF. The Phase II ESA included a geophysical survey; the advancement of seven soil borings across the Site and collection of up to three soil samples from each boring; and the installation of four temporary soil vapor points with collection of four soil vapor samples. AKRF attempted to install up to three temporary groundwater monitoring wells; however, groundwater was not encountered above presumed bedrock in any of the borings.

Soil borings were advanced across the Site using a Geoprobe[®] direct-push drill rig. Soil cores were field-screened using a photoionization detector (PID). At each boring location, one soil sample was collected from the 2-foot interval directly below existing pavement and a second sample was collected from the 2-foot interval where the greatest evidence of contamination (e.g., odors, staining, elevated PID readings) was observed. In the absence of evidence of contamination, a sample was collected from the 2-foot interval directly above the bedrock surface, which was encountered between approximately 7 and 19 feet below grade. At soil borings SB-02 and SB-03, a third sample was collected from 8 to 10 feet below grade and 11 to 13 feet below grade, respectively, where additional evidence of contamination was observed. Groundwater was not encountered above bedrock.

Soil beneath the Site consisted of fill material (sand, gravel, silt, concrete, brick, and asphalt) between just below surface grade down to approximately 2 to 5 feet below grade. The fill material was underlain by apparent native soil (sand, silt, and gravel) to 19 feet below grade (the maximum boring terminus). Presumed weathered bedrock was encountered between approximately 7 feet below grade in SB-07 and 19 feet below grade in SB-02. Petroleum-like odors and elevated PID readings were observed in soil borings SB-02, SB-03, and SB-07 up to 713.4 parts per million (ppm).

Exterior soil vapor points SV-01, SV-02, and SV-03 were installed at approximately 2 feet above presumed bedrock, at depths ranging between 15 and 17 feet below grade. Sub-slab soil vapor point SV-04 was installed approximately 12 inches beneath the concrete building slab of the auto repair shop. Soil and soil vapor laboratory analytical results are summarized below:

Soil

- Volatile organic compounds (VOCs) were detected in 11 of the 16 soil samples. The VOCs 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, acetone, benzene, ethylbenzene, n-propylbenzene, toluene, and total xylenes were detected at concentrations above their respective NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives (UUSCOs) and Protection of Groundwater Soil Cleanup Objectives (PGWSCOs). Concentrations of petroleum-related VOCs were detected up to 72 milligrams per kilogram (mg/kg) (total xylenes in sample 820_SB-03_11-13_20210323). No VOCs were detected at concentrations exceeding the Restricted Residential Soil Cleanup Objectives (RRSCOs).
- Semi-volatile organic compounds (SVOCs) were detected at low levels in 13 of the 16 samples. Indeno(1,2,3-cd)pyrene was detected at a concentration of 0.72 mg/kg in sample 820_SB-04_0-2_20210324, just above the UUSCO and RRSCO of 0.5 mg/kg. No other SVOCs were detected above the UUSCOs and RRSCOs.
- Up to 22 of the 23 Target Analyte List (TAL) metals analyzed and hexavalent chromium were detected in all 16 soil samples. Silver was not detected in any soil sample. Of the detections, copper (maximum of 125 mg/kg), hexavalent chromium (maximum of 2.2 mg/kg), lead (maximum of 398 mg/kg), mercury (maximum of 0.65 mg/kg), and zinc (maximum of 357 mg/kg) were detected at concentrations above the UUSCOs, but below the RRSCOs.

- Polychlorinated biphenyls (PCBs) were not detected above laboratory reporting limits in any of the soil samples. One pesticide, P,P'-DDT, was detected in sample 820_SB-01_0-2_20210323 at a concentration of 0.0035 mg/kg, above the UUSCO of 0.0033 mg/kg, but below the RRSCO of 7.9 mg/kg. No other pesticides were detected above laboratory reporting limits.

Soil Vapor

- Elevated concentrations of petroleum-related VOCs were detected in each of the four soil vapor samples. Of note, the VOCs 2,2,4-trimethylpentane, benzene, butane, cyclohexane, n-heptane, n-hexane, and toluene were detected at concentrations up to 360,000,000 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) (butane in sample 820_SV-03_20210323). The chlorinated solvent, tetrachloroethylene (PCE), was detected at a concentration of 58 $\mu\text{g}/\text{m}^3$ in sample 820_SV-04_20210323.

Interim Remedial Measure Completion Report, 820 East 182nd Street, Bronx, New York, AKRF, Inc., July 2024

The Interim Remedial Measure (IRM) was conducted in general accordance with the NYSDEC-approved IRM Work Plan dated October 2022. The IRMWP included the following scope of work:

- The demolition and removal of three pump dispensers and the associated pump island.
- The removal of five 4,000-gallon gasoline USTs and one 1,000-gallon waste oil UST, along with the fill ports, vent pipes, and associating piping (including piping to the dispensers).
- The collection and laboratory analysis of 15 endpoint samples from beneath the tank grave, piping, and pump island to determine the extent of petroleum-contaminated material.
- Placement of clean backfill material on top of a demarcation barrier across the Site to cap and return the Site to the established grade following the UST and pump island removal.

Between March 1 and 9, 2023, a 1,000-gallon waste oil UST, five 4,000-gallon gasoline USTs and associated piping, including the piping to the pump islands, were removed from the Site. The tanks were previously emptied by Island Pump & Tank (IPT) of East Northport, New York and rendered temporarily out of service in October 2021. Once exposed, each tank was placed on and covered with poly sheeting for additional cleaning and future off-site disposal. No elevated PID readings or evidence of gross contamination [e.g., presence of non-aqueous phase liquid (NAPL), heavy staining, strong odors] was detected in the soil at the base of the removal area. Disposal of the UST contents included approximately 100 gallons of a petroleum-water mixture and five drums of tank sludge at Advanced Waste Water Tremont Corp. of Farmingdale, New York and Republic Environmental Systems, LLC of Hatfield, Pennsylvania, respectively. The cleaned tank carcasses were removed from the Site and disposed of as scrap metal at Bronx Scrap Metal of the Bronx, New York, between March 7 and 9, 2023.

Fifteen endpoint soil samples were collected from the bottom of the excavation following removal of the USTs, pumps, and associated piping, to determine the extent of petroleum-contaminated material. The samples were analyzed for the VOCs and SVOCs identified in Tables 2 and 3 of the NYSDEC CP-51 Soil Cleanup Guidance, by EPA Methods 8260 and 8270, respectively. Soil laboratory analytical results are summarized below:

- VOCs were not detected above laboratory reporting limits in eight of the 15 soil samples. In the remaining seven samples, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, n-propylbenzene, toluene, naphthalene, and/or total xylenes were detected at concentrations above the UUSCOs and/or RRSCOs. Concentrations ranged from 0.1 mg/kg to 2,100 mg/kg (total xylenes in sample IRM-EP-13_4_20230310).

- SVOCs were not detected above laboratory reporting limits in five of the 15 soil samples. In the remaining 10 samples, SVOCs were detected at concentrations ranging from 0.0085 mg/kg to 21 mg/kg. Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, chrysene, and indeno(1,2,3-c,d)pyrene were detected in sample IRM-EP-15_2_20230310 at concentrations above the UUSCOs and RRSCOs (chrysene was only detected above the UUSCO). Naphthalene was detected in sample IRM-EP-13_4_20230310 at a concentration of 21 mg/kg, above the UUSCO, but below the RRSCO.

On March 27 and 28, 2023, a total of 158.45 tons of virgin sand was imported to the Site from Coram Materials Corp. of Miller Place, New York, a NYSDEC-permitted sand and gravel quarry (NYSDEC ID No. 10098). The sand was used exclusively as backfill in areas where the tanks, pump island, and piping were removed. A demarcation barrier was placed at the base of the excavation prior to backfilling, to separate the clean fill material from the on-site soils.

NYSDEC approved the IRMCR in July 2024.

Draft Remedial Investigation Report, Mapes East 182 Street Site, 820 East 182nd Street, Bronx, New York, AKRF, Inc., January 2025

Upon acceptance into the BCP, AKRF was retained by the Volunteer to conduct a RI at the Site in accordance with a NYSDEC-approved RI Work Plan (RIWP). The RI was performed in February 2024 and consisted of a geophysical survey; the advancement of 12 soil borings across the Site and collection of 32 soil samples; the installation of five permanent groundwater monitoring wells with the collection of five groundwater samples; and the installation of eight temporary soil vapor probes with the collection and laboratory analysis of six soil vapor samples and two sub-slab soil vapor samples, and the collection of one ambient air sample.

Soil, groundwater, and soil vapor laboratory analytical results are summarized below:

Soil

- Up to nine petroleum-related VOCs, including 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, n-propylbenzene, tert-butyl methyl ether, toluene, and total xylenes, were detected in multiple samples above their respective UUSCOs, RRSCOs, and/or PGWSCOs. Concentrations ranged from 0.044 to 180 mg/kg. Acetone was detected above the UUSCO; however, as it was additionally detected in the field blank and trip blank samples, it is likely due to laboratory contamination and not considered a COC.
- Up to eight SVOCs, including benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-c,d)pyrene, and phenanthrene, were detected above UUSCOs and/or RRSCOs in shallow soil samples (0 to 6 feet bgs) collected from across the Site. Concentrations ranged from 0.39 to 17 mg/kg.
- One pesticide, 4,4'-DDT, was detected above UUSCOs, but below the RRSCOs.
- The metals barium, copper, hexavalent chromium, lead, mercury, nickel, and zinc were detected above the UUSCOs. Of these, barium, hexavalent chromium, lead, and mercury were detected above RRSCOs.

Groundwater

- Thirteen VOCs, including 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, acetone, benzene, ethylbenzene, isopropylbenzene, m,p-xylenes, n-butylbenzene, n-propylbenzene, o-xylene, sec-

butylbenzene, tert-butyl methyl ether, and toluene, were detected at concentrations above the AWQSGVs. Concentrations ranged from 5.9 to 9,300 micrograms per liter ($\mu\text{g/L}$).

- Five SVOCs, including benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, naphthalene, and phenol, were detected in the groundwater samples at concentrations above their respective AWQSGVs. Concentrations ranged from 0.42 to 340 $\mu\text{g/L}$.
- The metals barium (total), total chromium (total), iron (total and dissolved), lead (total), magnesium (total and dissolved), manganese (total and dissolved), nickel (total), sodium (total and dissolved), and thallium (total) were detected above their respective AWQSGVs.
- PFOA and PFOS were detected at concentrations above the guidance values for human health.

Soil Vapor

- Elevated concentrations of petroleum-related and chlorinated VOCs were detected in each of the six soil vapor and two sub-slab soil vapor samples. The following VOCs were detected at elevated concentrations: PCE (ranging from 11 to 190 $\mu\text{g/m}^3$); cyclohexane (ranging from 0.03 to 4,900,000 $\mu\text{g/m}^3$); 2,2,4-trimethylpentane (ranging from 0.91 to 18,000,000 $\mu\text{g/m}^3$); m,p-xylenes (ranging from 2.7 to 16,000 $\mu\text{g/m}^3$); n-heptane (ranging from 0.39 to 4,400,000 $\mu\text{g/m}^3$); and, n-hexane (ranging from 0.78 to 31,000,000 $\mu\text{g/m}^3$).
- All other VOCs were detected at concentrations typically encountered in urban settings, with many at values similar to ambient air concentrations. Low levels of VOCs were detected in the ambient air sample (AA-01).

Soil concentrations above the UUSCOs, RRSCOs, and/or PGWSCOs, groundwater concentrations above AWQSGVs, and soil vapor detections are shown on Figures 4, 5, and 6, respectively.

3.1 Areas of Concern (AOCs)

Based on the Site's history and previous reports prepared for the Site, the AOCs for the SRI include:

1. The Site's historic use as a gasoline station and auto repair shop.
2. Delineation of petroleum-related compounds in soil and groundwater, particularly beneath the former USTs and pump island.
3. Elevated concentrations of petroleum-related compounds in soil vapor.

4.0 FIELD PROGRAM

The SRI field program will focus on collecting soil, groundwater, and soil vapor data to further define and characterize the nature and extent of Site contamination and to assist with determining the appropriate remedial action.

4.1 Field Program Summary

The field work scope of work (SOW) includes: a utility location survey; the advancement of 20 soil borings with the collection and laboratory analysis of at least two soil samples from each soil boring; the installation of nine permanent groundwater monitoring wells with the collection and laboratory analysis of nine groundwater samples; and the installation of five temporary soil vapor probes with the collection and laboratory analysis of five soil vapor samples. Six additional soil vapor probes will be installed to vertically delineate the extent of soil vapor contamination. The proposed sample locations are shown on Figure 7.

The soil boring and temporary soil vapor point locations will be surveyed using a Global Positioning System (GPS) and will be measured off of fixed points in the field. The groundwater monitoring wells will be surveyed by a New York State-licensed surveyor. Any field evidence of contamination (visual, olfactory, and/or elevated PID readings) will be recorded on logs for inclusion in the RIR. All sampling equipment will be either dedicated or decontaminated between sampling locations.

The aforementioned SOW will be conducted by AKRF and its subcontractors. Qualifications for AKRF personnel are included in Section 2.0 of Attachment A. The following sections describe the methods that will be used to complete the aforementioned SOW.

4.2 Utility Location Survey

A geophysical survey was previously conducted across the entire Site in February 2024 during the RI. As part of this Supplemental RI, a utility survey will be performed to clear the proposed sampling locations and investigate the presence of underground utilities within the adjacent sidewalk. Ground-penetrating radar (GPR) uses electromagnetic wave propagation and scattering to image and identify changes in electrical and magnetic properties in the ground. Magnetometers measure irregularities in the magnetic field in a given area. Any anomalies indicative of UST(s) will be marked in the field, measured off of fixed points in the field, and surveyed using GPS.

4.3 Soil Boring Advancement and Soil Sampling

A Rotosonic and/or direct-push drill rig will be used to advance 20 soil borings (denoted as RI-SB-13 through RI-SB-32) at the approximate locations shown on Figure 7. Continuous soil cores will be collected in 5-foot long, dedicated plastic sleeves. Soil borings will be advanced to the groundwater table or bedrock surface, estimated between approximately 6 and 23 feet below grade. Soil samples will be inspected by AKRF field personnel for evidence of contamination (e.g., odors, staining, etc.), screened for the presence of VOCs with a calibrated PID, and logged using the modified Burmister soil classification system.

At all soil boring locations, one soil sample will be collected for analysis from the upper 2 feet below existing pavement, all 2-foot intervals exhibiting visual or olfactory evidence of contamination, and the 2-foot interval immediately above the bedrock surface or groundwater table (whichever is encountered first). If evidence of contamination is observed, an additional sample will be collected at the first interval indicating no contamination.

Soil samples slated for laboratory analysis will be labeled and placed in laboratory-supplied containers and shipped to the laboratory via a courier with chain-of-custody (COC) documentation in accordance with appropriate United States Environmental Protection Agency (EPA) protocols to a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP)-certified laboratory.

Approximately 25% of the soil samples will be analyzed for VOCs by EPA Method 8260, SVOCs by EPA Method 8270, PCBs by EPA Method 8082, pesticides by EPA Method 8081, Target Analyte List (TAL) metals by EPA Method 6000/7000 series, hexavalent chromium by EPA Method 7196A, per- and polyfluorinated compounds (PFAS) by Modified EPA 1633A, and 1,4-dioxane by EPA Method 8270. The remaining samples will be analyzed for VOCs, SVOCs, and TAL metals only.

After each boring is completed, the boreholes will be filled with on-site materials (if not noticeably contaminated) in accordance with Section 3.3(e) of DER-10. Soil cuttings displaying field evidence of contamination will be containerized in properly labeled Department of Transportation (DOT)-approved 55-gallon drums for off-site disposal at a permitted facility. Boreholes that require drill cutting disposal will be filled with bentonite chips (hydrated). Disposable sampling equipment that comes in contact with environmental media will be double bagged and disposed of as municipal trash as non-hazardous refuse.

The rationale for the proposed soil sample locations is summarized in Table 2.

Table 2
Proposed Soil Sample Rationale

Sample Location	Sample Intervals for Laboratory Analysis ¹	Location	Rationale
RI-SB-13	0-2 ft, all 2-ft intervals exhibiting evidence of contamination, 2-ft above bedrock/groundwater. In event evidence of contamination is observed, an additional sample will be collected from the 2-ft interval immediately following the vertical extent of contamination.	Northern	To support the QHHEA and evaluate soil conditions along Site boundary
RI-SB-14		Northwestern	To support the QHHEA and evaluate soil conditions along Site boundary
RI-SB-15		Northwestern	To delineate extent of contamination beneath former tanks
RI-SB-16		Northern	To delineate extent of petroleum contamination along the northern boundary of the former tank farm
RI-SB-17		Northern	To delineate extent of petroleum contamination along the southeastern boundary of the former tank farm
RI-SB-18		Northern	To delineate extent of petroleum contamination along the eastern boundary of the former tank farm
RI-SB-19		Northeastern	To delineate extent of petroleum contamination around the former piping from the tanks to the pump island
RI-SB-20		Eastern	To delineate extent of petroleum contamination around the former piping from the tanks to the pump island

Table 2
Proposed Soil Sample Rationale

Sample Location	Sample Intervals for Laboratory Analysis ¹	Location	Rationale
RI-SB-21	0-2 ft, all 2-ft intervals exhibiting evidence of contamination, 2-ft above bedrock/groundwater. In event evidence of contamination is observed, an additional sample will be collected from the 2-ft interval immediately following the vertical extent of contamination.	Eastern	To delineate extent of petroleum contamination around the former piping from the tanks to the pump island
RI-SB-22		Eastern	To delineate extent of petroleum contamination around the former piping from the tanks to the pump island
RI-SB-23		Eastern-Central	To delineate the western extent of petroleum contamination around the former pump island
RI-SB-24		Southeastern	To delineate extent of petroleum contamination around RI-SB-07 to the north
RI-SB-25		Southeastern	To delineate extent of petroleum contamination around RI-SB-07 to the west
RI-SB-26		Southeastern	To delineate extent of petroleum contamination around RI-SB-07 to the south
RI-SB-27		Southern	To delineate the southwestern extent of petroleum contamination around the former pump island
RI-SB-28		Southeast-adjacent sidewalk	To support the QHHEA and evaluate potential for off-site migration to the south
RI-SB-29		North-adjacent sidewalk	To support the QHHEA and evaluate potential for off-site migration to the north
RI-SB-30		East-adjacent sidewalk	To support the QHHEA and evaluate potential for off-site migration to the east
RI-SB-31		Southwestern	To support the QHHEA and evaluate soil conditions along Site boundary
RI-SB-32		Southeastern	To delineate extent of petroleum contamination around RI-SB-07 to the east
Notes: 1. Indicates sample depth below existing pavement/building slab. 2. Additional samples may be collected from one or several borings if field evidence of contamination is observed.			

4.4 Groundwater Monitoring Well Installation and Development

Nine permanent monitoring wells (denoted as RI-MW-13, RI-MW-21, RI-MW-23, and RI-MW-26 through RI-MW-31) will be installed using a Rotasonic drill rig at the proposed locations shown on Figure 7. The wells will be constructed with 10 feet of 2-inch diameter 0.002-inch slotted polyvinyl chloride (PVC) well screen set approximately 5 feet below the water table, and a 2-inch diameter solid PVC riser installed to grade. The boreholes will be at least 6 inches in diameter to

allow for a minimum 2-inch annular space surrounding the monitoring well. A No. 2 morie sandpack will be installed from the base of the well to approximately 2 feet above the well screen. The annular space around the solid well riser above the sandpack will be sealed with approximately 2 feet of bentonite followed by a non-shrinking grout/cement mixture to approximately one foot below grade. Each of the wells will be finished with a locking j-plug and flush-mounted well cover with a concrete pad. Well construction logs will be prepared and included as an appendix to the RIR.

Following installation, each groundwater monitoring well will be developed via pumping and surging to remove any accumulated fines and establish a hydraulic connection with the surrounding aquifer. Development will continue until turbidity within the well is less than 50 nephelometric turbidity units (NTUs) for three successive readings; and until water quality indicators have stabilized to within 10% for pH, temperature, and specific conductivity for three successive readings. In the event that 50 NTUs cannot be achieved, at least three well volumes will be purged from the well. Well development details will be noted on groundwater development logs, included as an appendix to the RIR.

The rationale for the proposed soil sample locations is summarized in Table 3.

Table 3
Proposed Groundwater Sample Rationale

Groundwater Monitoring Well ID	Location	Rationale
RI-MW-13	Northern	To delineate extent of petroleum contamination north of the former tank grave and determine Site-specific groundwater flow direction and elevation.
RI-MW-21	Eastern	To assess groundwater quality in the eastern portion of the Site and determine Site-specific groundwater flow direction and elevation.
RI-MW-23	Eastern-Central	To assess groundwater quality on the eastern-central portion of the Site and determine Site-specific groundwater flow direction and elevation.
RI-MW-26	Southeastern	To delineate extent of contamination to the southeast of the former pump island and determine Site-specific groundwater flow direction and elevation.
RI-MW-27	Southern	To assess groundwater quality southwest of the former pump island and determine Site-specific groundwater flow direction and elevation.
RI-MW-28	Southeast-adjacent sidewalk	To evaluate potential for off-site migration of groundwater contamination and determine Site-specific groundwater flow direction and elevation.
RI-MW-29	North-adjacent sidewalk	To evaluate potential for off-site migration of groundwater contamination and determine Site-specific groundwater flow direction and elevation.
RI-MW-30	East-adjacent sidewalk	To evaluate potential for off-site migration of groundwater contamination and determine Site-specific groundwater flow direction and elevation.

Table 3
Proposed Groundwater Sample Rationale

Groundwater Monitoring Well ID	Location	Rationale
RI-MW-31	Southwestern	To assess groundwater quality on the southwestern portion of the Site and determine Site-specific groundwater flow direction and elevation.

4.5 Groundwater Elevation Survey

The groundwater monitoring wells will be surveyed by a New York State-licensed surveyor to determine their accurate location and elevation. Two elevation measurements will be taken at each well location: the at-grade elevation; and the elevation of the top of PVC casing (north side at marking), to facilitate preparation of a groundwater contour map and to determine the direction of groundwater flow. The elevation datum for the sampling points will be based on NAVD 88 Elevation Datum. The groundwater elevation survey will be included as an appendix to the RIR.

4.6 Groundwater Sampling

In accordance with EPA low-flow sampling protocols, the wells will be sampled one to two weeks following their development. Prior to sampling, an electronic interface meter will be used to measure water levels and a bailer will be used to measure any separate phase liquid. The purge water will be monitored for turbidity and water quality indicators [i.e., pH, dissolved oxygen, oxidation-reduction potential (ORP), temperature, and specific conductivity] with measurements collected approximately every five minutes. The criteria for stabilization will be three successive readings within $\pm 10\%$ for pH, temperature, and specific conductivity. All purge water will be containerized in properly labeled, DOT-approved 55-gallon drums for off-site disposal at a permitted facility.

Groundwater samples slated for laboratory analysis will be placed in laboratory-supplied containers and shipped in accordance with appropriate EPA protocols to a NYSDOH ELAP-certified laboratory. The samples will be analyzed for VOCs by EPA Method 8260, SVOCs by EPA Method 8270, PCBs by EPA Method 8082, pesticides by EPA Method 8081, total and dissolved TAL metals by EPA Method 6000/7000 series, PFAS by EPA Method 1633A, and 1,4-dioxane by EPA Method 8270 selected ion monitoring (SIM) using Category B deliverables. Filtering will occur in the field. Sampling for PFAS will be conducted in accordance with the April 2023 NYSDEC-issued sampling protocol, except that a low-density polyethylene (LDPE) bladder will be used as no industry-approved high-density polyethylene (HDPE) alternative currently exists. Well sampling details will be noted on groundwater sampling logs, included as an appendix to the RIR.

4.7 Soil Vapor Sampling

Five soil vapor samples (denoted as RI-SV-12, RI-SV-13, RI-SV-16, RI-SV-18, and RI-SV-20) will be collected from five temporary vapor monitoring probes at the approximate locations shown on Figure 7. Soil vapor points RI-SV-13 and RI-SV-16 will be installed as a sub-slab points approximately 3 inches beneath the building slab. The remaining three locations will be installed approximately 2 feet above the groundwater table or bedrock (whichever is encountered first). Soil vapor sampling will be performed in accordance with the guidelines provided in the NYSDOH document entitled, "Guidance for Evaluating Soil Vapor Intrusion in the State of New York," (October 2006, revised 2017 and 2024)." As the on-site building is unoccupied, no indoor air samples will be collected.

The temporary sub-slab and soil vapor points will be installed by advancing an expendable drive point using either a direct-push drill rig, a slide hammer, or hammer drill to the target sampling depth. At each monitoring point, a 6-inch stainless steel screen implant, connected to Teflon tubing will be installed by hand or through the drilling rods and threaded into the drive point. The sampling tubing will extend from the end of the screen to above grade. The push probe rods will then be removed and the boring will be backfilled with clean silica sand to 3 to 6 inches above the screen. Hydrated bentonite will be used to fill the remaining void around the sampling tubing to the ground surface.

The soil vapor samples will be collected over a 2-hour time period from each monitoring point using a 6-Liter, batch-certified SUMMA[®] canister equipped with a vacuum gauge and flow regulator set at a maximum rate of 0.2 liter per minute.

Prior to sample collection, the soil vapor sampling points will be purged of three sample volumes using a GilAir air sampling pump. During purging, a shroud will be placed over the sampling point and helium gas will be introduced to saturate the atmosphere around the sample port with helium gas. Purged vapors will be collected into a Tedlar[™] bag and field-screened for organic vapors using a PID. The purged air will also be monitored using a portable helium detector to check for short-circuiting of ambient air into the vapor sampling point. If the purged soil vapor contains greater than 10% helium, additional bentonite will used to enhance the surface seal, and the point will be retested.

Following purging, a soil vapor sample will be collected using the vacuum from the SUMMA[®] canister. Immediately after opening the flow control valve equipped with a two-hour regulator, the initial SUMMA[®] canister vacuum (inches of mercury) will be noted. After two hours, the flow controller valve will be closed, the final vacuum noted, and the canister placed in a shipping carton for delivery to the laboratory.

The soil vapor samples will be analyzed for VOCs by EPA Method TO-15 by a NYSDOH ELAP-certified laboratory with Category B deliverables. Samples will be shipped to the laboratory with appropriate COC documentation.

The rationale for the proposed soil vapor samples is summarized in Table 4.

Table 4
Proposed Soil Vapor Sample Rationale

Vapor Point ID	Sample Location	Rationale
RI-SV-12	Northwestern	To delineate concentrations of VOCs on the northwestern portion of the Site and evaluate the potential for off-site exposure to the northwest.
RI-SV-13	Western	To delineate concentrations of VOCs on the western portion of the Site and evaluate the potential for off-site exposure to the west.
RI-SV-16	Southwestern	To delineate concentrations of VOCs on the southwestern portion of the Site and evaluate the potential for off-site exposure to the southwest.
RI-SV-18	Central	To delineate concentrations of VOCs in the central portion of the Site.

Table 4
Proposed Soil Vapor Sample Rationale

Vapor Point ID	Sample Location	Rationale
RI-SV-20	Eastern	To delineate concentrations of VOCs on the eastern portion of the Site and evaluate the potential for off-site exposure to the east.

4.8 Vertical Soil Vapor Delineation

To vertically delineate the extent of soil vapor contamination across the Site, soil vapor samples will be collected at four depth intervals from six sample locations (denoted as RI-SV-14, RI-SV-15, RI-SV-17, RI-SV-19, RI-SV-22, and RI-SV-25 on Figure 7). The soil vapor point clusters will be constructed using four individual dedicated 6-inch stainless steel mesh sample points connected to polyethylene tubing installed at 5 feet, 10 feet, 15 feet, and 20 feet, or above bedrock/groundwater if encountered at shallower depths, for a total of 24 individual points. Each individual point within a cluster will be designated either “A”, “B”, “C”, or “D” to correspond with the varying depths (i.e., “A” = 5 ft bgs, “B” = 10 ft bgs, “C” = 15 ft bgs, and “D” = 20 ft bgs). Each sample point will be backfilled with No. 2 filter sand to 1-foot above the screened interval, followed by hydrated bentonite until the start of the next sampling point interval. Sample locations were selected to obtain representative vertical coverage across the Site and support the forthcoming remedial design.

The soil vapor samples will be collected using 1-Liter Tedlar® bags. The soil vapor samples will be analyzed for VOCs by EPA Method TO-15 by a NYSDOH ELAP-certified laboratory with Category B deliverables. Samples will be shipped to the laboratory with appropriate COC documentation.

4.9 Quality Assurance/Quality Control (QA/QC)

The analytical results will be reported using Category B deliverables. As required by the Category B sampling techniques, additional analysis will be included for QC measures. The QA/QC samples for soil and groundwater will include one field blank, one trip blank, one matrix spike/matrix spike duplicate (MS/MSD), and one blind duplicate sample at a frequency of one sample per 20 field samples per media. The field blank, blind duplicate, and MS/MSD samples will be analyzed for the same analyte list as the accompanying field samples. The laboratory-prepared trip blanks will be submitted for analysis of VOCs only to determine the potential for cross-contamination. QA/QC samples accompanying the soil and groundwater samples will also be analyzed for PFAS by EPA Method 1633A and 1,4-dioxane by EPA Method 8270 (SIM analysis will be used for groundwater samples). Additionally, one equipment blank will be collected for each day of groundwater sampling and analyzed for PFAS by EPA Method 1633A only.

Upon receipt of the analytical data from the laboratory, it will be reviewed by a third-party data validator, who will prepare a Data Usability summary Report (DUSR). The QAPP, included as Appendix A, describes the QA/QC protocols and procedures that will be followed during implementation of this RIWP.

4.10 Decontamination Procedures

All non-dedicated sampling equipment will be decontaminated between sampling locations using the following procedure:

1. Scrub equipment with a bristle brush using a tap water/Alconox® solution.

2. Rinse with tap water.
3. Scrub again with a bristle brush using a tap water/Alconox[®] solution.
4. Rinse with tap water.
5. Rinse with distilled water.
6. Air-dry the equipment.

Non-dedicated equipment used for soil and groundwater sampling of emerging contaminants will be decontaminated with laboratory-certified PFAS-free water.

4.11 Management of Investigation-Derived Waste (IDW)

IDW that does not exhibit field evidence of contamination will be used to backfill the corresponding borehole that generated them to within 12 inches of the surface. Soil IDW exhibiting evidence of gross contamination will be containerized in DOT-approved 55-gallon drums. All development and purge groundwater will be containerized in 55-gallon drums. The drums will be sealed at the end of each work day and labeled with the date, the well or boring number(s), the type of waste (i.e., drill cuttings, decontamination fluids, development water, or purge water) and the name of an AKRF point-of-contact. All drums will be labeled "pending analysis" until laboratory data is available. All boreholes will be restored after backfill. Handling of IDW and backfilling of boreholes will be conducted in accordance with Section 3.3(e) of DER-10.

5.0 REPORTING REQUIREMENTS

5.1 Daily Field Reports

During the field activities, daily reports will be submitted to the NYSDEC and NYSDOH Project Managers by noon the following day, and will include:

- A summary of progress made during the reporting day (e.g., borings advanced, monitoring wells installed, sample collection, etc.);
- An updated Site plan;
- A summary of CAMP data and response actions (if necessary);
- An explanation of notable findings; and
- Photographs of the Site documenting daily activities.

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

5.2 Remedial Investigation Report (RIR)

Upon completion of all field work and receipt of laboratory analytical results, the January 2025 draft RIR will be updated in compliance with Section 3.14 of DER-10 that will: document field activities; present field and laboratory data; evaluate exposure pathways in an exposure assessment; identify and characterize the source(s) of contamination; a summary of the overall nature and extent of contamination using the applicable standards, criteria, and guidance; and discuss conclusions and recommendations drawn from the results of the RI and SRI.

5.2.1 Description of Field Activities

The RIR will include a section that will describe the field methods used to characterize the Site conditions, including: sampling techniques; field screening equipment; drilling and excavation equipment; monitoring well installation procedures; and management of IDW. This section will also include descriptions of hydrogeologic factors of the Site.

5.2.2 Soil Assessment

The RIR will include a section that presents field and laboratory data for soil results. The section will include a description of soil characteristics and figures will be provided that illustrate soil boring locations. Field and laboratory analytical results will be presented in the body of the report, summarized in tables and figures, and the detected concentrations will be compared to regulatory standards and/or guidance values. Soil boring logs and laboratory analytical reports will be provided as attachments. Category B deliverables will be provided by the laboratory and a third-party DUSR will be prepared and discussed.

5.2.3 Groundwater Assessment

The RIR will include a section that presents field and laboratory data from the groundwater monitoring results. The section will include a description of groundwater characteristics and figures will be provided that illustrate monitoring well locations. Well survey data and water level measurements will be used to create a groundwater elevation contour map and determine the inferred groundwater flow direction. Field and laboratory analytical results

will be presented and compared with regulatory standards and/or guidance values. Well construction, well development, and groundwater sampling logs, and laboratory analytical reports will be provided as attachments. Category B deliverables will be provided by the laboratory and a third-party DUSR will be prepared and discussed.

5.2.4 Soil Vapor Assessment

The RIR will include a section that presents field and laboratory data from the soil vapor results. The section will include a description of soil vapor characteristics and will provide a comparison of soil vapor and indoor air sample analytical data. Figures will be provided that illustrate the soil vapor point locations. Field and laboratory analytical results will be presented and compared with regulatory standards and/or guidance values. Soil vapor sample logs and laboratory analytical reports will be provided as attachments. Category B deliverables will be provided by the laboratory and a third-party DUSR will be prepared and discussed.

5.2.5 Qualitative Human Health Exposure Assessment (QHHEA)

The RIR will include a QHHEA, which will be performed in accordance with DER-10 Section 3.3(c)4 and Appendix 3B.

6.0 PROPOSED PROJECT SCHEDULE

Table 5
Proposed Project Schedule

Activity	Time To Complete
Revised SRIWP Submitted to NYSDEC	October 2025
SRIWP Approved	January 2026
Implement SRIWP	February-April 2026
ULURP Rezoning Action Finalized	by December 2026
Update RIR and Submittal to NYSDEC	August 2026
NYSDEC Approves RIR and Issues Significant Threat Determination	January 2027
RAWP/Remedial Design Preparation	February 2027 – December 2027
Draft RAWP submitted	January 2028
45-day Public Comment Period for RAWP	August-September 2028
NYSDEC Approves RAWP and Issues Decision Document	June 2029
Issue Remedial/Construction Notice Fact Sheet	November 2030
Financing Closing with HPD	December 2030
Begin Implementation of RAWP	January 2031
Execution of Environmental Easement (if required)	June 2031
Draft Site Management Plan (SMP) Submitted to NYSDEC	August 2031
Draft Final Engineering Report and Fact Sheet	September 2031
Certificate of Completion and Fact Sheet	December 2031
Completion of Building (first occupancy)	December 2033

7.0 CERTIFICATION

I, Deborah Shapiro, certify that I am currently a Qualified Environmental Professional as defined in 6 NYCRR Part 375 and that this Supplemental Remedial Investigation Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

Deborah Shapiro, QEP

Name

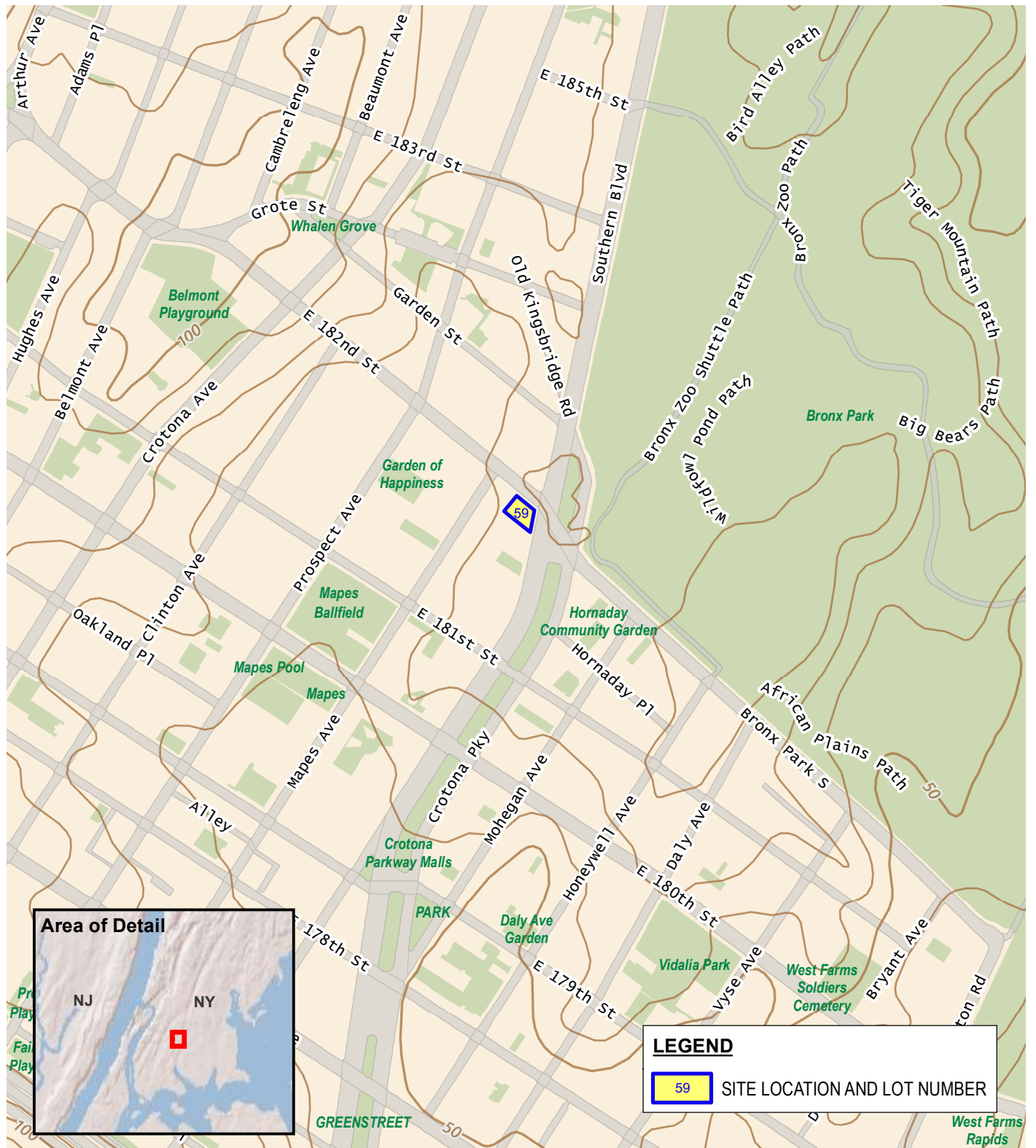


Signature

10/6/2025

Date

FIGURES



akrf

440 Park Avenue South, New York, NY 10016

820 East 182nd Street
Bronx, New York

SITE LOCATION

DATE
6/19/2025

PROJECT NO.
210138

FIGURE
1

C:\Users\AKRF\OneDrive\Documents\210138 - 820 EAST 182ND STREET\Technical\GIS and Graphics\Hazmat\Phase II\210138 Fig 2 Site and Sample Location Plan.mxd 6/19/2025 12:44:51 PM mveilleux



Aerial Source:
2018 New York State ITS GIS Orthoimagery
Map Source:
NYCDP (NYC Dept. of City Planning) GIS database

LEGEND

- BCP SITE BOUNDARY
- 59 LOT BOUNDARY AND TAX LOT NUMBER
- 3111 BLOCK NUMBER
- PHASE II SOIL BORING LOCATION (MARCH 2021)
- ⊕ PHASE II SOIL BORING/SOIL VAPOR POINT LOCATION (MARCH 2021)
- SOIL BORING LOCATION
- ⊕ SOIL VAPOR POINT LOCATION
- ⊗ SOIL BORING/MONITORING WELL LOCATION
- ⊕ SOIL BORING/SOIL VAPOR POINT LOCATION
- ⊗ SOIL BORING/MONITORING WELL/SOIL VAPOR POINT LOCATION
- FUEL PIPING *
- ELECTRIC *
- WATER *
- UNKNOWN UTILITY *
- METALLIC ANOMALY *

* APPROXIMATE LOCATIONS BASED ON GPR SURVEY,
PREPARED BY ENVIROPROBE SERVICE, INC.
FEBRUARY 05, 2024.

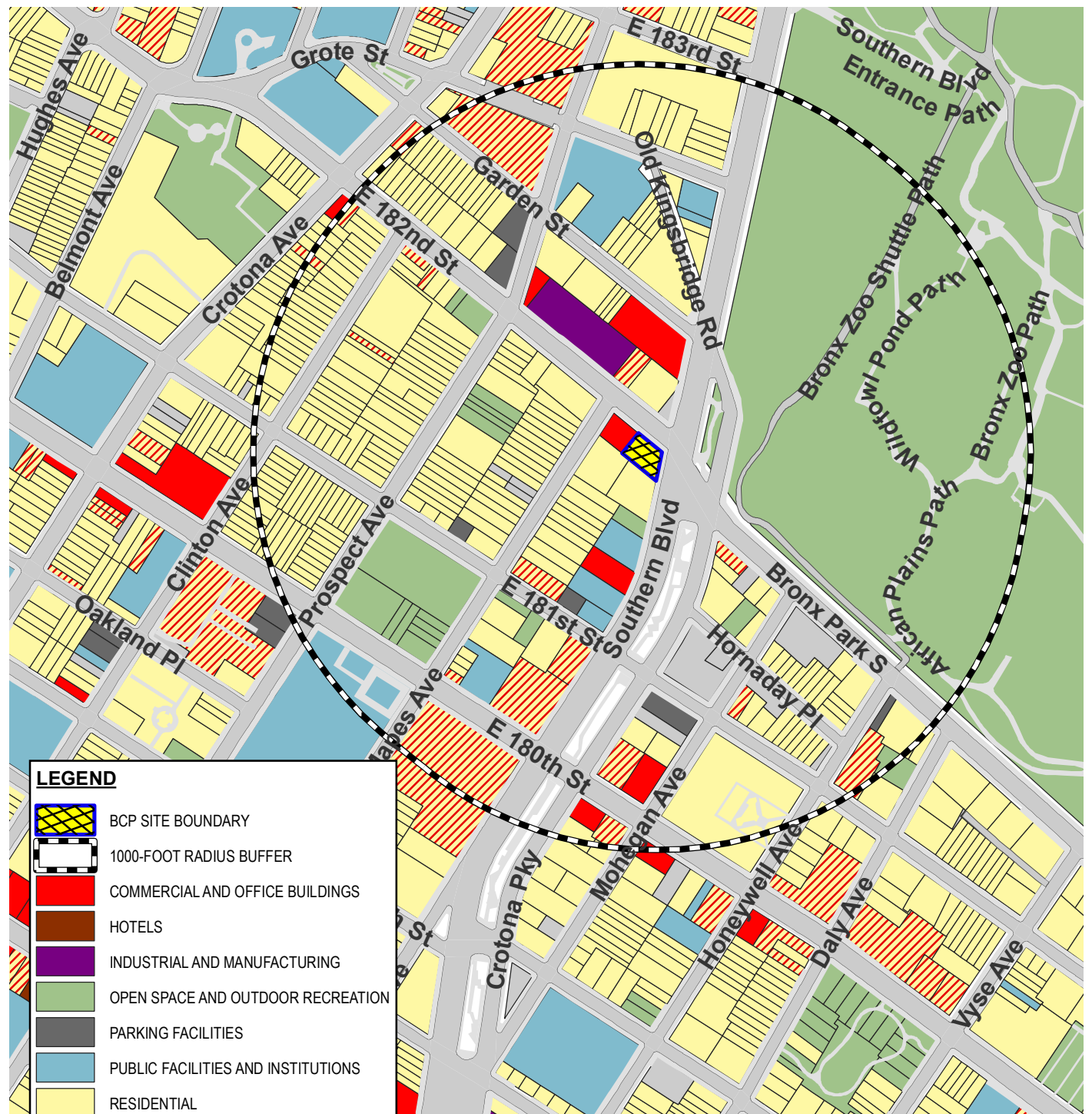


akrf
440 Park Avenue South, New York, NY 10016

820 East 182nd Street
Bronx, New York
SITE AND SAMPLE LOCATION PLAN

DATE
6/19/2025
PROJECT NO.
210138
FIGURE
2

© 2025 AKRF Q:\Projects\210138 - 820 East 182nd Street\Technical\GIS and Graphics\Hazmat\Phase II\210138 Fig 3 Surrounding Land Use.mxd 6/19/2025 1:04:05 PM mvelieux



LEGEND

BCP SITE BOUNDARY

1000-FOOT RADIUS BUFFER

COMMERCIAL AND OFFICE BUILDINGS

HOTELS

INDUSTRIAL AND MANUFACTURING

OPEN SPACE AND OUTDOOR RECREATION

PARKING FACILITIES

PUBLIC FACILITIES AND INSTITUTIONS

RESIDENTIAL

RESIDENTIAL WITH COMMERCIAL BELOW

TRANSPORTATION AND UTILITY

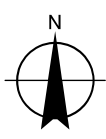
VACANT LAND

VACANT BUILDING

UNDER CONSTRUCTION

HYDROGRAPHY - WATER

Map Source:
NYCDP (NYC Dept. of City Planning) GIS database



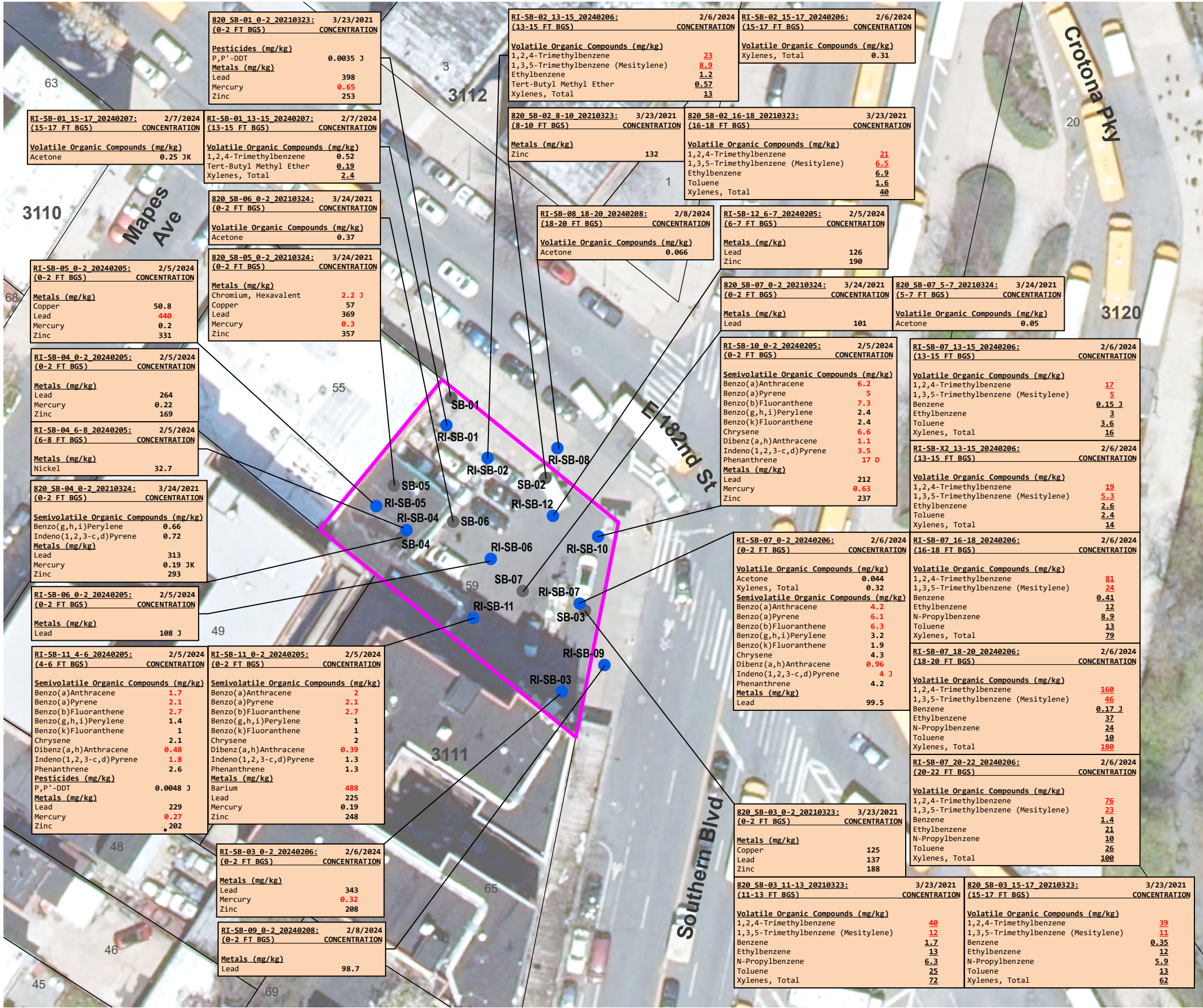
akrf

440 Park Avenue South, New York, NY 10016

820 East 182nd Street
Bronx, New York

SURROUNDING LAND USE

DATE	6/19/2025
PROJECT NO.	210138
FIGURE	3



- LEGEND**
- BCP SITE BOUNDARY
 - 59 LOT BOUNDARY AND TAX LOT NUMBER
 - 3111 BLOCK NUMBER
 - PHASE II SOIL BORING LOCATION (MARCH 2021)
 - RI SOIL BORING LOCATION (FEBRUARY 2024)

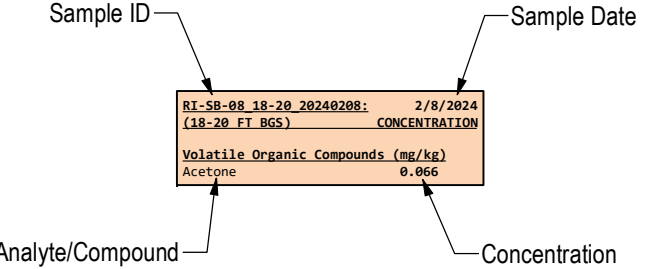
Part 375 Soil Cleanup Objectives (SCOs): SCOs listed in the New York State Department of Environmental Conservation (NYSDEC) "Part 375" Regulations (6 NYCRR Part 375).

Exceedances of NYSDEC Unrestricted Use Soil Cleanup Objectives (UUSCOs) are presented in bold font.
Exceedances of NYSDEC Restricted Residential Soil Cleanup Objectives (RRSCOs) are presented in red font.
Petroleum VOC Exceedances of NYSDEC Protection of Groundwater Soil Cleanup Objectives (PGWSCOs) are presented in underlined font.

mg/kg: milligrams per kilogram = parts per million (ppm)

J: The concentration given is an estimated value.
D: Analyte concentration obtained from dilution.
K: Reported concentration value is proportional to dilution factor and may be exaggerated.

	PGWSCO mg/kg	RRSCO mg/kg	UUSCO mg/kg
Volatile Organic Compounds			
1,2,4-Trimethylbenzene	5.9	0.52	0.51
1,3,5-Trimethylbenzene (Mesitylene)	3.1	0.52	0.51
Acetone	0.03	100	0.03
Benzene	0.06	3.7	0.06
Ethylbenzene	1	76	1
N-Propylbenzene	5	100	5
Tert-Butyl Methyl Ether (MTBE)	0.1	100	0.1
Toluene	0.7	100	0.7
Xylenes, Total	1.2	100	0.26
Semivolatile Organic Compounds			
Benzo(a)Anthracene	1	1.4	1
Benzo(a)Pyrene	22	1	1
Benzo(b)Fluoranthene	2.1	1.4	1
Benzo(g,h,i)Perylene	1000	4.9	0.64
Benzo(k)Fluoranthene	2	4.9	0.8
Chrysene	1	4.9	1
Dibenz(a,h)Anthracene	1000	0.33	0.33
Indeno(1,2,3-c,d)Pyrene	6.6	1.4	0.5
Phenanthrene	1000	4.9	1.1
Metals			
Barium	820	410	410
Chromium, Hexavalent	19	1	1
Copper	1720	280	50
Lead	450	400	63
Mercury	0.73	0.26	0.18
Zinc	2480	6600	109
Pesticides			
P,P'-DDT	135	3.8	0.0033



Aerial Source:
2018 New York State ITS GIS Orthoimagery

Map Source:
NYCDP (NYC Dept. of City Planning) GIS database

820 East 182nd Street
Bronx, New York

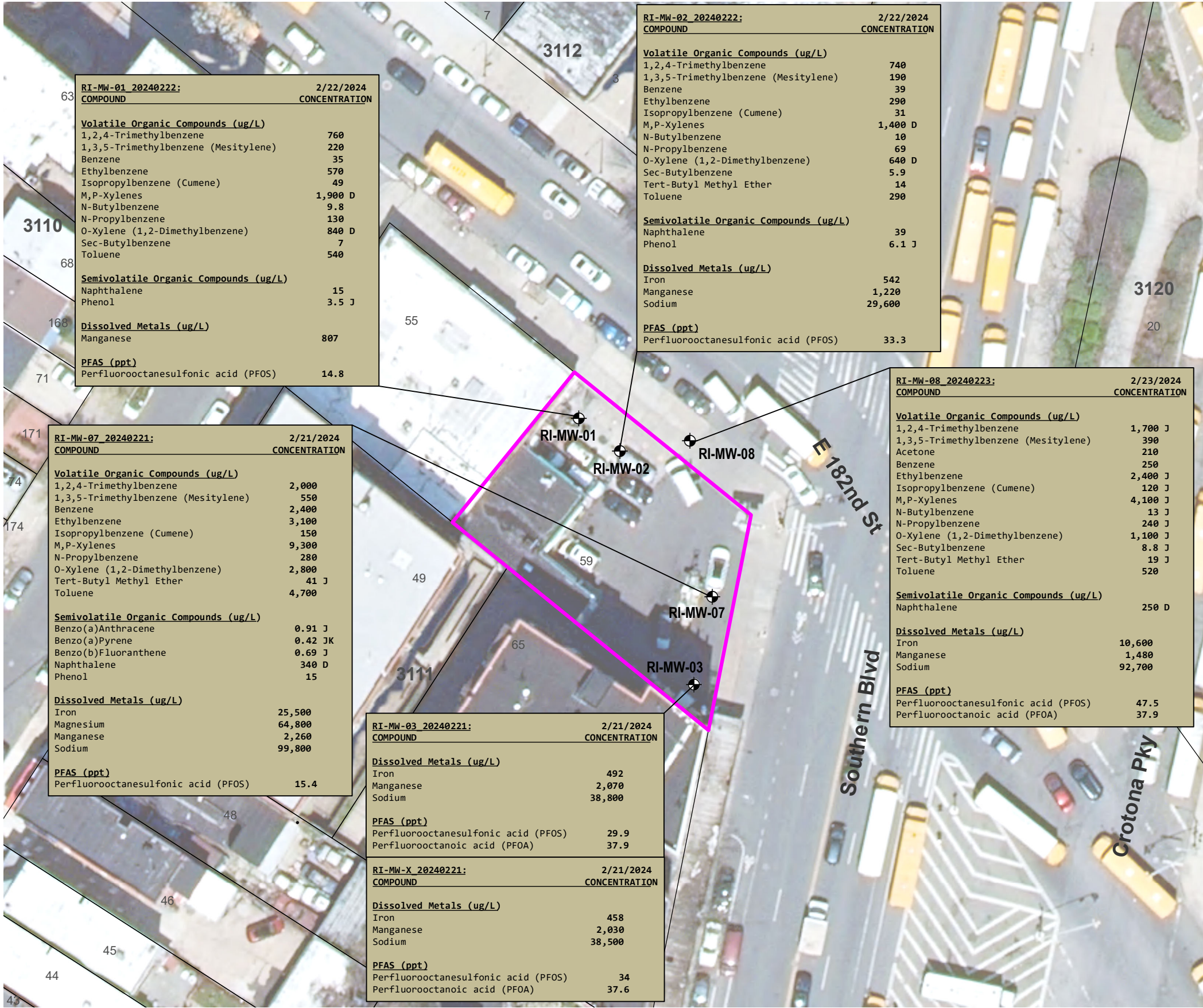
SOIL SAMPLE CONCENTRATIONS ABOVE UUSCOs, RRSCOs, PGWSCOs AND PFAS GUIDANCE VALUES

DATE
6/19/2025

PROJECT NO.
210138

FIGURE
4

© 2025 AKRF C:\Projects\210138 - 820 EAST 182ND STREET\Technical\GIS and Graphics\Hazmat\Phase II\210138 Fig 5 Groundwater Sample Concentrations Above AWQSGVs and PFAS Guidance Values.mxd 6/19/2025 1:25:40 PM mveilleux



LEGEND

- BCP SITE BOUNDARY
- 59 LOT BOUNDARY AND TAX LOT NUMBER
- 3111 BLOCK NUMBER
- RI MONITORING WELL LOCATION (FEBRUARY 2024)

NYSDEC TOGS Class GA Ambient Water Quality Standard and Guidance Values (AWQSGVs):
New York State Department of Environmental Conservation (NYSDEC)
Technical and Operational Guidance Series (TOGS) (1.1.1):

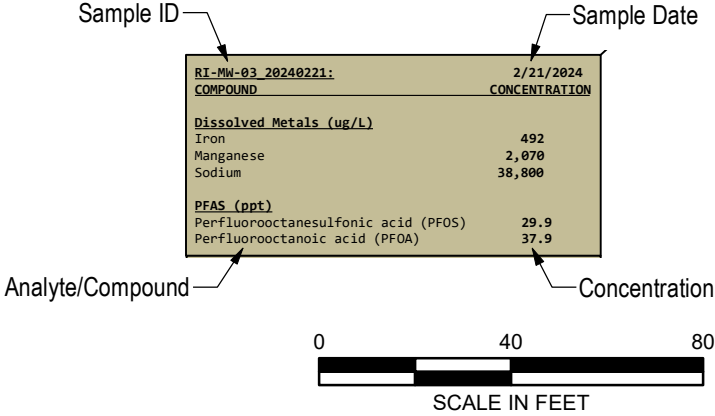
Groundwater PFAS results are compared to guidance values listed in
NYSDEC's April 2023 Sampling, Analysis, and Assessment of PFAS Under
NYSDEC's Part 375 Remedial Programs.

µg/L: micrograms per Liter = parts per billion (ppb)
ppt: parts per trillion

Only Exceedances of NYSDEC AWQSGVs and PFAs Guidance Values
are shown in bold font.

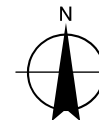
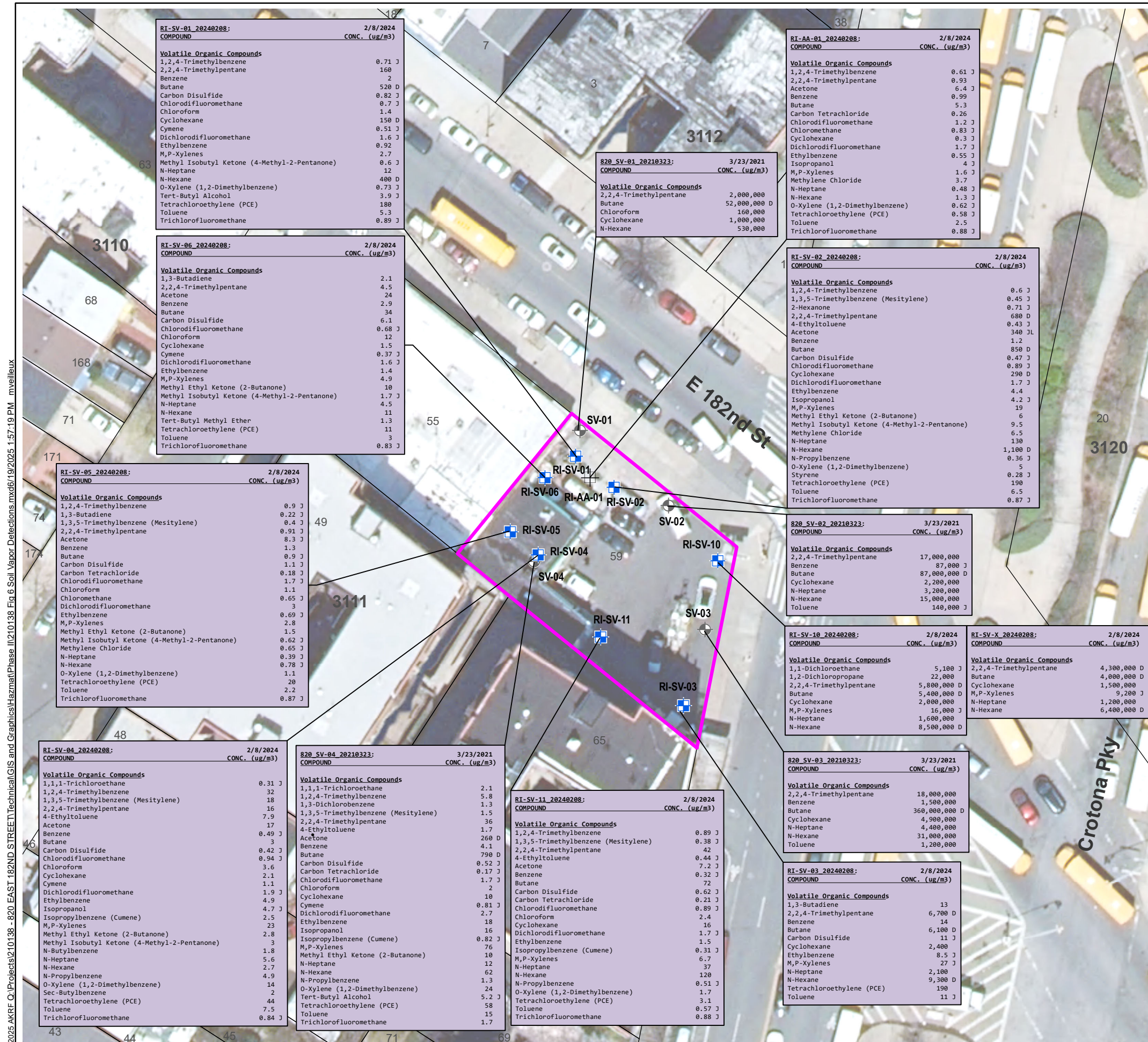
J: The concentration given is an estimated value.
D: Analyte concentration obtained from dilution.
K: Reported concentration value is proportional to dilution factor

NYSDEC AWQSGVs	
	ug/l
Volatile Organic Compounds	
1,2,4-Trimethylbenzene	5
1,3,5-Trimethylbenzene (Mesitylene)	5
Acetone	50
Benzene	1
Ethylbenzene	5
Isopropylbenzene (Cumene)	5
Naphthalene	10
N-Butylbenzene	5
N-Propylbenzene	5
O-Xylene (1,2-Dimethylbenzene)	5
Sec-Butylbenzene	5
Tert-Butyl Methyl Ether (MTBE)	10
Toluene	5
Xylenes, M,P	5
Semivolatile Organic Compounds	
Benzo(a)Anthracene	0.002
Benzo(a)Pyrene	0
Benzo(b)Fluoranthene	0.002
Phenol	1
Metals	
Iron	300
Magnesium	35,000
Manganese	300
Sodium	20,000
PFAS	
Perfluorooctanesulfonic acid (PFOS)	0.0027
Perfluorooctanoic acid (PFOA)	0.0067



820 East 182nd Street
Bronx, New York

GROUNDWATER SAMPLE CONCENTRATIONS ABOVE AWQSGVs
AND PFAS GUIDANCE VALUES



LEGEND



BCP SITE BOUNDARY



LOT BOUNDARY AND TAX LOT NUMBER

3111 BLOCK NUMBER

BLOCK NUMBER



PHASE II SOIL VAPOR POINT LOCATION (MARCH 2021)



RI AMBIENT AIR SAMPLE LOCATION (FEBRUARY 2024)



RI SOIL VAPOR POINT LOCATION (FEBRUARY 2024)

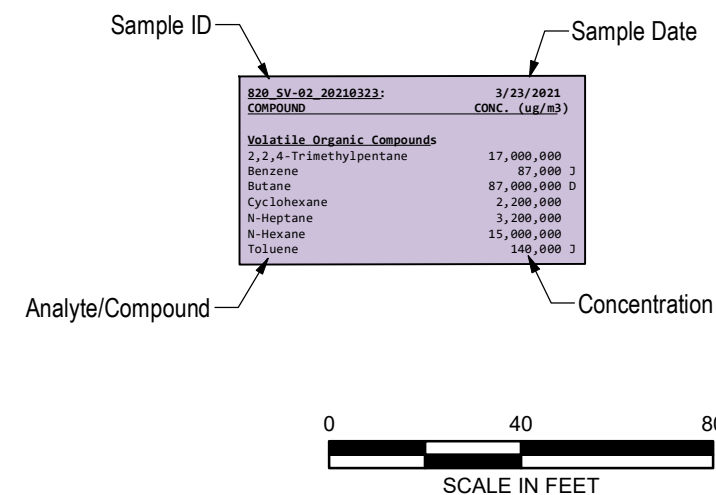
SOIL VAPOR

µg/m³- micrograms per cubic meter

D: Analyte concentration obtained from dilution.
J: The concentration given is an estimated value.
L: Sample result is estimated and biased low.

Aerial Source:
2018 New York State ITS GIS Orthoimagery

Map Source:
NYCDP (NYC Dept. of City Planning) GIS database



820 East 182nd Street
Bronx, New York

akrf
440 Park Avenue South, New York, NY 10016

SOIL VAPOR DETECTIONS

DATE _____

6/19/2025

PROJECT NO.

210138

FIGURE

6

© 2025 AKRF C:\Projects\210138 - 820 EAST 182ND STREET\Technical\GIS and Graphics\Hazmat\Phase II\210138 Fig 7 Proposed Supplemental RI Sample Location Plan.mxd 9/23/2025 10:24:12 AM mvelieux



Aerial Source:
2018 New York State ITS GIS Orthoimagery
Map Source:
NYCDP (NYC Dept. of City Planning) GIS database

LEGEND

- BCP SITE BOUNDARY
- 59 LOT BOUNDARY AND TAX LOT NUMBER
- 3111 BLOCK NUMBER
- PROPOSED SOIL BORING LOCATION
- PROPOSED SOIL VAPOR POINT LOCATION
- PROPOSED SOIL BORING/MONITORING WELL LOCATION
- PROPOSED VERTICAL SOIL VAPOR DELINEATION SAMPLE LOCATION
- PHASE II SOIL BORING LOCATION (MARCH 2021)
- PHASE II SOIL BORING/SOIL VAPOR POINT LOCATION (MARCH 2021)
- SOIL BORING LOCATION
- SOIL VAPOR POINT LOCATION
- SOIL BORING/MONITORING WELL LOCATION
- SOIL BORING/SOIL VAPOR POINT LOCATION
- SOIL BORING/MONITORING WELL/SOIL VAPOR POINT LOCATION
- FUEL PIPING *
- ELECTRIC *
- WATER *
- UNKNOWN UTILITY *
- METALLIC ANOMALY *

* APPROXIMATE LOCATIONS BASED ON GPR SURVEY,
PREPARED BY ENVIROPROBE SERVICE, INC.
FEBRUARY 05, 2024.



820 East 182nd Street
Bronx, New York

akrf
440 Park Avenue South, New York, NY 10016

PROPOSED SUPPLEMENTAL RI SAMPLE LOCATION PLAN

DATE
9/23/2025
PROJECT NO.
210138
FIGURE
7

APPENDIX A
QUALITY ASSURANCE PROJECT PLAN

**MAPES EAST 182 STREET
BRONX, NEW YORK**

Quality Assurance Project Plan

**NYSDEC BCP Site Number: C203149
AKRF Project Number: 210138**

Prepared For:

New York State Department of Environmental Conservation
Division of Environmental Remediation, Remedial Bureau B
625 Broadway, 12th Floor
Albany, New York 12233

Prepared On Behalf Of:

East 182 Street Associates, LLC
902 Broadway, 13th Floor
New York, NY 10010

Prepared by:



AKRF, Inc.

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

JULY 2025

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Table 1 –	Laboratory Analytical Methods for Analysis Groups
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ATTACHMENTS

Attachment A – Resumes for Project Director, Project Manager, and Field Team Leader

1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) describes the protocols and procedures that will be followed during implementation of the Supplemental Remedial Investigation Work Plan (SRIWP) for the Mapes East 182 Street site located at 820 East 182nd Street in the Belmont section of the Bronx, New York, hereafter referred to as the “Site.” The Site is identified by the City of New York as Borough of Queens, Block 3111, Lot 59. The objective of this QAPP is to provide for Quality Assurance (QA) and maintain Quality Control (QC) of environmental investigative and sampling activities conducted under the New York State Department of Environmental Conservation (NYSDEC) oversight in the Brownfield Cleanup Program (BCP) (BCP Site No. C203149). Adherence to this QAPP will ensure that defensible data will be obtained during environmental work at the Site.

2.0 PROJECT TEAM

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

2.1 Project Director

Ms. Deborah Shapiro, QEP, will serve as the project director and will be responsible for adherence to the QAPP including quality assurance/quality control (QA/QC). The project director will review the procedures with all personnel prior to commencing any fieldwork and will conduct periodic Site visits to assess implementation of the procedures. The project director will also be responsible for reviewing the Data Usability Summary Reports (DUSRs) prepared by a third-party data validator for soil, groundwater, and soil vapor analytical results. Ms. Shapiro's resume is included in Attachment A.

2.2 Project Manager

The project manager will be responsible for directing and coordinating all elements of the SRIWP. The project manager will prepare reports and participate in meetings with the Site owner/Participant, and/or the NYSDEC. Adrianna Bosco will serve as the project manager for the SRIWP. Ms. Bosco's resume is included in Attachment A.

2.3 Field Team Leader, Field Technician, Site Safety Officer (SSO), and Alternates

The field team leader will be responsible for supervising the daily sampling and health and safety activities in the field and will ensure adherence to the work plan and Health and Safety Plan (HASP), included as Appendix A of the SRIWP. The field team leader will also act as the field technician and Site Safety Officer (SSO) and will report to the project manager or project manager alternate on a regular basis regarding daily progress and any deviations from the work plan. The field team leader will be a qualified and responsible person able to act professionally and promptly during environmental work at the Site. Brian Quinn will be the field team leader. The field team leader alternate is Mackenzie Miller of AKRF. Mr. Quinn's and Ms. Miller's resumes are included in Attachment A.

2.4 Laboratory Quality Assurance/Quality Control (QA/QC) Officer

The laboratory QA/QC officer will be responsible for quality control procedures and checks in the laboratory and ensuring adherence to laboratory protocols. The QA/QC officer will track the movement of samples from the time they are checked in at the laboratory to the time that analytical results are issued, and will conduct a final check on the analytical calculations and sign off on the laboratory reports. The laboratory QA/QC officer will be Carl Ambruster of Eurofins Edison (Eurofins) the New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP)-certified laboratory being employed for all environmental sampling at the Site.

2.5 Third-Party Data Validator

The third-party data validator will be responsible for reviewing the final data packages for soil, groundwater, and soil vapor and preparing a DUSR that will provide performance information with regard to accuracy, precision, sensitivity, representation, completeness, and comparability associated with the laboratory analyses for the investigation. The third-party data validator will be

Lori Beyer of L.A.B. Validation Corporation of East Northport, New York, or Jeri Rossi, CEAC,
an independent Environmental Chemistry Consultant.

3.0 STANDARD OPERATING PROCEDURES (SOPS)

The following sections describe the SOPs for the remedial activities included in the SRIWP. During these activities, safety monitoring will be performed as described in the HASP, included as Appendix B of the SRIWP.

3.1 Decontamination of Sampling Equipment

All sampling equipment (augers, drilling rods, split spoon samplers, probe rods, pumps, etc.) will be either dedicated or decontaminated between sampling locations. Decontamination will be conducted on plastic sheeting (or equivalent) that is bermed to prevent discharge to the ground. The decontamination procedure will be as follows:

1. Scrub using tap water/Alconox[®] mixture and bristle brush.
2. Rinse with tap water.
3. Scrub again with tap water/Alconox[®] mixture and bristle brush.
4. Rinse with tap water.
5. Rinse with distilled water.
6. Air-dry the equipment, if possible.

3.2 Management of Investigation-Derived Waste (IDW)

IDW will be containerized in New York State Department of Transportation (NYSDOT)-approved 55-gallon drums. The drums will be sealed at the end of each work day and labeled with the date, the excavation grid(s), the type of waste (i.e., drill cuttings), and the name and phone number of an AKRF point-of-contact. All IDW exhibiting field evidence of contamination will be disposed of or treated according to applicable local, state, and federal regulations.

4.0 SAMPLING AND LABORATORY PROCEDURES

4.1 Soil Sampling

Soil sampling will be conducted according to the following procedures:

- Characterize the sample according to the modified Burmister soil classification system.
- Field screen the sample for evidence of contamination (e.g., odors, staining, etc.) using visual and olfactory methods and screen for volatile organic compounds (VOCs) using a photoionization detector (PID) equipped with a 10.6 electron Volt (eV) lamp.
- Collect an aliquot of soil from each proposed sample location, place in laboratory-supplied glassware, label the sample in accordance with Section 4.6.1, and place in an ice-filled cooler for shipment to the laboratory. Samples analyzed for the emerging contaminants, per- and polyfluorinated compounds (PFAS), should be contained in a separate cooler and the sample containers should be labeled with ballpoint pen, not permanent marker.
- Complete the proper chain of custody (COC) paperwork and seal the cooler.
- Record sample location, sample depth, and sample observations (evidence of contamination, PID readings, soil classification, etc.) in field log book and boring log data sheet, if applicable.
- Decontaminate any soil sampling equipment between sample locations as described in Section 3.1 of this QAPP.

4.2 Groundwater Sampling

Groundwater sampling will be conducted according to the following procedures:

- Field screen the sample for evidence of contamination (e.g., odors, staining, etc.) using visual and olfactory methods and screen the well headspace for VOCs using a PID equipped with a 10.6 eV lamp.
- Collect the groundwater sample from each proposed sample location in laboratory-supplied glassware, label the sample in accordance with Section 4.6.1, and place in an ice-filled cooler for shipment to the laboratory. Samples analyzed for the emerging contaminants, PFAS, should be contained in a separate cooler and the sample containers should be labeled with ballpoint pen, not permanent marker.
- Complete the proper COC paperwork and seal the cooler.
- Record sample location, sample depth, and sample observations (evidence of contamination, PID readings, free phase liquid, etc.) in field log book and boring log data sheet, if applicable.
- Decontaminate any groundwater sampling equipment between sample locations as described in Section 3.1 of this QAPP.

4.3 Soil Vapor Sampling

Soil vapor sampling will be conducted according to the following procedures:

- Field screen the sample for evidence of contamination (e.g., odors, etc.) using olfactory methods and screen the purged vapors for VOCs using a PID equipped with an 10.6 eV lamp.

- Collect the soil vapor samples from each proposed sample locations in laboratory-supplied SUMMA[®] canisters, label the sample in accordance with Section 4.6.1, and place in shipment container for shipment to the laboratory.
- Complete the proper COC paperwork and seal the shipment container.
- Record sample location, sample depth, and sample observations (odors, PID readings, etc.) in field log book and boring log data sheet, if applicable.

4.4 Laboratory Methods

Table 1 summarizes the laboratory methods that will be used to analyze field samples and the sample container type, preservation, and applicable holding times. Eurofins Edison of Edison, New Jersey and Burlington, Vermont, a NYSDOH ELAP-certified laboratory subcontracted to AKRF, will be used for all chemical analyses in accordance with the Division of Environmental Remediation (DER)-10 2.1(b) and 2.1(f) with Category B Deliverables.

Table 1
Laboratory Analytical Methods for Analysis Groups

Matrix	Analysis	EPA Method	Bottle Type	Preservative	Hold Time
Soil and Soil QA/QC	Volatile Organic Compounds (VOCs)	8260D	EnCore [®] samplers (3) and 2 oz. plastic jar	≤ 6 °C	48 hours to extract; 14 days to analyze
	Semi-volatile Organic Compounds (SVOCs)	8270E	8 oz. Glass Jar	≤ 6 °C	14 days to extract; 40 days to analyze
	1,4-Dioxane	8270E; 0.1 mg/kg RL	4 oz. Glass Jar	≤ 6 °C	14 days to extract; 40 days to analyze
	Total Analyte List (TAL) Metals, and Hexavalent Chromium	6000/7000 Series, 6010C, and 7196A	8 oz. Glass Jar	≤ 6 °C	6 months holding time; Mercury 28 days holding time; Hexavalent chromium 30 days to extract, 7 days to analyze
	Pesticides	8081B	8 oz. Glass Jar	≤ 6 °C	14 days to extract; 40 days to analyze
	Polychlorinated Biphenyls (PCBs)	8082A	8 oz. Glass Jar	≤ 6 °C	14 days to extract; 40 days to analyze
	Per- and Polyfluorinated Compounds (PFAS)	1633; 0.5 µg/kg (ppb) RL	4 oz. HDPE Plastic Container	≤ 6 °C	14 days to extract; 40 days to analyze
Groundwater and Groundwater QA/QC	VOCs	8260D	3x40 mL Glass Vials	HCl to pH < 2 and ≤ 6 °C	48 hours to extract; 14 days to analyze
	SVOCs	8270E	1 L Amber Jar	≤ 6 °C	7 days to extract; 40 days to analyze
	1,4-Dioxane	8270E plus Selective Ion Monitoring (SIM); 0.35 µg/L RL	1 L Amber Jar	≤ 6 °C	7 days to extract; 40 days to analyze
	TAL Metals	6000/7000 Series	2x250 mL Plastic	HNO ₃ to pH < 2	6 months for metals; 28 days for mercury; 24 hours for hex. chromium
	Pesticides	8081B	1 L Amber Jar	≤ 6 °C	7 days to extract; 40 days to analyze
	PCBs	8082A	1 L Amber Jar	≤ 6 °C	7 days to extract; 40 days to analyze
	Per- and Polyfluorinated Compounds (PFAS)	1633; 2 ng/L (ppt) RL	3 x 250 mL Polypropylene Bottles	≤ 6 °C, Trizma	14 days to analyze
Soil Vapor	VOCs	TO-15	6L SUMMA [®] Canister or 1-Liter Tedlar Bag	None	14 days

Notes:

QA/QC samples will be analyzed for the same parameters as the parent sample, with the exception of the trip blank(s), which will be analyzed for VOCs by EPA Method 8260C only.

EPA – Environmental Protection Agency

mg/kg – milligrams per kilogram (parts per million)

µg/kg – micrograms per kilogram (parts per billion)

ng/L – nanograms per liter (parts per trillion)

4.5 Quality Control (QC) Sampling

In addition to the laboratory analysis of the soil and groundwater samples, additional analysis will be included for QC measures, as required by the Category B sampling techniques. These samples will include a field blank, trip blank, matrix spike/matrix spike duplicate (MS/MSD), and blind duplicate samples at a frequency of one sample per 20 field samples collected. Samples will be analyzed for the same parameters as the accompanying samples, with the exception of any trip blanks, which will be analyzed for the VOC list only. Additionally, one equipment blank will be collected during each day of groundwater sampling for PFAS analysis only.

4.6 Sample Handling

4.6.1 Sample Identification

All samples will be consistently identified in all field documentation, chain-of-custody (COC) documents, and laboratory reports. Soil, groundwater, and soil vapor samples collected during the RI will be identified with “RI-” and “SB-” for soil borings “MW-” for groundwater monitoring wells, and “SV-” for soil vapor points, and the soil boring, groundwater monitoring well number, or soil vapor point sample number. All samples will be amended with the collection date at the end of the sample name in a year, month, day (YYYYMMDD) format. Blind duplicate sample nomenclature will consist of the sample type, followed by an “X”; MS/MSD samples nomenclature will consist of the parent sample name only, but triplicate sample volume will be collected and the COC comment section will explain that the additional volume is for running the MS/MSD; and trip and field blanks will consist of “TB-” and “FB-”, respectively, followed by “S” for soil and “GW” for groundwater, and a sequential number of the trip/field blanks collected within the sample digestion group (SDG). Special characters, including primes/apostrophes (’), will not be used for sample nomenclature. Table 2 provides examples of the sampling identification scheme for samples collected during the SRI.

Table 2
Remedial Investigation Sample Nomenclature

Sample Description	Sample Designation
Groundwater sample collected from groundwater monitoring well RI-MW-13 on September 22, 2025	RI-MW-13_20250922
Blind duplicate sample of groundwater sample collected from groundwater monitoring well RI-MW-13 on September 22, 2025	RI-MW-X_20250922
Second field blank collected on September 8, 2025 with the soil samples	RI-FB-S_20250908
Soil sample collected from soil boring RI-SB-19 between 0 and 2 feet below grade on September 8, 2025	RI-SB-19_0-2_20250908
Second blind duplicate soil sample collected from soil boring RI-SB-19 between 0 and 2 feet below grade on September 8, 2025	RI-SB-X_0-2_20250908
Soil vapor sample collected from temporary soil vapor point RI-SV-17 on September 8, 2025	RI-SV-17_20250908

Sample Labeling and Shipping

All sample containers will be provided with labels containing the following information:

- Project identification, including Site name, BCP Site number, Site address
- 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. All samples will be shipped to the laboratory at least twice per week. At the start and end of each workday, field personnel will add ice to the cooler(s) as needed.

The samples will be prepared for shipment by placing each sample in laboratory-supplied glassware, then wrapping each container in bubble wrap to prevent breakage, and adding freezer packs and/or fresh ice in sealable plastic bags. The COC form will be properly completed by the sampler in ink, and all sample shipment transactions will be documented with signatures, and the date and time of custody transfer. Samples will be shipped overnight (e.g., Federal Express) or transported by a laboratory courier. All coolers shipped to the laboratory will be sealed with mailing tape and a COC seal to ensure that the samples remain under strict COC protocol.

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 COC forms. The COC forms will contain the following information: project name; names of sampling personnel; sample number; date and time of collection and matrix; and signatures of individuals involved in sample transfer, and the dates and times of transfers. Laboratory personnel will note the condition of the custody seal and sample containers at sample check-in.

4.7 Field Instrumentation

Field personnel will be trained in the proper operation of all field instruments at the start of the field program. Instruction manuals for the equipment will be on file at the Site for referencing proper operation, maintenance, and calibration procedures. The equipment will be calibrated according to manufacturer specifications at the start of each day of fieldwork. If an instrument fails calibration, the project manager or QA/QC officer will be contacted immediately to obtain a replacement instrument. A calibration log will be maintained to record the date of each calibration, any failure to calibrate and corrective actions taken. The PID will be equipped with an 10.6 eV lamp and will be calibrated each day using 100 parts per million (ppm) isobutylene standard gas in accordance with the manufacturer's standards.

4.8 Quality Assurance (QA)

All soil, groundwater, and soil vapor laboratory analytical data will be reviewed by a third-party validator and a Data Usability Summary Report (DUSR) will be prepared to document the usability and validity of the data. AKRF's January 2025 Draft Remedial Investigation Report (RIR) will be updated to include a detailed description of the Supplemental RI sampling activities, data summary tables, concentration map showing sample locations and concentrations, DUSR, and laboratory reports.

ATTACHMENT A

**RESUMES OF QA/QC OFFICER AND PROJECT DIRECTOR, PROJECT MANAGER, AND FIELD TEAM
LEADER/FIELD TECHNICIAN/SITE SAFETY OFFICER/ALTERNATE**

DEBORAH SHAPIRO, QEP

SENIOR VICE PRESIDENT

Deborah Shapiro is a Senior Vice President in the Site Assessment and Remediation Department. Ms. Shapiro supervises project teams and manages all aspects of assessment and remediation projects across the New York Metropolitan Area. Ms. Shapiro works with developers, non-profit organizations, architects, local community groups, local businesses, and government agencies. Her projects fall under the regulatory oversight of NYSDEC, NYCDEP, and NYCOER including the New York State Brownfield Cleanup Program (BCP), New York City Voluntary Cleanup Program (VCP), NYSDEC petroleum spills program, RCRA/UIC closures, and NYCOER's E-designation program. Ms. Shapiro has also assisted commercial and industrial property owners with maintaining the integrity of their portfolios by providing compliance related cleanup and chemical storage management services. Ms. Shapiro has also been a moderator and panelist at numerous conferences.

Ms. Shapiro manages all aspects of redevelopment projects from the initial Phase I ESA, Phase II, and remediation through post-remedial site management. In addition, her experience includes groundwater investigations, monitoring, and sampling programs; Brownfield and hazardous waste site investigations; In-Situ Chemical Oxidation; underground storage tank studies, including soil contamination delineation, classification, removal and disposal; waste characterization sampling; exposure assessments; on-going remedial action (especially AS/SVE), and permitting.

BACKGROUND

Education

M.S., Environmental Science, American University, 2001

B.A., Environmental Studies, American University, 1998

Professional Licenses/Certifications

Qualified Environmental Professional

Health and Safety Operations at Hazardous Materials Sites 29 CFR 1910.120

OSHA 8 Hour HAZWOPER Supervisor

OSHA 10 Hour Occupational Construction Safety and Health

CPR

Professional Memberships

Past President, New York City Brownfield Partnership

Board Member, Residents for a More Beautiful Port Washington

Member, Institute of Professional Environmental Practitioners (IPEP)

Awards

Big Apple Brownfield Award recipient as part of the Elton Crossing redevelopment team 2017

Big Apple Brownfield Award recipient as part of the Courtlandt Crescent redevelopment team 2013

Big Apple Brownfield Award recipient as part of the Via Verde redevelopment team 2012

Big Apple Brownfield Award recipient as part of the Cornerstone B1 (LaTerraza) redevelopment team 2011

Years of Experience

Year started in company: 2013

Year started in industry: 1998



DEBORAH SHAPIRO, QEP

SENIOR VICE PRESIDENT

| p. 2

RELEVANT EXPERIENCE

Elton Crossing, Bronx, NY

AKRF provided environmental consulting services in connection with the purchase and redevelopment of the Elton Crossing site at 899 Elton Avenue in the Bronx, NY. The work initially involved the preparation of a Phase II subsurface investigation including soil and soil vapor testing to determine if the site would be eligible for the New York State Brownfield Cleanup Program (NYSBCP). Upon completion of the investigation, AKRF prepared a NYCBCP Application and the site was accepted into the NYSBCP. AKRF managed all aspects of the brownfield cleanup including; development of Investigation Work Plans, performing Remedial Investigations and Reports, preparation of Phase I ESAs, preparation of a Citizen Participation Plan, distribution of public notices, preparation and implementation of a Remedial Action Work Plan (RAWP), design of a sub-slab depressurization system, preparation of the Final Engineering Report and Site Management Plan, and sampling and management of soil disposal. AKRF is in the midst of implementing the Site Management Plan. As project manager, Ms. Shapiro was responsible for managing all technical components of the project, communication with NYSDEC and the Client, and managing the budget.

Second Farms, Bronx, NY

AKRF, Inc. was initially contracted by the New York City Office of Environmental Remediation (NYCOER) to conduct a subsurface investigation of a 1.12-acre parcel in the Bronx, New York under the United States Environmental Protection Agency (USEPA) Brownfield Assessment Grant program. The investigation included a geophysical survey and utility mark-outs, and the collection and analysis of soil, groundwater, soil vapor, indoor air and ambient air samples. AKRF continued working on the project for the developer by preparing a Remedial Action Plan and Environmental Assessment Statement. AKRF is in the midst of implementing the remedy. As project manager, Ms. Shapiro was responsible for managing all technical components of the project, communication with OER, NYCDEP, and the Client, and managing the budget.

Bradhurst Cornerstone II Residences, Manhattan, NY

AKRF, Inc. prepared a Part 58 Environmental Assessment and a City Environmental Quality Review Environmental Assessment Statement for the Bradhurst Cornerstone II Apartments project. Issues of concern for the environmental review included the identification of project commitments for certain of the four sites related to historic resources, hazardous materials, air quality, and building attenuation. As part of the mitigation of hazardous materials, AKRF conducted a Phase II investigation, and prepared a Remedial Action Plan and Construction Health and Safety Plan. As project manager, Ms. Shapiro was responsible for managing all technical components of the hazardous materials portion of the project, communication with the regulatory agency and the Client, and managing the budget.

Lambert Houses, Bronx, NY

AKRF performed an EIS of the Lambert Houses affordable housing complex located in the West Farms section of the Bronx, NY. Lambert Houses consisted of multi-story apartment buildings, parking garage, and a multi-tenant retail/commercial building alongside the elevated NYC subway. AKRF also conducted a Phase I ESA with a vapor intrusion screen of the Property to satisfy HUD's vapor intrusion requirements. The Phase I and vapor intrusion screens were prepared in accordance with ASTM E1527-05, ASTM E2600, and EPA's All Appropriate Inquiry (AAI) rule. After completion of the EIS, an E designation for hazardous materials was placed on the Site. A Subsurface Investigation was conducted and a Remedial Action Work Plan was prepared under OER oversight. The Site was subsequently entered in the NYC Voluntary Cleanup Program. AKRF is in the midst of implementing the RAWP, which included remediation of a hydraulic oil spill. As project manager, Ms. Shapiro was responsible for managing all technical components of the hazardous materials portion of the project, communication with the regulatory agency and the Client, and managing the budget.



DEBORAH SHAPIRO, QEP

SENIOR VICE PRESIDENT

| p. 3

Brook 156, Bronx, NY

AKRF was retained to provide environmental consulting services in connection with the purchase and development of the Site. AKRF prepared a Phase I Environmental Site Assessment (ESA) of the NYC-owned former gasoline service station and a former railroad. A Tier 1 Vapor Encroachment Screening was also conducted to satisfy HUD's vapor intrusion requirements. AKRF prepared a Remedial Investigation Work Plan (RIWP) and conducted a Remedial Investigation (RI) at the site, which included the collection and analysis of soil, soil vapor, and groundwater. The results of the RI, which were documented in a Remedial Investigation Report (RIR), were used to prepare a New York City Brownfield Cleanup Program (NYCBCP) application. The site was accepted into the New York State Brownfield Cleanup Program (NYSBCP). AKRF prepared a Citizen Participation Plan (CPP), distributed public notices, and conducted multiple Remedial Investigations to further investigate soil, soil vapor, and groundwater at the site prior to redevelopment. The results of the investigations were used to prepare a Remedial Action Work Plan (RAWP), which is undergoing review and approval by NYSDEC. The proposed remedy includes excavation of soil, design and installation of a soil vapor extraction system and sub-slab depressurization system, contingent groundwater treatment program, and installation of a vapor barrier and composite cover system. As project manager, Ms. Shapiro is responsible for managing all technical components of the project, communication with NYSDEC and the Client, and managing the budget.

On-Call Environmental Consulting Services (Various Locations), New York City Mayor's Office of Environmental Remediation (OER) (administered by NYCEDC)

Ms. Shapiro is managing an on-call contract with the OER for brownfields environmental assessment and remediation. The work has included conducting Phase I environmental site assessments (ESAs) and multi-media sampling of soil, groundwater, and soil vapor for various sites funded by EPA grants. The work plans and investigation reports were completed in accordance with OER and EPA requirements. AKRF also implemented a remedial plan for capping a park site in Staten Island. In addition, AKRF provided support to OER and an affordable housing developer to expedite an application for entry into the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP), as well as preparation and implementation of the remedial investigation and remedial plan.

Atlantic Chestnut, Brooklyn, NY

AKRF was retained to provide environmental consulting services in connection with the purchase and redevelopment of former burned manufacturing buildings encompassing an entire city block in Brooklyn, New York. As part of due diligence, AKRF prepared a Phase I Environmental Site Assessment (ESA) Report for the property. After acquisition, the property was divided into three separate sites (3264 Fulton Street, 235 Chestnut Street, and 3301 Atlantic Avenue). AKRF prepared a Subsurface (Phase II) Investigation Work Plans and conducted Phase IIs at each of the sites, which included the collection and analysis of soil, soil vapor, and groundwater samples. Based on the results of the Phase IIs, which were documented in Subsurface (Phase II) Reports, New York State Brownfield Cleanup Program (NYSBCP) applications were prepared for each of the sites. After acceptance into the NYSBCP, AKRF prepared Citizen Participation Plans (CPPs) and distributed public notices. AKRF prepared Remedial Investigation (RI) Work Plans (RIWPs) and implemented numerous Remediation Investigations for each of the sites to further investigate contaminated media at the site prior to redevelopment, and prepared the RI Reports (RIRs). AKRF is in the midst of preparing Interim Remedial Work Plans for each Site, which include installation of a Soil Vapor Extraction to prevent the off-site migration of contaminants. As project manager, Ms. Shapiro was responsible for managing all technical components of the project, communication with NYSDEC and the Client, and managing the budget.



ADRIANNA BOSCO

ENVIRONMENTAL ENGINEER

Adrianna Bosco is an environmental engineer experienced in the assessment, investigation, and remedial practices required to redevelop former industrial and manufacturing sites under New York State's Brownfield Cleanup Program.

BACKGROUND

Education

BS, Manhattan College, Environmental Engineering, 2011

Licenses/Certifications

OSHA 10 Hour Construction Safety & Health Course

OSHA 40 Hour HAZWOPER

OSHA 8 Hour Refresher

Professional Memberships

Committee Member - Policy Innovation Network, Citizens Housing Planning Council

Years of Experience

11 years in the industry

8 years with AKRF

RELEVANT EXPERIENCE

The Greenpoint at 21 India Street, Brooklyn, NY

AKRF provided site assessment/remediation services for The Greenpoint, a residential development along Brooklyn's East River waterfront. Investigation and remediation of the site was conducted under the NYSDEC Brownfield Cleanup Program.

Adrianna Bosco served as Deputy Project Manager and conducted a supplemental remedial investigation, including soil and groundwater sampling, and several rounds of waste characterization soil sampling. She performed remedial oversight during activities such as soil excavation and off-site disposal, underground storage tank (UST) removal, SSDS piping installation and testing, and routine air monitoring. Adrianna aided in the preparation of the Final Engineering Report (FER) and Site Management Plan (SMP).

22-60 46th Street, Queens, NY

Redevelopment plans are underway for 22-60 46th Street in the Ditmars-Steinway section of Astoria, Queens. The development program includes 173,000 square feet of affordable and market-rate rentals, retail space, and a performance venue for the Cyprian and Hellenic communities. AKRF is providing site assessment/remediation services and filed a Brownfield Cleanup Program application for this project. Adrianna Bosco serves as Project Manager.

J2 at 147-25 94th Avenue, Queens, NY

AKRF is providing site assessment/remediation, civil engineering, and E-Designation services related to noise and hazardous materials for J2, a 25-story residential and retail building at 147-25 94th Avenue in Jamaica, Queens. The



ADRIANNA BOSCO

ENVIRONMENTAL ENGINEER

550,000-square-foot building will include 543 residential units, including affordable housing, and is located adjacent to the Jamaica Station transit hub. Construction of J2 broke ground in March 2020. A Certificate of Completion for participation in New York State's Brownfield Cleanup Program was issued by NYSDEC in December 2020. The project is currently under construction.

Adrianna Bosco prepared the Brownfield Cleanup Program application and Remedial Work Plan. She managed field activities associated with the Remedial Investigation to determine the vertical and horizontal extent of on-site contamination. Once construction begins, she will manage the on-site remediation and prepare NYSDEC-required submittals and reports.

The Wilfrid at 1888 Bathgate, Bronx, NY

AKRF is providing environmental consulting services in connection to the investigation and remediation of an approximately 36,000-square foot parcel enrolled in the Brownfield Cleanup Program. This former steel door manufacturing facility is contaminated with chlorinated solvents, including tetrachloroethene. The selected remedy included site-wide excavation of soil and bedrock, continuous air monitoring, collection of post-excavation endpoint samples, and implementation of an in-situ groundwater treatment program.

Adrianna Bosco managed various field efforts, including a Remedial Design Investigation to develop the groundwater treatment program and implementation of the Remedial Action Work Plan. Upon completion of the remediation, she prepared the Final Engineering Report and Site Management Plan for submission to the NYSDEC.

2350 Fifth Avenue - 141st Street & Fifth Avenue, New York, NY

Remedial investigation has included evaluation of soil, groundwater, soil vapor, indoor air, and building materials. Interim remediation included the removal of contaminated building materials and operation of an innovative sub-slab vapor extraction system retrofitted into the existing building. Phase 1 of the Remedial Action Work Plan consisted of further removal of contaminated building materials. Phase 2 of the remediation included a sub-slab depressurization system (SSDS) retrofitted into the existing building, soil vapor extraction (SVE) system, and chemical oxidation injection.

Adrianna Bosco served as the Environmental Scientist of the only New York State Department of Environmental Conservation's (NYSDEC) listed inactive hazardous waste (State Superfund) site in Manhattan, a former laundry/dry cleaning plant in Harlem. Remedial investigation included evaluation of soil, groundwater, soil vapor, indoor air, and building materials. Interim remediation included the removal of contaminated building materials and operation of an innovative sub-slab vapor extraction system retrofitted into the existing building. She performed remedial action oversight, including SSDS piping installation inspections and Health and Safety Plan (HASP) air monitoring for volatiles and particulates. Remedial action work was completed in 2014 and documented in a Final Engineering Report. NYSDEC issued Certificate of Completion in January 2015 and the site has been reclassified to a "Class 4" site (site properly closed – requires continued management). Ongoing activities continue under the NYSDEC-approved Site Management Plan, including operations, maintenance and monitoring of the SSDS and SVE system.

New York City School Construction Authority, On-Call Environmental Consulting, New York, NY

For new school sites, initial due diligence involves conducting Phase I environmental site assessments (ESAs) and multi-media sampling of soil, groundwater, and soil vapor to determine the suitability of a site for development as a school and remediation requirements and associated costs. Once design for a school is underway, AKRF would prepare remediation plans and construction specifications and oversee the construction activities. For existing school sites, the work can



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involve conducting Phase I ESAs and indoor air quality testing, preparation of specifications, supervision of storage tank removals, investigation and remediation of spills, and development of remediation cost estimates.

Adrianna Bosco worked on the following assignments under this contract:

- Grace Nursery School (Brooklyn)
- PS 340X
- SCA ERC Hazmat CS

OER On-Call Contract, Various Locations, NY

The work has included conducting Phase I environmental site assessments (ESAs) and multi-media sampling of soil, groundwater, and soil vapor for various sites funded by EPA grants. The work plans and investigation reports were completed in accordance with OER and EPA requirements. AKRF also implemented a remedial plan for capping a park site in Staten Island. In addition, AKRF provided support to OER and an affordable housing developer to expedite an application for entry into the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP), as well as preparation and implementation of the remedial investigation and remedial plan. Adrianna Bosco served as Deputy Project Manager.

Elton Crossing - Melrose Commons North Site C, Bronx, NY

AKRF provided environmental consulting services in connection with the purchase and redevelopment of the Elton Crossing site at 899 Elton Avenue in the Bronx, NY. The work initially involved the preparation of a Phase II subsurface investigation including soil and soil vapor testing to determine if the site would be eligible for the New York State Brownfield Cleanup Program (NYSBCP). Upon completion of the investigation, AKRF prepared a NYCBCP Application and the site was accepted into the NYSBCP. AKRF managed all aspects of the brownfield cleanup including; development of Investigation Work Plans, performing Remedial Investigations and Reports, preparation of Phase I ESAs, preparation of a Citizen Participation Plan, distribution of public notices, preparation and implementation of a Remedial Action Work Plan (RAWP), design of a sub-slab depressurization system, preparation of the Final Engineering Report and Site Management Plan, and sampling and management of soil disposal. AKRF is in the midst of implementing the Site Management Plan.

Adrianna Bosco provided remedial oversight during soil excavation, confirmatory endpoint sampling, SSDS piping installation and inspections, vapor barrier installation, and air monitoring for particulates and volatile organic compounds (VOCs).

Northeast Bronx YMCA, Bronx, NY

The firm was asked to assist the YMCA of Greater New York in its response to a request for proposals by the Economic Development Corporation for the development of a site in the Edenwald section of the Bronx into a community center. AKRF had provided earlier hazardous materials and site-civil engineering due diligence services on the site. The YMCA was successful in winning the development rights, and AKRF prepared an Environmental Assessment for the site. Adrianna Bosco served as Environmental Scientist.

The Crossing at Jamaica Station, Jamaica, NY



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AKRF is assisting BRP Properties with a massive construction project next to the Jamaica Train Station that would result in an approximately 755,000-gsf mixed use development containing approximately 578,000 gsf of residential use (580 affordable housing units, of which 194 units would be reserved for families earning 40 to 60 percent of area median income [AMI]); approximately 14,660 gsf of community facility use; approximately 104,800 gsf of retail use (including commercial storage and loading dock); and approximately 56,900 gsf for parking, loading, and mechanical space. The site, which has an E-designation for hazardous materials, was entered into the NYSDEC's Voluntary Cleanup Program (VCP). Adrianna Bosco serves as Environmental Scientist.

American Museum of Natural History Gilder Center Expansion, New York, NY

AKRF is preparing this Environmental Impact Statement (EIS) to assess the potential environmental impacts associated with an approximately 220,000 square-foot expansion of the American Museum of Natural History. This expansion would largely take the form of a new building, the Richard Gilder Center for Science, Education, and Innovation, located on the Columbus Avenue side of the Museum campus.

Edwin's Place at 833 Howard Avenue, Brooklyn, NY

AKRF provided CEQR environmental planning and site assessment/remediation services for Edwin's Place, a new 125-unit affordable and supportive housing building on the corner of Livonia Avenue and Grafton Street in Brownsville, Brooklyn, that opened in July 2021. We prepared the Environmental Assessment Statement and hazardous materials reports for the project site, including a Phase I environmental site assessment and Phase II subsurface investigation. The New York City Department of Housing Preservation and Development was Lead Agency under CEQR for the project that included such discretionary approvals as zoning map amendments, a special permit, mayoral zoning overrides, and the disposition of city-owned property by NYCHPD. Housing is set aside for formerly homeless families and low-income New Yorkers, and amenities include a ground-floor community facility, sunken garden courtyard, computer lab, and other facilities. Adrianna Bosco served as Environmental Scientist.

On-Call for Professional Services for EAS, New York, NY

AKRF worked with DDC, DOT, and NYSDOT on a full roadway and sidewalk reconstruction project along Main Street between 38th Avenue and 40th Road in Downtown Flushing, Queens. The goal of the project was focused on formalizing a DOT pilot program for improving pedestrian circulation and safety in an area that experiences some of the highest pedestrian traffic in New York City given its proximity to the terminus of the 7-train subway line at Flushing Main Street station and Long Island Railroad (LIRR) Flushing Main Street station as well as numerous bus routes, in conjunction with traffic study and analysis, and environmental impact analysis for the proposed widening of sidewalks within the project limits. This unique project tied together the interconnected relationship between the proposed reconstruction engineering and the balance of improving pedestrian accommodation, flow, and safety with maintaining modified vehicular flow and acceptable level of service along Main Street which experiences notably high volumes of intermodal pedestrian, train, bus, and vehicular traffic. Design scope included reconstruction of the roadway and curb to widen sidewalks, traffic study and analysis, and environmental impact assessment including Design Approval Document and Plans, Specifications and Estimate (PS&E) submission to NYSDOT for review and approval associated with Federal funding allocated for the project. AKRF developed the preliminary design and final design plans for the reconstruction project. Adrianna Bosco served as Environmental Scientist.

Garden City Union Free School District Environmental Consulting Services, Garden City, NY

AKRF was retained by the Garden City Union Free School District (UFSD) to provide environmental consulting services pertaining to a United States Environmental Protection Agency (EPA) Superfund Site, known as the Old



ADRIANNA BOSCO

ENVIRONMENTAL ENGINEER

Roosevelt Field Contaminated Groundwater Area Site or Old Roosevelt Airfield. Concern was raised as to whether contamination associated with the Old Roosevelt Airfield had the potential to impact public school facilities within the Garden City UFSD. The Old Roosevelt Airfield was historically operated by the United States Army and Navy between approximately 1911 and 1951 as a facility to receive, refuel, crate, and ship army aircrafts. Previous investigations conducted within the footprint of the Old Roosevelt Airfield identified elevated levels of the chlorinated solvents tetrachloroethene (PCE) and trichloroethene (TCE) in a deep groundwater plume.

AKRF reviewed publicly available records and reports to understand the nature and extent of contamination and to determine if any testing was warranted to further protect the health and safety of the students and faculty at public school facilities. AKRF conducted a Soil Vapor Intrusion (SVI) assessment at two public schools to evaluate whether chlorinated solvents associated with the regional deep groundwater affected indoor air quality. The SVI assessment included a pre-sampling inspection and analysis of sub-slab soil vapor, indoor air, and ambient air conditions. AKRF prepared presentations to the School Board and community members detailing the testing methodologies and to present the findings.

Adrianna Bosco served as Deputy Project Manager.

56 North Moore Street, New York, NY

AKRF is providing site assessment/remediation services for the construction of a three-story infill and addition at 56 North Moore Street in Manhattan's Tribeca West Historic District. Adrianna Bosco serves as Deputy Project Manager.

Twin Parks Terrace, Bronx, NY

AKRF provided site assessment/remediation services on behalf of NYCHA in connection with a joint application for conversion of assistance under HUD's Rental Assistance Demonstration and Section 18 disposition programs. We then supported the public/private partnership formed between NYCHA and Highbridge Affordable Group for leasing, financing, capital rehabilitation, operation, property management, and social service delivery at several public housing developments in the Bronx, including Twin Parks West (Sites 1 and 2). AKRF proceeded to work on behalf of Settlement Housing Fund for Twin Parks Terrace, the proposed redevelopment of a parking lot adjacent to Twin Parks West (Sites 1 and 2). Twin Parks Terrace will be a 14-story building with 182 units of affordable housing, 10,000 square feet of commercial space, and 1,800 square feet of community facility space. Social services will be provided by BronxWorks. Adrianna Bosco served as Project Manager.

East Side Coastal Resiliency (ESCR) Preliminary & Final Design, New York, NY

AKRF is leading a multidisciplinary design team that was selected by the New York City agency partnership of NYCDDC, New York City Department of Parks and Recreation (NYC Parks), New York City Department of Transportation, and the Mayor's Office of Recovery and Resiliency (ORR) to provide engineering, planning, landscape architecture, urban design and community engagement services for the Preliminary and Final Design Services for East Side Coastal Resiliency (ESCR).

Adrianna Bosco conducted a portion of the 2016 subsurface investigation. The ESCR subsurface exploration program involved a review of available utility plans and environmental reports involving manufactured gas plant (MGP) and petroleum-related contamination. Responsibilities included groundwater sampling, soil boring and temporary well installation, and compliance with the Supplemental Subsurface Investigation Work Plan.

New York City School Construction Authority, On-Call Environmental Consulting, New York, NY



ADRIANNA BOSCO

ENVIRONMENTAL ENGINEER

AKRF's on-call hazardous materials consulting contract with the New York City School Construction Authority (NYCSCA). In addition to conducting Phase I and Phase II Environmental Site Assessments, AKRF performed lead in drinking water sampling in about 160 schools during two three-month periods. AKRF continues to provide lead sampling, reporting and remedial recommendations, as new plumbing is installed. AKRF also oversees plumbing disinfection work, which is required prior to new plumbing being placed into service. The assignments involve reviewing and commenting on disinfection plans, supervision of the disinfection and confirmation testing, and preparation of reports documenting the work was conducted in accordance with the specifications and applicable requirements. Due to the sensitivity of school sites, work under this contract is often conducted on short notice and during non-school hours.

Adrianna Bosco worked on the following assignments under this contract:

- PS 153Q - Construction
- PS 108K - Water Disinfection
- PS 195K - Addition
- PS 58K
- 8501 5th Avenue Brooklyn
- PS 1K Annex
- Midwood HS Boiler
- 980 Atlantic Ave Brooklyn
- 1223 Coney Island Ave Brooklyn
- PS 97X
- PS 19Q Phase I Update
- 6901 34th Ave Queens
- PS 75M - Ust Closure
- 67-69 Schermerhorn Avenue
- St Vincent Ferrer
- Our Lady of Help
- 131 Union Street
- 621 86th Street
- Our Lady of Mercy
- 335 Adams Street
- SCA Potable Water Sampling
- City-Wide Water Sampling
- 141 Conover Street
- 21-31 and 35 Delavan Street



MACKENZIE MILLER

ENVIRONMENTAL SCIENTIST

Mackenzie Miller is an Environmental Scientist at AKRF. She has experience in a laboratory setting, as well as participating in scientific field work and analysis. Mackenzie's experience also includes data entry and data manipulation. She is proficient providing statistical analyses with Rstudio and SPSS. Her environmental consulting experience includes implementing Phase I Environmental Site Assessments and Phase II Environmental Site Investigations; and overseeing remedial action programs under the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP) and NYC Office of Environmental Remediation (OER) E-Designation program, including soil excavation, community air monitoring, remedial system installation, and collection of environmental samples.

BACKGROUND

Education

BA, University of Colorado at Boulder, Environmental Studies, 2020

BA, University of Colorado at Boulder, Ecology & Evolutionary Biology, 2020

Licenses/Certifications

OSHA Safety Training Institute – 30-Hour Construction Safety and Health Certification

OSHA Safety Training Institute – 40-Hour Hazardous Waste and Emergency Response Certification

NYC SST – 8-Hour Fall Prevention for Construction Certification

New York State Conservation District – Certificate of Erosion and Sediment Control Training (exp. July 2023)

Years of Experience

4 years in the industry

2 years with AKRF

RELEVANT EXPERIENCE

210300, New York City Department of Design & Construction, BBS Queens Dismantle & Swing Space, Queens, NY

AKRF is leading acoustics, noise, and vibration services as part of the design-build team dismantling the Queens Detention Center as part of the New York City Borough-Based Jail Program. Mackenzie is providing air monitoring in accordance with the site-specific Community Air Monitoring Plan (CAMP) during remedial excavation and demolition activities, providing construction oversight, and documenting daily construction, demolition, and remedial activities performed under the NYSDEC -approved BCP Remedial Action Work Plan (RAWP).

80614.04, New York City Economic Development Corporation, New York City Public Health Laboratory, New York, NY

AKRF is providing site assessment/remediation services on behalf of the New York City Economic Development Corporation and the Department of Health and Mental Hygiene for a new 10-story, 240,000-square-foot Public Health Laboratory on the Harlem Hospital campus in Manhattan. The \$454 million building will allow for testing and services for a wide range of clinical and environmental health-related concerns related to microbiology, virology, immunology, and biosafety. The topping-out ceremony was held in September 2023. Mackenzie is providing air monitoring in accordance with the site-specific Community Air Monitoring Plan (CAMP) during remedial excavation activities, on-site field inspections for construction oversight, overseeing soil export manifests, and documenting construction and remedial activities performed under the NYSDEC -approved BCP Remedial Action Work Plan (RAWP).



MACKENZIE MILLER

ENVIRONMENTAL SCIENTIST

80619, New York City School Construction Authority, On-Call Environmental Consulting (Multiple) Contracts, Various Locations, New York, NY

For new school sites, initial due diligence involves conducting Phase I environmental site assessments (ESAs) and multi-media sampling of soil, groundwater, and soil vapor to determine the suitability of a site for development as a school and remediation requirements and associated costs. Once design for a school is underway, AKRF would prepare remediation plans and construction specifications and oversee the construction activities. For existing school sites, the work can involve conducting Phase I ESAs and indoor air quality testing, preparation of specifications, supervision of storage tank removals, investigation and remediation of spills, and development of remediation cost estimates. Mackenzie is providing on-site field inspections, overseeing drinking water disinfection and sampling protocol associated with installation of new plumbing fixtures, and documenting daily activities performed for task orders at various SCA sites.

210379, NYCHA PACT Williamsburg Houses, Brooklyn, NY

AKRF is providing professional environmental services in connection with the Williamsburg Houses site, which consists of 20 four-story residential buildings situated on four city blocks in Williamsburg, Brooklyn. The site is being rehabilitated under NYCHA's Permanent Affordability Commitment Together (PACT) program. AKRF is providing remedial engineering services, assisting the Client with soil management services including testing, import and export), and vapor mitigation work required under a NYCDEP-approved Remedial Action Work Plan (RAWP). As the RAWP was prepared by a prior consulting firm, AKRF successfully amended the RAWP to reduce certain monitoring and vapor mitigation requirements on behalf of our Client. At the conclusion of AKRF's work, we will document all activities in a Remedial Closure Report (RCR) for approval by NYCDEP. Mackenzie is providing air monitoring in accordance with the site-specific Community Air Monitoring Plan (CAMP) during remedial excavation activities, on-site field inspections for construction oversight, overseeing soil export manifests, and documenting construction and remedial activities performed under the NYSDEC -approved BCP Remedial Action Work Plan (RAWP).

Phipps Houses, Lambert Houses Redevelopment, Bronx, NY

AKRF is providing a range of services to Phipps Houses for the phased redevelopment of their Lambert Houses complex in the West Farms neighborhood of the Bronx. The current Lambert Houses will be demolished and replaced with new buildings on nearly 12 acres of the Bronx Park South Large-Scale Residential Development area, increasing by 1,000 the number of permanently affordable housing units along with tenant amenities, retail space, and community facilities. AKRF prepared the Environmental Impact Statement pursuant to CEQR, SEQRA, and NEPA guidelines for the entire redevelopment, and has since provided site assessment/remediation services along with civil engineering and permitting for buildings on Parcels 3 and 5. We have also provided civil engineering and resident engineering inspection services for NYCDEP utility improvements and supported a city map change application pursuant to ULURP. AKRF has also been responsible for noise and air quality consulting related to the property's E-Designation. Mackenzie is providing air monitoring in accordance with the site-specific Community Air Monitoring Plan (CAMP) during remedial excavation activities, on-site field inspections for construction oversight, overseeing soil export manifests, and documenting construction and remedial activities performed under the NYSDEC -approved BCP Remedial Action Work Plan (RAWP), including engineering controls such as the Sub-Slab Depressurization System (SSDS) and collection of environmental documentation and waste characterization samples.

190021, 272 4th Avenue, Brooklyn, NY

AKRF is providing site assessment/remediation services for a proposed residential apartment building at 272-274 Fourth Avenue in Gowanus, Brooklyn. Mackenzie is providing air monitoring in accordance with the site-specific Community Air Monitoring Plan (CAMP) during remedial excavation activities, on-site field inspections for construction oversight,



MACKENZIE MILLER

ENVIRONMENTAL SCIENTIST

overseeing soil export manifests, and documenting construction and remedial activities performed under the NYSDEC - approved BCP Remedial Action Work Plan (RAWP), including engineering controls such as the Sub-Slab Depressurization System (SSDS) and collection of environmental documentation and waste characterization samples.



Brian Quinn

Environmental Scientist



Education

*BA, Environmental
Studies, Bucknell University*

Years of Experience

*4 years in the industry
2 years with AKRF*

Brian Quinn is an Environmental Scientist at AKRF. He has experience in remedial investigations and construction oversight on project sites across the tri-state area. Brian also performs soil, groundwater, soil vapor, and air sampling.

Relevant Experience

New York City Public Health Laboratory, New York, NY

Brian conducts remedial oversight and air monitoring during building construction as part of AKRF's assessment/remediation services for a new Public Health Laboratory at the Harlem Hospital campus in Manhattan.

Hudson Piers, Yonkers, NY

AKRF is providing site assessment/remediation services for the southern half of the Hudson Piers site along the Yonkers waterfront. Brian is conducting construction oversight, air monitoring, and in-situ stabilization and solidification drilling oversight during building construction.

NYCSCA On-Call Environmental Consulting, Multiple Contracts, New York, NY

AKRF provides environmental consulting, environmental site assessment and remediation services under these contracts. Assignments have included environmental assessment, remedial design, plumbing disinfection, and potable water (lead) sampling consulting tasks. For sites undergoing design and development, assignments include preparation of remediation plans, design of sub-slab depressurization systems and contract specifications, and construction oversight. Brian has conducted Phase II investigations, remedial oversight, interior and exterior disinfection oversight, air monitoring and lead sampling during the construction of multiple school sites.

1100 Myrtle Avenue, Brooklyn, NY

AKRF prepared a Remedial Investigation Work Plan for the OER and performed the associated Remedial Investigation for a new 11-story mixed-use building. Following, the site was accepted into the NYSDEC Brownfield Cleanup Program, for which AKRF prepared the application. AKRF also prepared the BCP RIWP. Brian conducted remedial oversight and air monitoring during building construction.

1475 Macombs Road Zeta Charter School, Bronx, NY

Brian conducted remedial oversight, air monitoring, and performed sub-slab depressurization system sampling during building construction as part of AKRF's civil engineering and site assessment/remediation services for this 8-story building.

1559 Boone Avenue, Bronx, NY

Brian is conducting remedial oversight and air monitoring during building construction as part of AKRF's environmental planning, site assessment/remediation consulting, and geotechnical engineering for a new eight-story, 66-unit supportive housing building.

APPENDIX B
HEALTH AND SAFETY PLAN

MAPES EAST 182 STREET
BRONX, NEW YORK

Health and Safety Plan

NYSDEC BCP Site No: C203149
AKRF Project Number: 210138

Prepared For:

New York State Department of Environmental Conservation
Division of Environmental Remediation, Remedial Bureau B
625 Broadway, 12th Floor
Albany, New York 12233

Prepared On Behalf Of:

East 182 Street Associates, LLC
902 Broadway, 13th Floor
New York, NY 10010

Prepared by:



AKRF, Inc.
440 Park Avenue South, 7th Floor
New York, New York 10016
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JULY 2025

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Figure 1 – Hospital Location Map

ATTACHMENTS

Attachment A – Potential Health Effects from On-Site Contaminants

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1.0 INTRODUCTION

This environmental Health and Safety Plan (HASP) has been developed for the implementation of a Supplemental Remedial Investigation (SRI) Work Plan (SRIWP) by AKRF, Inc. (AKRF) personnel and its subcontractors at the Mapes East 182 Street site located at 820 East 182nd Street in the Belmont section of the Bronx, New York, hereafter referred to as the “Site.” The Site is identified by the City of New York as Borough of Queens, Block 3111, Lot 59.

Currently, the Site is unoccupied and contains a former Sunoco[®] gasoline station and a single-story building that formerly housed an auto repair shop and adjoining convenience store. Exterior portions of the Site are primarily uncapped with exposed clean backfill and some areas covered with asphalt pavement. The former pump island, located in the eastern portion of the lot, was supplied by five 4,000-gallon gasoline underground storage tanks (USTs) located in the northern portion of the Site. In addition, an 1,000-gallon waste oil UST was previously located in the northwestern portion of the Site, abutting the auto repair shop. The pump island was disconnected in May 2021 and the USTs were emptied and taken out-of-service in October 2021. The USTs and pump island were removed from the Site between March 1 and 9, 2023 as part of an Interim Remedial Measure (IRM).

A Remedial Investigation (RI) was performed at the Site in February 2024. The RI identified elevated levels of petroleum-related volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), and select metals in soil and groundwater, and petroleum-related VOCs in soil vapor. The highest detections were located beneath the former UST grave and former pump island. The SRIWP describes the procedures to be used to further define the nature and extent of contamination at the Site. The data compiled from the SRI will be used to update the January 2025 draft RI Report (RIR).

This HASP does not discuss routine health and safety issues common to general construction and excavation, including, but not, limited to slips, trips, falls, shoring, and other physical hazards. All AKRF employees are directed that all work must be performed in accordance with the AKRF's Generic HASP and all Occupation Safety and Health Administration (OSHA)-applicable regulations for the work activities required for the project. All project personnel are furthermore directed that they are not permitted to enter Permit Required Confined Spaces (as defined by OSHA). For issues unrelated to contaminated materials, all non-AKRF employees are to be bound by all applicable OSHA regulations as well as any more stringent requirements specified by their employer in their corporate HASP or otherwise. AKRF is not responsible for providing oversight for issues unrelated to contaminated materials for non-employees. This oversight shall be the responsibility of the employer of that worker or other official designated by that employer.

2.0 HEALTH AND SAFETY GUIDELINES AND PROCEDURES

2.1 Hazard Evaluation

2.1.1 Hazards of Concern

Hazards of concern include: organic and inorganic chemicals, and heat and/or cold stress.

2.1.2 Physical Characteristics

Physical characteristics of the hazards of concern include solid, aqueous, and vapor states.

2.1.3 Hazardous Materials

The Site-specific hazardous materials that may be encountered during SRI implementation include: historical fill material, solvent-related VOCs, SVOCs, petroleum, polychlorinated biphenyls (PCBs), and/or metals.

2.1.4 Chemicals of Concern

Chemical	REL/PEL/STEL	Health Hazards
Benzene	REL: 0.1 ppm N STEL: 1 ppm PEL: 1 ppm O STEL: 5 ppm	Irritation eyes, skin, nose, respiratory system; dizziness; headache, nausea, staggered gait; anorexia, lassitude (weakness, exhaustion); dermatitis; bone marrow depression; [potential occupational carcinogen].
Chromium	REL: 0.5 mg/m ³ PEL: 1 mg/m ³	Irritation eyes, skin; lung fibrosis (histologic).
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.
DDD, DDE, & DDT	REL: 0.5 mg/m ³ PEL: 1 mg/m ³	Irritation eyes, skin; paresthesia tongue, lips, face; tremor; anxiety, dizziness, confusion, malaise (vague feeling of discomfort), headache, lassitude (weakness, exhaustion); convulsions; paresis hands; vomiting; [potential occupational carcinogen].
Ethylbenzene	REL: 100 ppm N STEL: 125 ppm PEL: 100 ppm	Irritation eyes, nose, respiratory system; headache, lassitude (weakness, exhaustion), dizziness, confusion, malaise (vague feeling of discomfort), drowsiness, unsteady gait; narcosis; defatting dermatitis; possible liver injury; reproductive effects.
Fuel Oils	REL: 100 mg/m ³	Irritation eyes, skin, nose, throat; burning sensation in chest; headache, nausea, lassitude (weakness, exhaustion), restlessness, incoordination, confusion, drowsiness; vomiting, diarrhea; dermatitis; chemical pneumonitis (aspiration liquid).

Chemical	REL/PEL/STEL	Health Hazards
Lead	REL: 0.050 mg/m ³ PEL: 0.050 mg/m ³	Lassitude (weakness, exhaustion), insomnia; facial pallor; anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis wrist, ankles; encephalopathy; kidney disease; irritation eyes; hypertension.
Mercury	REL: 0.05 mg/m ³ REL C: 0.1 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.
Methylene Chloride	PEL: 25 ppm O STEL: 125 ppm	Irritation eyes, skin; lassitude (weakness, exhaustion), drowsiness, dizziness; numb, tingle limbs; nausea; [potential occupational carcinogen].
PAHs	REL: 0.1 mg/m ³ PEL: 0.2 mg/m ³	Effects reported from occupational exposure to PAHs include chronic bronchitis, chronic cough irritation, bronchogenic cancer, dermatitis, cutaneous photosensitization, and pilosebaceous reactions. Reported health effects associated with chronic exposure to coal tar and its by-products (e.g., PAHs): Skin: erythema, burns, and warts on sun-exposed areas with progression to cancer. The toxic effects of coal tar are enhanced by exposure to ultraviolet light. Eyes: irritation and photosensitivity. Respiratory system: cough, bronchitis, and bronchogenic cancer. Gastrointestinal system: leukoplakia, buccal-pharyngeal cancer, and cancer of the lip. Hematopoietic system: leukemia (inconclusive) and lymphoma. Genitourinary system: hematuria and kidney and bladder cancers.
PCBs	REL: 0.001 mg/m ³ PEL: 0.5 mg/m ³	Irritation eyes, chloracne; liver damage; reproductive effects; [potential occupational carcinogen].
Tetrachloroethylene	PEL: 100 ppm PEL C: 200 ppm; max peak: 300 ppm	Irritation eyes, skin, nose, throat, respiratory system; nausea; flush face, neck; dizziness, incoordination; headache, drowsiness; skin erythema (skin redness); liver damage; [potential occupational carcinogen].
Toluene	REL: 100 ppm N STEL: 150 ppm PEL: 200 ppm PEL C: 300 ppm; 10-min max peak: 500 ppm	Irritation eyes, nose; lassitude (weakness, exhaustion), confusion, euphoria, dizziness, headache; dilated pupils, lacrimation (discharge of tears); anxiety, muscle fatigue, insomnia; paresthesia; dermatitis; liver, kidney damage.
Trichloroethylene	PEL: 100 ppm PEL C: 200 ppm; 5-min max peak: 300 ppm	Irritation eyes, skin; headache, visual disturbance, lassitude (weakness, exhaustion), dizziness, tremor, drowsiness, nausea, vomiting; dermatitis; cardiac arrhythmias, paresthesia; liver injury; [potential occupational carcinogen].

Chemical	REL/PEL/STEL	Health Hazards
Xylene	REL: 100 ppm N STEL: 150 ppm PEL: 100 ppm	Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis.
Zinc	REL: 5 mg/m ³ REL C: 15 mg/m ³ N STEL: 10 mg/m ³ PEL: 5 mg/m ³ (ZnO fume); 15 mg/m ³ (ZnO dust)	Chills, elevated body temperature, myalgia, cough, fatigue, chest pain, stomach cramps, nausea, anemia, changes in cholesterol levels, and vomiting.
Notes: REL: Recommended exposure limit (NIOSH) PEL: Permissible exposure limits (OSHA) STEL: Short-term exposure limit N: NIOSH O: OSHA C: Ceiling		

The potential health effects from these known and suspected on-site contaminants are provided in Attachment A.

2.2 Designated Personnel

AKRF will appoint one of its on-site personnel as the Site Safety Officer (SSO). This individual will be responsible for the implementation of the HASP. The SSO will work under the direction of a Qualified Environmental Professional (QEP) and will be experienced in the implementation of air monitoring and hazardous materials sampling programs. Health and safety training required for the SSO and all field personnel are outlined in Section 2.3 of this HASP.

2.3 Training

All personnel who enter the work area while intrusive activities are being performed will have completed a 40-hour training course that meets OSHA requirements of 29 CFR Part 1910, Occupational Safety and Health Standards. In addition, all personnel will have up-to-date 8-hour refresher training. The training will allow personnel to recognize and understand the potential hazards to health and safety. All field personnel must attend a training program, whose purpose is to:

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

Each member of the field crew will be instructed in these objectives before work begins. A Site safety meeting will be conducted at the start of the project work. Additional meetings shall be conducted, as necessary, for new personnel working at the Site.

2.4 Medical Surveillance Program

All AKRF and subcontractor personnel performing field work involving subsurface disturbance at the Site are required to have passed a complete medical surveillance examination in accordance with 29 CFR 1910.120 (f). A physician's medical release for work will be confirmed by the SSO before an employee can begin Site activities. The medical release shall consider the type of work

to be performed and the required personal protective equipment (PPE). The medical examination will, at a minimum, be provided annually and upon termination of hazardous waste Site work.

2.5 Site Work Zones

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

The Exclusion Zone is defined as the area where exposure to impacted media could be encountered. The Contamination Reduction Zone (CRZ) is the area where decontamination procedures take place and is located next to the Exclusion Zone. The Support is the zone area where support facilities such as vehicles, fire extinguisher, and first aid supplies are located. The emergency staging area (part of the Support Zone) is the area where all workers on-site would assemble in the event of an emergency. A summary of these areas is provided below. These zones may be changed by the SSO, depending on that day's activities. All field personnel will be informed of the location of these zones before work begins. The exclusion zone and CRZ are 10 and 25 feet from the drill rig during the SRI, respectively. Control measures such as caution tape and/or traffic cones will be placed around the perimeter of the work area when needed.

2.6 Personal Protection Equipment (PPE)

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

AKRF field personnel and other site personnel shall wear, at a minimum, Level D PPE. The protection will be based on the air monitoring described in Section 2.6.

Level D PPE includes donning of the following during drilling and sampling:

- Steel Toed Boots
- Hard Hat
- Work Gloves
- Safety Glasses
- Ear Plugs
- Nitrile Gloves
- Tyvek Suit [if non-aqueous phase liquid (NAPL) is present]

If PID readings exceed 5 ppm in the breathing zone, personnel will don Level C PPE, which includes Level D PPE and a half- or full-face respirator with a dual organic and particulate cartridge.

2.7 General Work Practices

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

- Eating, drinking, chewing gum or tobacco, and smoking are prohibited, except in designated areas on the Site. These areas will be designated by the SSO.
- Workers must wash their hands thoroughly on leaving the work area and before eating, drinking, or any other such activity.
- The workers should shower as soon as possible after leaving the Site. Contact with contaminated or suspected surfaces should be avoided.

- The buddy system should always be used; each buddy should watch for signs of fatigue, exposure, and heat/cold stress.

3.0 EMERGENCY PROCEDURES AND EMERGENCY RESPONSE PLAN

The field crew will be equipped with emergency equipment, such as a first aid kit and disposable eye washes. In the case of a medical emergency, the SSO will determine the nature of the emergency and he/she will have someone call for an ambulance, if needed. If the nature of the injury is not serious, i.e., the person can be moved without expert emergency medical personnel, he/she should be taken to a hospital by on-site personnel. Directions to the hospital are provided below, and a Hospital Location Map showing the more direct route to the hospital is included as Figure 2.

3.1 Hospital Information

Hospital Name:	St. Barnabas Hospital
Phone Number:	(718) 960-9000
Address:	4422 3 rd Avenue, Bronx, NY 10457
Directions:	1. Turn LEFT out of the Site onto East 182nd Street toward Mapes Avenue. 2. Continue STRAIGHT on East 182nd Street 2. Turn LEFT onto Quarry Road 3. Turn RIGHT onto East 181st Street 4. Turn RIGHT onto 3rd Avenue The emergency room will be on the RIGHT at the intersection of 3rd Avenue and East 183rd Street.

3.2 Emergency Contacts

Company	Individual Name	Title	Contact Number
AKRF	Deborah Shapiro	Project Director, QEP	(646) 388-9544
	Adrianna Bosco	Project Manager	Office: (646) 388-9576 Cell: (914) 874-3358
	Brian Quinn	Field Team Leader/Site Safety Officer (SSO)	(201) 314-8032 (cell)
	Mackenzie Miller	Alternate Field Team Leader/SSO	(631) 357-9404 (cell)
East 182 Street Associates, LLC	Kell Biscuso	Applicant's Representative	(212) 243-9090
Ambulance, Fire Department & Police Department	-	-	911
NYSDEC Spill Hotline	-	-	800-457-7362

4.0 APPROVAL & ACKNOWLEDGMENTS OF HASP

4.1 Approval

Signed: _____ Date: _____

AKRF Project Manager

Signed: _____ Date: _____

AKRF Health and Safety Officer

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

4.2 Affidavit

I have read the Health and Safety Plan (HASP) for the project located at the Mapes East 182 Street site located at 820 East 182nd Street in the Bronx, New York. I agree to conduct all on-site work in accordance with the requirements set forth in this HASP and understand that failure to comply with this HASP could lead to my removal from the site.

Signed: _____ Company: _____ Date: _____

Signed: _____ Company: _____ Date: _____

Signed: _____ Company: _____ Date: _____

Signed: _____ Company: _____ Date: _____

Signed: _____ Company: _____ Date: _____

Signed: _____ Company: _____ Date: _____

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Signed: _____ Company: _____ Date: _____

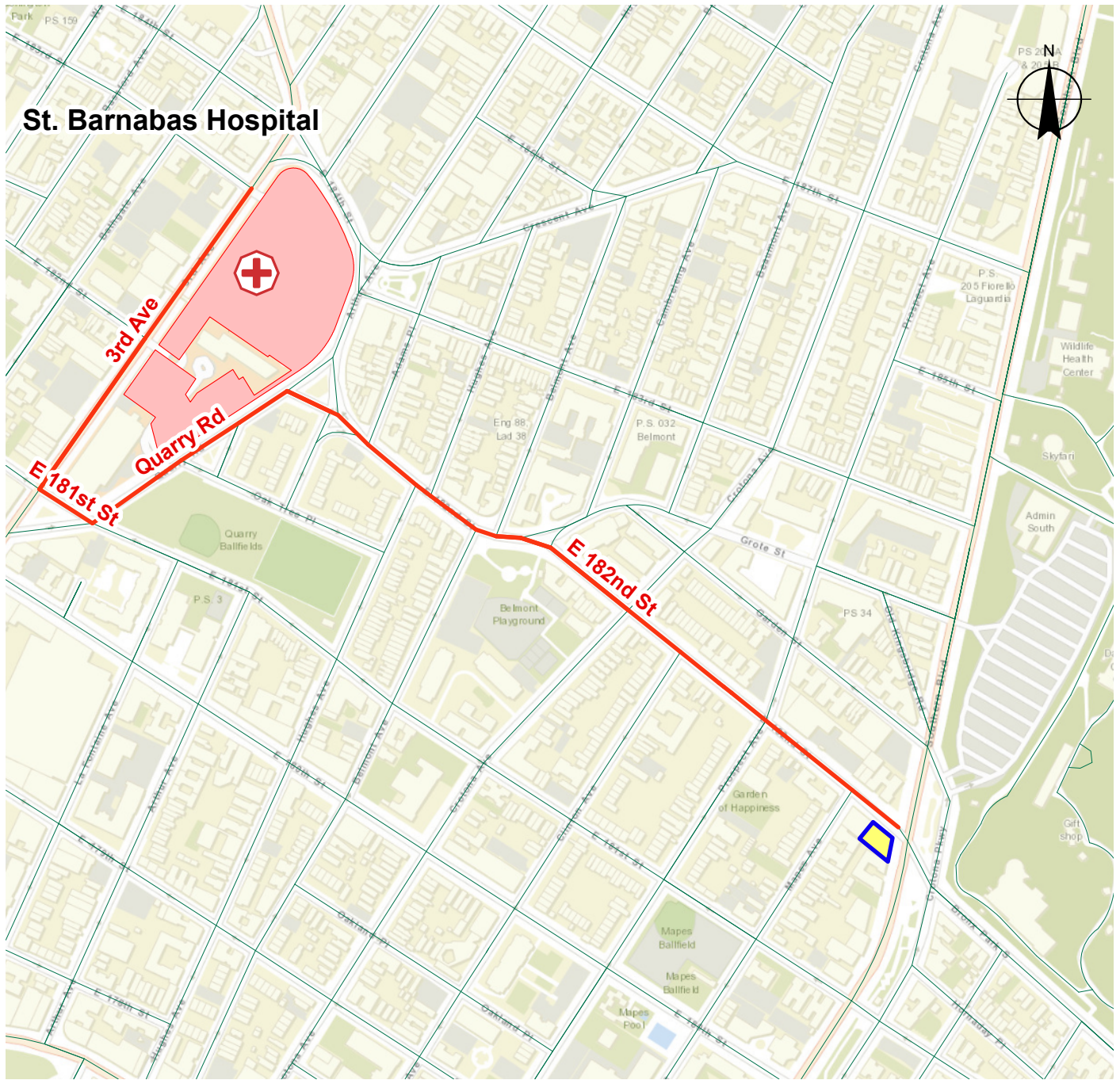
Signed: _____ Company: _____ Date: _____

Signed: _____ Company: _____ Date: _____

Signed: _____ Company: _____ Date: _____

Signed: _____ Company: _____ Date: _____

FIGURES



Service Layer Credits: ESRI World Street Map 2024

LEGEND

-  PROJECT SITE BOUNDARY
-  HOSPITAL LOCATION
-  ROUTE TO HOSPITAL

St. Barnabas Hospital
4422 3rd Avenue
Bronx, NY 10457
(718) 960-9000



akrf

440 Park Avenue South, New York, NY 10016

820 East 182nd Street
Bronx, New York

HOSPITAL ROUTE MAP

DATE	5/6/2025
PROJECT NO.	210138
FIGURE	1

ATTACHMENT A
POTENTIAL HEALTH EFFECTS FROM ON-SITE CONTAMINANTS

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 chromium. 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 chromium occurs from ingesting contaminated food or drinking water or breathing contaminated workplace air. Chromium(VI) at high levels can damage the nose and cause cancer. Ingesting high levels of chromium(VI) may result in anemia or damage to the stomach or intestines. Chromium(III) is an essential nutrient. Chromium has been found in at least 1,127 of the 1,669 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is chromium?

Chromium is a naturally occurring element found in rocks, animals, plants, and soil. It can exist in several different forms. Depending on the form it takes, it can be a liquid, solid, or gas. The most common forms are chromium(0), chromium(III), and chromium(VI). No taste or odor is associated with chromium compounds.

The metal chromium, which is the chromium(0) form, is used for making steel. Chromium(VI) and chromium(III) are used for chrome plating, dyes and pigments, leather tanning, and wood preserving.

What happens to chromium when it enters the environment?

- ☐ Chromium can be found in air, soil, and water after release from the manufacture, use, and disposal of chromium-based products, and during the manufacturing process.
- ☐ Chromium does not usually remain in the atmosphere, but is deposited into the soil and water.
- ☐ Chromium can easily change from one form to another in water and soil, depending on the conditions present.
- ☐ Fish do not accumulate much chromium in their bodies from water.

How might I be exposed to chromium?

- ☐ Eating food containing chromium(III).

- ☐ Breathing contaminated workplace air or skin contact during use in the workplace.
- ☐ Drinking contaminated well water.
- ☐ Living near uncontrolled hazardous waste sites containing chromium or industries that use chromium.

How can chromium affect my health?

Chromium(III) is an essential nutrient that helps the body use sugar, protein, and fat.

Breathing high levels of chromium(VI) can cause irritation to the lining of the nose, nose ulcers, runny nose, and breathing problems, such as asthma, cough, shortness of breath, or wheezing. The concentrations of chromium in air that can cause these effects may be different for different types of chromium compounds, with effects occurring at much lower concentrations for chromium(VI) compared to chromium(III).

The main health problems seen in animals following ingestion of chromium(VI) compounds are irritation and ulcers in the stomach and small intestine and anemia. Chromium(III) compounds are much less toxic and do not appear to cause these problems.

Sperm damage and damage to the male reproductive system have also been seen in laboratory animals exposed to chromium(VI).

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

Skin contact with certain chromium(VI) compounds can cause skin ulcers. Some people are extremely sensitive to chromium(VI) or chromium(III). Allergic reactions consisting of severe redness and swelling of the skin have been noted.

How likely is chromium to cause cancer?

The Department of Health and Human Services (DHHS), the International Agency for Research on Cancer (IARC), and the EPA have determined that chromium(VI) compounds are known human carcinogens. In workers, inhalation of chromium(VI) has been shown to cause lung cancer. Chromium(VI) also causes lung cancer in animals. An increase in stomach tumors was observed in humans and animals exposed to chromium(VI) in drinking water.

How can chromium affect children?

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

We do not know if exposure to chromium will result in birth defects or other developmental effects in people. Some developmental effects have been observed in animals exposed to chromium(VI).

How can families reduce the risks of exposure to chromium?

- ☐ Children should avoid playing in soils near uncontrolled hazardous waste sites where chromium may have been discarded.
- ☐ Chromium is a component of tobacco smoke. Avoid smoking in enclosed spaces like inside the home or car in order to limit exposure to children and other family members.
- ☐ Although chromium(III) is an essential nutrient, you should avoid excessive use of dietary supplements containing chromium.

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

Since chromium(III) is an essential element and naturally occurs in food, there will always be some level of chromium in your body. Chromium can be measured in hair, urine, and blood.

Higher than normal levels of chromium in blood or urine may indicate that a person has been exposed to chromium. However, increases in blood and urine chromium levels cannot be used to predict the kind of health effects that might develop from that exposure.

Has the federal government made recommendations to protect human health?

The EPA has determined that exposure to chromium in drinking water at concentrations of 1 mg/L for up to 10 days is not expected to cause any adverse effects in a child.

The FDA has determined that the chromium concentration in bottled drinking water should not exceed 1 mg/L.

The Occupational Health and Safety Administration (OSHA) has limited workers' exposure to an average of 0.0005 mg/m³ chromium(VI), 0.5 mg/m³ chromium(III), and 1.0 mg/m³ chromium(0) for an 8-hour workday, 40-hour workweek.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2008. Toxicological Profile for Chromium (Draft for Public Comment). Atlanta, GA: U.S. Department of Public Health and Human Services, Public Health Service.

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



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

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

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 ěth/ əl běn/ zěn')

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

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

What happens to ethylbenzene when it enters the environment?

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

How might I be exposed to ethylbenzene?

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

How can ethylbenzene affect my health?

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

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

How likely is ethylbenzene to cause cancer?

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

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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'əl oilz)

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

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

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

What happens to fuel oils when they enter the environment?

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

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

How might I be exposed to fuel oils?

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

How can fuel oils affect my health?

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

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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, light-headedness, 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 can pass to a nursing infant through breast milk. However, the benefits of breast feeding may be greater than the possible adverse effects of mercury in breast milk.

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

How can families reduce the risk of exposure to mercury?

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

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

Pregnant women and children should keep away from

rooms where liquid mercury has been used.

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

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

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

Has the federal government made recommendations to protect human health?

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

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

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

References

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

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



This fact sheet answers the most frequently asked health questions (FAQs) about methylene chloride. 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 methylene chloride occurs mostly from breathing contaminated air, but may also occur through skin contact or by drinking contaminated water. Breathing in large amounts of methylene chloride can damage the central nervous system. Contact of eyes or skin with methylene chloride can result in burns. Methylene chloride has been found in at least 882 of 1,569 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is methylene chloride?

Methylene chloride is a colorless liquid with a mild, sweet odor. Another name for it is dichloromethane. Methylene chloride does not occur naturally in the environment.

Methylene chloride is used as an industrial solvent and as a paint stripper. It may also be found in some aerosol and pesticide products and is used in the manufacture of photographic film.

What happens to methylene chloride when it enters the environment?

- ☐ Methylene chloride is mainly released to the environment in air. About half of the methylene chloride in air disappears in 53 to 127 days.
- ☐ Methylene chloride does not easily dissolve in water, but small amounts may be found in drinking water.
- ☐ We do not expect methylene chloride to build up in plants or animals.

How might I be exposed to methylene chloride?

- ☐ The most likely way to be exposed to methylene chloride is by breathing contaminated air.
- ☐ Breathing the vapors given off by products containing methylene chloride. Exposure to high levels of methylene chloride is likely if methylene chloride or a product containing it is used in a room with inadequate ventilation.

How can methylene chloride affect my health?

If you breathe in large amounts of methylene chloride you may feel unsteady, dizzy, and have nausea and a tingling or numbness of your finger and toes. A person breathing smaller amounts of methylene chloride may become less attentive and less accurate in tasks requiring hand-eye coordination. Skin contact with methylene chloride causes burning and redness of the skin.

How likely is methylene chloride to cause cancer?

We do not know if methylene chloride can cause cancer in humans. An increased cancer risk was seen in mice

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breathing large amounts of methylene chloride for a long time.

The World Health Organization (WHO) has determined that methylene chloride may cause cancer in humans.

The Department of Health and Human Services (DHHS) has determined that methylene chloride can be reasonably anticipated to be a cancer-causing chemical.

The EPA has determined that methylene chloride is a probable cancer-causing agent in humans.

How can methylene chloride affect children?

It is likely that health effects seen in children exposed to high amounts of methylene chloride will be similar to the effects seen in adults. We do not know if methylene chloride can affect the ability of people to have children or if it causes birth defects. Some birth defects have been seen in animals inhaling very high levels of methylene chloride.

How can families reduce the risk of exposure to methylene chloride?

- ☐ Families may be exposed to methylene chloride while using products such as paint removers. Such products should always be used in well-ventilated areas and skin contact should be avoided.
- ☐ Children should not be allowed to remain near indoor paint removal activities.

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

- ☐ Several tests can measure exposure to methylene chloride.

These tests are not routinely available in your doctor's office.

- ☐ Methylene chloride can be detected in the air you breathe out and in your blood. These tests are only useful for detecting exposures that have occurred within a few days.
- ☐ It is also possible to measure carboxyhemoglobin (a chemical formed in the blood as methylene chloride breaks down in the body) in the blood or formic acid (a breakdown product of methylene chloride) in the urine. These tests are not specific for methylene chloride.

Has the federal government made recommendations to protect human health?

- ☐ The EPA requires that releases of methylene chloride of 1,000 pounds or more be reported to the federal government.
- ☐ The EPA recommends that exposure of children to methylene chloride be limited to less than 10 milligrams per liter of drinking water (10 mg/L) for 1 day or 2 mg/L for 10 days.
- ☐ The Food and Drug Administration (FDA) has established limits on the amounts of methylene chloride that can remain after processing of spices, hops extract, and decaffeinated coffee.
- ☐ The Occupational Safety and Health Administration (OSHA) has set limits of 25 parts methylene chloride per million parts of workplace air (25 ppm) for 8-hour shifts and 40-hour work weeks.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2000. Toxicological Profile for methylene chloride. 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 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.

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

How can PAHs affect my health?

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

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

How likely are PAHs to cause cancer?

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

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

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

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

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

Has the federal government made recommendations to protect human health?

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

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

Glossary

Carcinogen: A substance that can cause cancer.

Ingest: Take food or drink into your body.

References

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

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



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

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

What are polychlorinated biphenyls?

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

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

What happens to PCBs when they enter the environment?

- ❑ PCBs entered the air, water, and soil during their manufacture, use, and disposal; from accidental spills and leaks during their transport; and from leaks or fires in products containing PCBs.
- ❑ PCBs can still be released to the environment from hazardous waste sites; illegal or improper disposal of industrial wastes and consumer products; leaks from old electrical transformers containing PCBs; and burning of some wastes in incinerators.
- ❑ PCBs do not readily break down in the environment and thus may remain there for very long periods of time. PCBs can travel long distances in the air and be deposited in areas far away from where they were released. In water, a small amount of PCBs may remain dissolved, but most stick to organic particles and bottom sediments. PCBs also bind strongly to soil.
- ❑ PCBs are taken up by small organisms and fish in water. They are also taken up by other animals that eat these

aquatic animals as food. PCBs accumulate in fish and marine mammals, reaching levels that may be many thousands of times higher than in water.

How might I be exposed to PCBs?

- ❑ Using old fluorescent lighting fixtures and electrical devices and appliances, such as television sets and refrigerators, that were made 30 or more years ago. These items may leak small amounts of PCBs into the air when they get hot during operation, and could be a source of skin exposure.
- ❑ Eating contaminated food. The main dietary sources of PCBs are fish (especially sportfish caught in contaminated lakes or rivers), meat, and dairy products.
- ❑ Breathing air near hazardous waste sites and drinking contaminated well water.
- ❑ In the workplace during repair and maintenance of PCB transformers; accidents, fires or spills involving transformers, fluorescent lights, and other old electrical devices; and disposal of PCB materials.

How can PCBs affect my health?

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

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

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

How likely are PCBs to cause cancer?

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

How can PCBs affect children?

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

How can families reduce the risk of exposure to PCBs?

- ☐ You and your children may be exposed to PCBs by eating fish or wildlife caught from contaminated locations. Certain states, Native American tribes, and U.S. territories have issued advisories to warn people about PCB-contaminated fish and fish-eating wildlife. You can reduce your family's exposure to PCBs by obeying these advisories.
- ☐ Children should be told not play with old appliances,

electrical equipment, or transformers, since they may contain PCBs.

- ☐ Children should be discouraged from playing in the dirt near hazardous waste sites and in areas where there was a transformer fire. Children should also be discouraged from eating dirt and putting dirty hands, toys or other objects in their mouths, and should wash hands frequently.
- ☐ If you are exposed to PCBs in the workplace it is possible to carry them home on your clothes, body, or tools. If this is the case, you should shower and change clothing before leaving work, and your work clothes should be kept separate from other clothes and laundered separately.

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

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

Has the federal government made recommendations to protect human health?

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

References

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

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



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

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

What is trichloroethylene?

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

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

What happens to trichloroethylene when it enters the environment?

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

plants and animals.

How might I be exposed to trichloroethylene?

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

How can trichloroethylene affect my health?

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

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

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

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

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

How likely is trichloroethylene to cause cancer?

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

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

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

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

Exposure to larger amounts is assessed by blood

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

Has the federal government made recommendations to protect human health?

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

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

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

Glossary

Carcinogenicity: The ability of a substance to cause cancer.

CAS: Chemical Abstracts Service.

Evaporate: To change into a vapor or gas.

Milligram (mg): One thousandth of a gram.

Nonflammable: Will not burn.

ppm: Parts per million.

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

Solvent: A chemical that dissolves other substances.

References

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

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

This fact sheet answers the most frequently asked health questions (FAQs) about tetrachloroethylene. 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: Tetrachloroethylene is a manufactured chemical used for dry cleaning and metal degreasing. Exposure to very high concentrations of tetrachloroethylene can cause dizziness, headaches, sleepiness, confusion, nausea, difficulty in speaking and walking, unconsciousness, and death. Tetrachloroethylene has been found in at least 771 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is tetrachloroethylene?

(Pronounced tět'rə-klôr' ō-ěth'ə-lēn')

Tetrachloroethylene is a manufactured chemical that is widely used for dry cleaning of fabrics and for metal-degreasing. It is also used to make other chemicals and is used in some consumer products.

Other names for tetrachloroethylene include perchloroethylene, PCE, and tetrachloroethene. It is a nonflammable liquid at room temperature. It evaporates easily into the air and has a sharp, sweet odor. Most people can smell tetrachloroethylene when it is present in the air at a level of 1 part tetrachloroethylene per million parts of air (1 ppm) or more, although some can smell it at even lower levels.

What happens to tetrachloroethylene when it enters the environment?

- ☐ Much of the tetrachloroethylene that gets into water or soil evaporates into the air.
- ☐ Microorganisms can break down some of the tetrachloroethylene in soil or underground water.
- ☐ In the air, it is broken down by sunlight into other chemicals or brought back to the soil and water by rain.
- ☐ It does not appear to collect in fish or other animals that live in water.

How might I be exposed to tetrachloroethylene?

- ☐ When you bring clothes from the dry cleaners, they will release small amounts of tetrachloroethylene into the air.
- ☐ When you drink water containing tetrachloroethylene, you are exposed to it.

How can tetrachloroethylene affect my health?

High concentrations of tetrachloroethylene (particularly in closed, poorly ventilated areas) can cause dizziness, headache, sleepiness, confusion, nausea, difficulty in speaking and walking, unconsciousness, and death.

Irritation may result from repeated or extended skin contact with it. These symptoms occur almost entirely in work (or hobby) environments when people have been accidentally exposed to high concentrations or have intentionally used tetrachloroethylene to get a "high."

In industry, most workers are exposed to levels lower than those causing obvious nervous system effects. The health effects of breathing in air or drinking water with low levels of tetrachloroethylene are not known.

Results from some studies suggest that women who work in dry cleaning industries where exposures to tetrachloroethyl-

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ene can be quite high may have more menstrual problems and spontaneous abortions than women who are not exposed. However, it is not known if tetrachloroethylene was responsible for these problems because other possible causes were not considered.

Results of animal studies, conducted with amounts much higher than those that most people are exposed to, show that tetrachloroethylene can cause liver and kidney damage. Exposure to very high levels of tetrachloroethylene can be toxic to the unborn pups of pregnant rats and mice. Changes in behavior were observed in the offspring of rats that breathed high levels of the chemical while they were pregnant.

How likely is tetrachloroethylene to cause cancer?

The Department of Health and Human Services (DHHS) has determined that tetrachloroethylene may reasonably be anticipated to be a carcinogen. Tetrachloroethylene has been shown to cause liver tumors in mice and kidney tumors in male rats.

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

One way of testing for tetrachloroethylene exposure is to measure the amount of the chemical in the breath, much the same way breath-alcohol measurements are used to determine the amount of alcohol in the blood.

Because it is stored in the body's fat and slowly released into the bloodstream, tetrachloroethylene can be detected in the breath for weeks following a heavy exposure.

Tetrachloroethylene and trichloroacetic acid (TCA), a breakdown product of tetrachloroethylene, can be detected in the blood. These tests are relatively simple to perform. These tests aren't available at most doctors' offices, but can be per-

formed at special laboratories that have the right equipment.

Because exposure to other chemicals can produce the same breakdown products in the urine and blood, the tests for breakdown products cannot determine if you have been exposed to tetrachloroethylene or the other chemicals.

Has the federal government made recommendations to protect human health?

The EPA maximum contaminant level for the amount of tetrachloroethylene that can be in drinking water is 0.005 milligrams tetrachloroethylene per liter of water (0.005 mg/L).

The Occupational Safety and Health Administration (OSHA) has set a limit of 100 ppm for an 8-hour workday over a 40-hour workweek.

The National Institute for Occupational Safety and Health (NIOSH) recommends that tetrachloroethylene be handled as a potential carcinogen and recommends that levels in workplace air should be as low as possible.

Glossary

Carcinogen: A substance with the ability to cause cancer.

CAS: Chemical Abstracts Service.

Milligram (mg): One thousandth of a gram.

Nonflammable: Will not burn.

References

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

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



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

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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.



This fact sheet answers the most frequently asked health questions (FAQs) about zinc. 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: Zinc is a naturally occurring element. Exposure to high levels of zinc occurs mostly from eating food, drinking water, or breathing workplace air that is contaminated. Low levels of zinc are essential for maintaining good health. Exposure to large amounts of zinc can be harmful. It can cause stomach cramps, anemia, and changes in cholesterol levels. Zinc has been found in at least 985 of the 1,662 National Priority List sites identified by the Environmental Protection Agency (EPA).

What is zinc?

Zinc is one of the most common elements in the earth's crust. It is found in air, soil, and water, and is present in all foods. Pure zinc is a bluish-white shiny metal.

Zinc has many commercial uses as coatings to prevent rust, in dry cell batteries, and mixed with other metals to make alloys like brass, and bronze. A zinc and copper alloy is used to make pennies in the United States.

Zinc combines with other elements to form zinc compounds. Common zinc compounds found at hazardous waste sites include zinc chloride, zinc oxide, zinc sulfate, and zinc sulfide. Zinc compounds are widely used in industry to make paint, rubber, dyes, wood preservatives, and ointments.

What happens to zinc when it enters the environment?

- ☐ Some is released into the environment by natural processes, but most comes from human activities like mining, steel production, coal burning, and burning of waste.
- ☐ It attaches to soil, sediments, and dust particles in the air.
- ☐ Rain and snow remove zinc dust particles from the air.
- ☐ Depending on the type of soil, some zinc compounds can move into the groundwater and into lakes, streams, and rivers.
- ☐ Most of the zinc in soil stays bound to soil particles and

does not dissolve in water.

- ☐ It builds up in fish and other organisms, but it does not build up in plants.

How might I be exposed to zinc?

- ☐ Ingesting small amounts present in your food and water.
- ☐ Drinking contaminated water or a beverage that has been stored in metal containers or flows through pipes that have been coated with zinc to resist rust.
- ☐ Eating too many dietary supplements that contain zinc.
- ☐ Working on any of the following jobs: construction, painting, automobile mechanics, mining, smelting, and welding; manufacture of brass, bronze, or other zinc-containing alloys; manufacture of galvanized metals; and manufacture of machine parts, rubber, paint, linoleum, oilcloths, batteries, some kind of glass, ceramics, and dyes.

How can zinc affect my health?

Zinc is an essential element in our diet. Too little zinc can cause problems, but too much zinc is also harmful.

Harmful effects generally begin at levels 10-15 times higher than the amount needed for good health. Large doses taken by mouth even for a short time can cause stomach cramps, nausea, and vomiting. Taken longer, it can cause anemia and decrease the levels of your good cholesterol. We do not know if high levels of zinc affect reproduction in humans. Rats that were fed large amounts of zinc became infertile.

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

Inhaling large amounts of zinc (as dusts or fumes) can cause a specific short-term disease called metal fume fever. We do not know the long-term effects of breathing high levels of zinc.

Putting low levels of zinc acetate and zinc chloride on the skin of rabbits, guinea pigs, and mice caused skin irritation. Skin irritation will probably occur in people.

How likely is zinc to cause cancer?

The Department of Health and Human Services (DHHS) and the International Agency for Research on Cancer (IARC) have not classified zinc for carcinogenicity. Based on incomplete information from human and animal studies, the EPA has determined that zinc is not classifiable as to its human carcinogenicity.

How can zinc affect children?

Zinc is essential for proper growth and development of young children. It is likely that children exposed to very high levels of zinc will have similar effects as adults. We do not know whether children are more susceptible to the effects of excessive intake of zinc than the adults.

We do not know if excess zinc can cause developmental effects in humans. Animal studies have found decreased weight in the offspring of animals that ingested very high amounts of zinc.

How can families reduce the risks of exposure to zinc?

- ☐ Children living near waste sites that contain zinc may be exposed to higher levels of zinc through breathing contaminated air, drinking contaminated drinking water, touching or eating contaminated soil.
- ☐ Discourage your children from eating soil or putting their hands in their mouths and teach them to wash their hands frequently and before eating.
- ☐ If you use medicines or vitamin supplements containing

zinc, make sure you use them appropriately and keep them out of the reach of children.

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

There are tests available to measure zinc in your blood, urine, hair, saliva, and feces. These tests are not usually done in the doctor's office because they require special equipment. High levels of zinc in the feces can mean high recent zinc exposure. High levels of zinc in the blood can mean high zinc consumption and/or high exposure. Tests to measure zinc in hair may provide information on long-term zinc exposure; however, the relationship between levels in your hair and the amount of zinc you were exposed to is not clear.

Has the federal government made recommendations to protect human health?

The EPA recommends that drinking water should contain no more than 5 milligrams per liter of water (5 mg/L) because of taste. The EPA requires that any release of 1,000 pounds (or in some cases 5,000 pounds) into the environment be reported to the agency.

To protect workers, the Occupational Safety and Health Administration (OSHA) has set an average limit of 1 mg/m³ for zinc chloride fumes and 5 mg/m³ for zinc oxide (dusts and fumes) in workplace air during an 8-hour workday, 40-hour workweek.

Similarly, the National Institute for Occupational Safety and Health (NIOSH) has set the same standards for up to a 10-hour workday over a 40-hour workweek.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2005. Toxicological Profile for Zinc (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, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaq.html>. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.



ATTACHMENT B
REPORT FORMS

WEEKLY SAFETY REPORT FORM

Week Ending: _____ Project Name/Number: _____

Report Date: _____ Project Manager Name: _____

Summary of any violations of procedures occurring that week:

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

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

Comments:

Name: _____ Company: _____

Signature: _____ Title: _____

INCIDENT REPORT FORM

Date of Report: _____

Injured: _____

Employer: _____

Site: _____ Site Location: _____

Report Prepared By: _____
Signature Title

ACCIDENT/INCIDENT CATEGORY (check all that applies)

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

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

WITNESS TO ACCIDENT/INCIDENT:

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

INJURED - ILL:

Name: _____ SSN: _____

Address: _____ Age: _____

Length of Service: _____ Time on Present Job: _____

Time/Classification: _____

SEVERITY OF INJURY OR ILLNESS:

____ Disabling ____ Non-disabling ____ Fatality

____ Medical Treatment ____ First Aid Only

ESTIMATED NUMBER OF DAYS AWAY FROM JOB: _____**NATURE OF INJURY OR ILLNESS:** __________
_____**CLASSIFICATION OF INJURY:**

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

Part of Body Affected: _____

Degree of Disability: _____

Date Medical Care was Received: _____

Where Medical Care was Received: _____

Address (if off-site): _____

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

PROPERTY DAMAGE:

Description of Damage: _____

Cost of Damage: \$ _____

ACCIDENT/INCIDENT LOCATION: _____

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

Was weather a factor?: _____

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

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

ON-SITE ACCIDENTS/INCIDENTS:

Level of personal protection equipment required in Site Safety Plan:

Modifications:

Was injured using required equipment?:

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

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

ACCIDENT/INCIDENT REPORT REVIEWED BY:

SSO Name Printed

SSO Signature

OTHERS PARTICIPATING IN INVESTIGATION:

Signature

Title

Signature

Title

Signature

Title

ACCIDENT/INCIDENT FOLLOW-UP: Date:

Outcome of accident/incident:

Physician's recommendations:

Date injured returned to work:

Follow-up performed by:

Signature

Title

ATTACH ANY ADDITIONAL INFORMATION TO THIS FORM

ATTACHMENT 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 C
COMMUNITY AIR MONITORING PLAN

MAPES EAST 182 STREET

BRONX, NEW YORK

Community Air Monitoring Plan

NYSDEC BCP Site No: C203149
AKRF Project Number: 210138

Prepared For:

New York State Department of Environmental Conservation
Division of Environmental Remediation, Remedial Bureau B
625 Broadway, 12th Floor
Albany, New York 12233

Prepared On Behalf Of:

East 182 Street Associates, LLC
902 Broadway, 13th Floor
New York, NY 10010

Prepared by:



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

JUNE 2025

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TABLES

Table 1 – Work Zone Air Monitoring Action Levels

1.0 INTRODUCTION

This Community Air Monitoring Plan (CAMP) has been developed for the implementation of a Supplemental Remedial Investigation (SRI) Work Plan (SRIWP) by AKRF, Inc. (AKRF) personnel and its subcontractors at the Mapes East 182 Street site located at 820 East 182nd Street in the Belmont section of the Bronx, New York, hereafter referred to as the “Site.” The Site is identified by the City of New York as Borough of Queens, Block 3111, Lot 59.

Currently, the Site is unoccupied and contains a former Sunoco[®] gasoline station and a single-story building that formerly housed an auto repair shop and adjoining convenience store. Exterior portions of the Site are primarily uncapped with exposed clean backfill and some areas covered with asphalt pavement. The former pump island, located in the eastern portion of the lot, was supplied by five 4,000-gallon gasoline underground storage tanks (USTs) located in the northern portion of the Site. In addition, an 1,000-gallon waste oil UST was previously located in the northwestern portion of the Site, abutting the auto repair shop. The pump island was disconnected in May 2021 and the USTs were emptied and taken out-of-service in October 2021. The USTs and pump island were removed from the Site between March 1 and 9, 2023 as part of an Interim Remedial Measure (IRM).

A Remedial Investigation (RI) was performed at the Site in February 2024. The RI identified elevated levels of petroleum-related volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), and select metals in soil and groundwater, and petroleum-related VOCs in soil vapor. The highest detections were located beneath the former UST grave and former pump island. The SRIWP describes the procedures to be used to further define the nature and extent of contamination at the Site. The data compiled from the SRI will be used to update the January 2025 draft RI Report (RIR).

2.0 AIR MONITORING PROGRAM

The purpose of the air monitoring program is to identify any exposure of the field personnel and the community to potential environmental hazards in the soil and groundwater. Air Monitoring will be conducted in accordance with the New York State Department of Health (NYSDOH) and New York State Department of Environmental Conservation (NYSDEC) guidance. Results of the air monitoring will be used to determine the appropriate response action, if needed. Field personnel will be trained in the proper operation of all field instruments at the start of the field program. 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.

2.1 Work Zone Air Monitoring

2.1.1 Volatile Organic Compound (VOC) Monitoring

Continuous monitoring for VOCs will be conducted using roving hand-held equipment during all ground-intrusive activities, including soil boring advancement and groundwater monitoring well installation. Upwind concentrations will be measured at the start of each workday and periodically thereafter to establish background concentrations. VOCs will be monitored continuously at the downwind perimeter of the exclusion zone. Monitoring will be conducted with a photoionization detector (PID) equipped with a 10.6 electron Volt (eV) lamp capable of calculating 15-minute running average concentrations. More frequent intervals of monitoring will be conducted if required as determined by the SSO. All PID readings will be recorded and available for NYSDEC and NYSDOH personnel to review. Instantaneous readings will also be recorded.

2.1.2 Airborne Particulate Monitoring

A DustTrak® or equivalent would be used to measure real-time concentrations of total particulates 10 micrometers or less (PM10). Measurements for particulates will be taken prior to commencement of the work and during the work in areas where contaminated soil would be disturbed. The action levels listed in Table 1 are based on 15-minute averages of the monitoring data. The measurements will be made at the breathing height of the workers and as close to their location as practicable. The Site Safety Officer (SSO) will set up the equipment and confirm that it is working properly. His/her qualified 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 background levels. The final measurement for the day will be performed after the end of work. The action levels for particulates and VOCs and required responses are listed in Table 1.

Table 1
Work Zone Action Levels and Required Responses

Monitoring	Action Level ¹	Response Action
Particulate	Less than 0.125 mg/m ³ above background	Level D or D-Modified (Requires coveralls and steel toe boots) (As applicable: Chemical resistant gloves, chemical resistant boot covers, hard hat, safety glasses, face shield, or escape mask)
	Between 0.125 mg/m ³ and 0.150 mg/m ³ above background	Level C (Requires full face or half face respirator, hooded chemical resistant two piece Tyvek suit or overalls, chemical resistant inner and outer gloves, chemical resistant boot covers, steel toe and shank boots) (As applicable: hard hat, face shield, or escape mask) Apply dust suppression measures. Resume work or upgrade.
	Greater than 0.150 mg/m ³ above background	Stop work. Apply additional dust suppression measures. Resume work when less than 0.150 mg/m ³ and maintain Level C.
Volatile Organic Compound (VOC)	Less than 5 ppm in breathing zone	Level D or D-Modified
	Between 5 and 50 ppm	Level C
	More than 50 ppm	Stop work. Resume work when source of vapors is abated and readings are less than 50 ppm above background.
Notes: ¹ - 15-minute time-weighted average parts per million = ppm milligrams per cubic meter = mg/m ³		

2.2 Perimeter Community Air Monitoring

Fixed air monitoring stations will be set up at the upwind and downwind perimeters of the exclusion zone during all ground intrusive activities and will continuously log VOC and particulate levels. Each fixed monitoring station will be fully enclosed and equipped with the following:

- A PID equipped with a 10.6 eV lamp capable of calculating 15-minute running average VOC concentrations;
- A TSI 8530 DustTrak II or equivalent dust monitor capable of measuring the concentration of airborne respirable particulates less than 10 micrometers in size (PM10) and calculating 15-minute running average particulate concentrations; and
- A Netronix™ Thiamus™ ICU-820 or equivalent Global System for Mobile Communication (GSM)/Global Positioning System (GPS) device capable of recording air monitoring and location data.
- Each monitoring station will be capable of sending e-mail alerts to the SSO to indicate an exceedance of action levels. Additionally, the SSO will conduct an inspection of the monitoring stations on at least an hourly basis. Upon completion of Site activities, all air monitoring data will be available to download via the iEnvironet® website. All air monitoring data recorded at the fixed monitoring stations will be available for NYSDOH and NYSDEC review and will be included in the Remedial Investigation Report (RIR).

2.2.1 Perimeter Community Air Monitoring Action Levels

VOC Action Levels

The following actions will be taken based on organic vapor levels measured:

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

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

If the total organic vapor level is above 25 ppm at the perimeter of the exclusion zone, activities will be shutdown.

Particulate Action Levels

The following actions will be taken based on particulate levels measured:

If the downwind particulate concentrations are greater than 0.1 milligrams per cubic meter (mg/m^3) above background (upwind concentrations), and no other obvious source is apparent, then it will be assumed that the elevated particulate concentrations are a result of site activities. In such instances, dust suppression measures will be implemented and monitoring will be continued. Work will be allowed to continue with dust suppression if downwind particulate levels do not exceed $0.15 \text{ mg}/\text{m}^3$ above the background (upwind concentration) and provided that no visible dust is migrating from the work area.

If particulate levels persist at $0.15 \text{ mg}/\text{m}^3$ above the background, work must be stopped until dust suppression measures bring particulate levels to below $0.15 \text{ mg}/\text{m}^3$ above background.

2.3 Major Vapor Emission Response Plan

If any organic levels greater than 5 ppm over background are identified 200 feet downwind from the work Site, or half the distance to the nearest residential or commercial property, whichever is less, all work activities must be halted or vapor controls must be implemented.

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

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

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

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

- The NYSDEC, NYSDOH, and local police authorities will be immediately contacted by the SSO and advised of the situation;
- Frequent air monitoring will be conducted at 30-minute intervals within the 20 Foot Zone. If two successive readings below action levels are measured, air monitoring may be halted or modified by the Site Health and Safety Officer; and
- All Emergency contacts will go into effect as appropriate.
- All readings will be recorded and be available for NYSDEC and NYSDOH personnel to review.

2.4 Reporting

CAMP summary reports will be prepared and submitted to NYSDEC and NYSDOH for review as part of the daily reports, and in supplemental weekly CAMP reports. In the event there is an action level exceedance or complaint, NYSDEC and NYSDOH will be notified within 24 hours (same day to the extent possible) of the exceedance or complaint. The notification will include a description of the exceedance or complaint, the cause of the exceedance, and any corrective actions taken. All recorded CAMP data will be included in the RIR.

APPENDIX D
PREVIOUS ENVIRONMENTAL REPORTS