102 BRUCKNER BOULEVARD

BRONX, NEW YORK

Draft Remedial Investigation Work Plan

NYSDEC BCP Site Number: C203168
AKRF Project Number: 200328

Prepared For:

New York State Department of Environmental Conservation
Division of Environmental Remediation
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Prepared On Behalf Of:

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TABLE OF CONTENTS

FIGURES

APPENDICES

IN-TEXT TABLES

1.0 INTRODUCTION

This Remedial Investigation Work Plan (RIWP) has been prepared by AKRF, Inc. (AKRF) on behalf of 132 Willis Associates, LLC (the Volunteer) for the property located at 102 Bruckner Boulevard in the Port Morris 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 2277, Lot 50 (formerly Lots 78, 94, and 50).

The Site entered the Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP) effective October 2, 2023 (NYSDEC BCP Site No. C203168; BCA Index No. C203168-07-23). Two Subsurface (Phase II) Investigations and a Supplemental Subsurface (Phase II) Investigation were conducted by AKRF, as documented in the September 2021 Subsurface (Phase II) Investigation Report, October 2021 Subsurface (Phase II) Investigation Report, and December 2022 Supplemental Subsurface (Phase II) Investigation Report. Results of the investigations identified elevated levels of volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs) and metals in soil; VOCs in groundwater; and petroleum-related and chlorinated VOCs in soil vapor.

This RIWP describes the procedures to be used to define the nature and extent of contamination at the Site. The data compiled from the Remedial Investigation (RI), as described in this RIWP, will be used to prepare an RI Report (RIR). All work will be completed in accordance with this RIWP, which includes a Quality Assurance Project Plan (QAPP) (Appendix A), Health and Safety Plan (HASP) (Appendix B) and Community Air Monitoring Plan (CAMP) (Appendix C).

Contact information for the parties responsible for the work described in this RIWP are included in Table I.

Table I
Remedial Investigation Personnel Contact Information

Company	Individual Name	Title	Contact Information
NYSDEC	Manfred Magloire	Project Manager	(718) 482-4078 Manfred.magloire@dec.ny.gov
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AKRF	Marc Godick	QA/QC Officer, QEP	(914) 922-2356 mgodick@akrf.com
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132 Willis Associates, LLC	Benny Caiola	Volunteer Representative	(212) 772-8830

2.0 SITE DESCRIPTION AND HISTORY

2.1 Site Description and Surrounding Land Use

The Site consists of an approximately 0.597-acre parcel located at 102 Bruckner Boulevard in the Port Morris section of the Bronx, New York, and is identified by the City of New York as Borough of Bronx Tax Block 2277, Lot 50 (formerly Lots 78, 94, and 50).

Currently, the Site buildings are unoccupied, and the Site is secured by a chain link fence. The Site is developed with a pump island from the former gasoline station, a one-story slab-on-grade building formerly used as an auto repair shop and a convenience store, and a one-story slab-on-grade former warehouse/garage with a loft. The remainder of the Site is concrete- and asphalt-paved with some sparse vegetation. The area surrounding the Site is primarily commercial, with some residential uses, parkland, and vacant land.

A Site Location Map is provided as Figure 1 and a Site Plan is provided as Figure 2. A land use map is provided as Figure 3.

2.2 Site Geology, Hydrogeology, and Subsurface Characteristics

The average Site elevation is approximately 30 feet above the North American Vertical Datum (NAVD) of 1988 (an approximation of mean sea level). The Site is situated on a ridge with varying surface topography; the northern and central portions of the Site slope slightly down to the northeast, and the southern portion of the Site slopes slightly down to the northwest.

Based on the findings of subsurface investigations completed at the Site in 2021 and 2022, the stratigraphy of the Site consists of historic fill (sand, silt, and gravel, with varying amounts of asphalt, brick, concrete, and wood) extending from ground surface to depths up to approximately 8.5 feet below ground surface (bgs), underlain by apparent native sand, silt, and gravel in the southeastern and southwestern portions of the Site. The fill/soil layer was underlain by bedrock encountered at depths ranging from approximately 1 to 5 feet bgs in the northern and central portions of the Site, at approximately 8.5 feet bgs in the southeastern portion of the Site, and at approximately 14 feet bgs in the southwestern portion of the Site. Shallow bedrock was reportedly removed to facilitate installation of the former gasoline station’s underground storage tanks (USTs), with suspected bedrock (or a concrete tank pad) encountered at approximately 10 feet bgs in that area (the “UST field”).

Groundwater was measured at approximately 4.25 feet bgs in two temporary monitoring wells installed within the UST field, at depths ranging from approximately 4.25 to 4.75 feet bgs in bedrock groundwater monitoring wells installed in the northern portion of the Site, and at approximately 9.5 feet bgs in the bedrock groundwater monitoring well installed in the central portion of the Site. Groundwater was not encountered in the bedrock groundwater monitoring well that was installed to approximately 17.5 feet bgs in the southern portion of the Site.

Based on surface topography and information presented in AKRF’s November 2020 Draft Phase I Environmental Site Assessment (ESA), groundwater is expected to flow in a generally southerly direction toward the Bronx Kill and Harlem River; however, actual groundwater levels and/or flow direction can be affected by many factors, including tidal influences, seasonal fluctuations in precipitation, subsurface openings or obstructions (basements/cellars, utilities), bedrock geology, and other factors. No surface water bodies or streams were noted on or immediately adjacent to the Site. Groundwater in the Bronx is not used as a source of potable water.

2.3 Proposed Development Plan

The redevelopment plan is still being contemplated; however, it is anticipated to include demolition of the current Site buildings followed by construction of a new residential building that may include a mix of market and affordable units with commercial space on the ground floor. Depending on competency and depth to bedrock, a partial cellar may be included in the plans.

2.4 Site History

Historically, the Site was developed with two small unspecified structures associated with Union Park by 1891. The northern portion of the Site was developed with a gasoline station with auto repair operations by 1935; the central portion of the Site was developed with a warehouse/garage by 1935; and the southern portion of the Site remained largely undeveloped (identified as an unopened portion of East 132nd Street) since circa 1891. Former structures at the Site were demolished between 1891 and 1951. The current Site buildings were vacated by 2022.

3.0 PREVIOUS ENVIRONMENTAL REPORTS

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

Draft Phase I ESA, 102 Bruckner Boulevard, 469 East 132nd Street, and 80 Willis Avenue, Bronx, NY 10454, prepared by AKRF, November 2020

AKRF prepared a Draft Phase I ESA of the Site in accordance with American Society for Testing and Materials (ASTM) Standard E1527-13, *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Practice,* which was the standard at the time of report issuance. The Draft Phase I ESA identified the following Recognized Environmental Conditions (RECs).

- The northern portion of the Site [102 Bruckner Boulevard (former Lot 78)] was occupied by a gasoline station with auto repair operations since at least 1935. The gasoline station (Facility ID No. 2-399000) was registered with the NYSDEC Petroleum Bulk Storage (PBS) program with two in-service 4,000-gallon gasoline USTs, one in-service 4,000-gallon diesel UST, one in-service 275-gallon motor oil aboveground storage tank (AST), and one in-service 275-gallon waste oil AST. The facility was also listed with 13 closed-removed 550-gallon gasoline USTs, which were reported to have been closed in August 1991. In addition to the registered storage tanks, the property owner at the time (Mr. Richard Caiola) reported that an unregistered 550-gallon waste oil UST was removed from the facility between circa 2005 and 2010; however, no documentation regarding its removal was available. Spill No. 9202017 was reported at the facility in May 1992 following the identification of petroleum contaminated soil. According to Mr. Richard Caiola (former property owner), the contamination was encountered during removal of the 550-gallon gasoline USTs and was remediated prior to installation of the current 4,000-gallon USTs; however, no information regarding the tank removal and/or remediation work was available. The NYSDEC closed the spill listing in March 2003. The gasoline station was also listed as a Resource Conservation and Recovery Act (RCRA) generator (Facility ID No. NYD000698597) of unspecified waste in 1980, 1999, 2006, and 2007 with no violations noted in the listing. One 275-gallon motor oil AST, one 275-gallon waste oil AST, automotive fluids (antifreeze, fuel, oils, etc.) in containers up to 55 gallons, and general cleaning products, paints, and solvents in containers up to 5 gallons were noted throughout the facility's auto repair shop; staining was noted on the floor in the repair bays and adjacent to chemical storage areas. No evidence of secondary containment for the 275-gallon waste oil AST or the 55-gallon drums were observed. Evidence of the former in-ground hydraulic lifts, which were reportedly abandoned below the building slab, was observed in the eastern portion of the auto repair shop.
- The central portion of the Site [469 East 132nd Street (former Lot 94)] was occupied by a warehouse/garage since at least 1935. Historical uses of the warehouse/garage included a bottling facility; a dairy products storage, distribution, and manufacturing facility; and sign fabrication/electrical contractor uses. Lubricants, oils, and unlabeled chemicals in containers up to 55 gallons were noted in the southwestern portion of the building; staining was noted on the floor of the building and adjacent to the chemical storage areas.
- Off-site land uses in the vicinity of the Site included auto repair shops, coal yards, garages with buried gasoline tanks, gasoline stations, railroad operations, used auto sales, and other commercial, industrial, and manufacturing operations.
- Regulatory database listings in the vicinity of the Site included spill incidents; hazardous waste generators; petroleum bulk storage facilities; and historic auto sites.

In addition to the RECs, the Draft Phase I ESA identified Business Environmental Risks (BERs) including: E-Designations assigned to the Site for hazardous materials contamination and noise; the potential presence of asbestos-containing material (ACM), lead-based paint (LBP), lead-containing paint (LCP), and/or polychlorinated biphenyl (PCB)-containing material in the Site building, in historic fill material, and/or in buried debris at the Site; the potential use of per- and polyfluoroalkyl substances (PFAS) at the Site; and two previous consent orders associated with NYSDEC PBS violations.

Subsurface (Phase II) Investigation, 469 East 132nd Street and 80 Willis Avenue, Bronx, NY 10454, prepared by AKRF, September 2021

AKRF completed a Subsurface (Phase II) Investigation of 469 East 132nd Street and 80 Willis Avenue to assess whether the RECs identified in AKRF's November 2020 Draft Phase I ESA had adversely affected subsurface conditions at portions of the Site. The investigation included the advancement of seven soil borings, installation of two bedrock groundwater monitoring wells, installation of three temporary soil vapor points, and the collection of soil, groundwater, and soil vapor samples for field-screening and laboratory analysis. Based on the findings of the Subsurface (Phase II) Investigation, AKRF concluded the following:

- Soil consisted of historic fill (sand, silt, and gravel, with varying amounts of asphalt, brick, and concrete) extending from ground surface to depths up to approximately 8.5 feet bgs, with some apparent native sand, silt, and gravel below the fill layer in two locations (SB-12 and SB-13). The fill/soil layer was underlain by suspected bedrock, which was encountered at approximately 1 to 4 feet bgs in the northern and central portions of the parcel, at approximately 8.5 feet bgs in the southeastern portion of the parcel, and at approximately 14 feet bgs in the southwestern portion of the parcel.
- No field evidence of contamination [e.g., odors, staining, and/or elevated photoionization detector (PID) readings] was noted in the soil borings. Low-level PID readings [0.2 to 10.6 parts per million (ppm)] were observed from approximately 0 to 2 feet bgs at SB-12; however, no odors or staining were noted.
- Groundwater was not encountered prior to Geoprobe® refusal on suspected bedrock. Two bedrock groundwater monitoring wells were installed to evaluate groundwater conditions. Groundwater was measured at approximately 9.5 feet bgs in monitoring well MW-04, and monitoring well MW-05 was dry. No field evidence of contamination was noted during purging or sampling of monitoring well MW-04.
- Analytical results for the soil samples identified acetone at a concentration above its Unrestricted Use Soil Cleanup Objective (UUSCO) and Protection of Groundwater Soil Cleanup Objective (PGWSCO), but below its Restricted Residential Soil Cleanup Objective (RRSCO), in one sample (SB-12_0-2-20210608). The detection of acetone was attributed to a minor surface spill associated with historic industrial and manufacturing operations at the Site; the detected concentration was not indicative of a large-scale release or source area, and acetone was noted to be a common laboratory contaminant. Low-level PID readings (0.2 to 10.6 ppm) were observed from approximately 0 to 2 feet bgs at SB-12; however, no odors or staining were noted.
- Seven semivolatile organic compounds (SVOCs) [benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-c,d)pyrene] and six metals (barium, copper, lead, mercury, nickel, and zinc) were detected at concentrations above their respective UUSCOs, RRSCOs, and/or PGWSCOs. The concentrations of SVOCs, which consisted of PAHs, a class of SVOCs commonly found in historic fill material, ash, asphalt, and petroleum products, and metals detected in the soil samples were attributed to historic fill material, which was observed in each of the soil borings advanced during the Subsurface (Phase II) Investigation, and not to a release or other source area.
- Analytical results for the groundwater sample collected from MW-04 identified chloroform at a concentration above its Ambient Water Quality Standard and Guidance Value (AWQSGV). Based on the Site history, field observations, and results of the soil and soil vapor sampling, the detection of

chloroform was not indicative of an on-site release or source area and was attributed to an off-site source.

- Analytical results for the soil vapor samples identified 34 VOCs, including petroleum-related compounds [e.g., benzene, toluene, ethylbenzene, xylenes, trimethylbenzenes, cyclohexane, n-heptane, n-hexane, tertiary butyl alcohol (TBA), etc.] and chlorinated solvent-related compounds [e.g., tetrachloroethylene (PCE), carbon tetrachloride, etc.] in one of more of the soil vapor samples. Of note, PCE was detected at a concentration of 37 micrograms per cubic meter (µg/m^3) at soil vapor point SV-06 and elevated concentrations of petroleum-related VOCs were detected at soil vapor point SV-07. Based on field observations and the Site history, the detected VOCs were attributed to historic industrial and manufacturing operations at the Site and/or off-site sources.

Subsurface (Phase II) Investigation, 102 Bruckner Boulevard, Bronx, NY 10454, prepared by AKRF, October 2021

AKRF completed a Subsurface (Phase II) Investigation of 102 Bruckner Boulevard to assess whether the RECs identified in AKRF's November 2020 Draft Phase I ESA had adversely affected subsurface conditions at the Site. The Subsurface (Phase II) Investigation included the advancement of 11 soil borings, installation of three bedrock groundwater monitoring wells, installation of four temporary soil vapor points, and the collection of soil, groundwater, and soil vapor samples for field-screening and laboratory analysis; however, key portions of the Site were inaccessible due to the active vehicle fueling/repair activities. Based on the findings of the Subsurface (Phase II) Investigation, AKRF concluded the following:

- Soil encountered consisted of historic fill (sand, silt, and gravel, with varying amounts of asphalt, brick, concrete, and wood) extending from ground surface to bedrock, which was encountered at depths ranging from approximately 1 to 5 feet bgs.
- Field evidence of suspected petroleum contamination was observed in three of the 11 soil boring locations: petroleum-like odors, staining, and elevated PID readings (14.6 to 341 ppm) were observed from approximately 2 to 4 feet bgs at SB-03; petroleum-like odors, staining, and elevated PID readings (64.6 to 643 ppm) were observed from approximately 0 to 2 feet bgs at SB-05; and faint petroleum-like odors and low-level PID readings (7.0 ppm) were observed from approximately 4 to 4.5 feet bgs at B-03.
- Groundwater was not encountered prior to Geoprobe® refusal on suspected bedrock. Three bedrock groundwater monitoring wells were installed to evaluate groundwater conditions. Groundwater was measured at depths ranging from approximately 4.25 to 4.75 feet bgs in the wells that were installed. Field evidence of suspected petroleum contamination was observed in one of the three wells: faint petroleum-like odors, a sheen, and low-level headspace PID readings (15.5 ppm) were observed at monitoring well MW-01.
- Analytical results for the soil samples identified total xylenes and naphthalene at concentrations above their respective UUSCOs and PGWSCOs, but below their respective RRSCOs, in one sample (SB-05_0-2-20210610). The elevated concentrations of total xylenes and naphthalene detected in the soil sample collected from soil boring SB-05, located adjacent to the pump island, were attributed to a petroleum release from piping associated with the fuel dispensers. Field evidence of suspected petroleum contamination (odors, staining, and elevated PID readings) was observed from approximately 0 to 2 feet bgs at SB-05, the 2-foot interval above bedrock.
- Copper, lead, nickel, and zinc were detected in one or more of the samples at concentrations above their respective UUSCOs, but below their respective RRSCOs and PGWSCOs; mercury was detected at concentrations above its UUSCO in three samples and above its RRSCO and PGWSCO in one sample (SB-01_0-2_20210610). The metals detected in the soil samples were attributed to historic fill material, which was observed in each of the soil borings advanced, and not to a release or other source area.

- No VOCs or SVOCs were detected at concentrations above their respective AWQSGVs in the groundwater samples collected; however, benzene was detected at a concentration of 1 µg/L, which is equal to its AWQSGV, in the sample collected from monitoring well MW-01. Field evidence of petroleum contamination (faint odors, sheen, and low-level headspace PID readings) were observed at monitoring well MW-01.
- Analytical results for the soil vapor samples identified petroleum-related compounds (e.g., benzene, toluene, ethylbenzene, xylenes, trimethylbenzenes, MTBE, cyclohexane, n-heptane, n-hexane, TBA, etc.) and chlorinated solvent-related compounds (e.g., PCE, TCE, etc.). Of note, PCE was detected at a concentration of 1,000 µg/m^3 at soil vapor point SV-01 and 1,100 µg/m^3 at soil vapor point SV-04, and elevated concentrations of petroleum-related VOCs were detected at soil vapor points SV-02 and SV-03. The elevated concentrations of PCE detected at soil vapor points SV-01 and SV-04, located in and adjacent to the auto repair shop, respectively, were attributed to historic auto repair operations at the Site. The elevated concentrations of petroleum-related VOCs detected at soil vapor points SV-02 and SV-03, located adjacent to the UST field, were attributed to historic petroleum storage and fueling operations at the Site.

Supplemental Subsurface (Phase II) Investigation, 102 Bruckner Boulevard, Bronx, NY 10454, prepared by AKRF, December 2022

AKRF completed a Supplemental Subsurface (Phase II) Investigation of 102 Bruckner Boulevard following the decommissioning of the gasoline station/auto repair shop to target areas that were previously in accessible for sampling, including in the vicinity of the USTs, floor drains, and former hydraulic lifts. The Supplemental Subsurface (Phase II) Investigation included the advancement of eight soil borings, installation of two temporary groundwater monitoring wells, and the collection of soil and groundwater samples for field-screening and laboratory analysis. Based on the findings of the Supplemental Subsurface (Phase II) Investigation, AKRF concluded the following:

- Soil encountered during the Supplemental Subsurface (Phase II) Investigation consisted of historic fill (sand, silt, and gravel, with varying amounts of asphalt, brick, and concrete) extending from ground surface to the surface of bedrock, which was encountered in each soil boring advanced; the fill material in the four borings advanced within the UST field was comprised primarily of pea gravel, which is industry standard fill material for fiberglass USTs used for petroleum storage. Outside of the UST field, bedrock was encountered at depths ranging from approximately 4 to 5 feet bgs. Shallow bedrock was historically removed to facilitate the installation of the facility's three 4,000-gallon USTs, with Geoprobe® refusal on suspected bedrock (or a concrete tank pad) encountered at approximately 10 feet bgs in this area.
- Field evidence of suspected petroleum contamination was observed in seven of the eight soil boring locations: faint petroleum-like odors were observed from approximately 5 to 10 feet bgs at SSB-01 through SSB-03; faint petroleum-like odors were observed from approximately 5 to 9.5 feet bgs at SSB-04, with strong odors and elevated PID readings (>90 ppm) noted from approximately 9.5 to 10 feet bgs; faint petroleum-like odors were observed from approximately 0 to 4 feet bgs at SSB-05 and from approximately 0 to 5 feet bgs at SSB-06; and faint petroleum-like odors were observed from approximately 0 to 2 feet bgs at SSB-08, with strong odors and elevated PID readings (>130 ppm) noted from approximately 2 to 4 feet bgs. No other field evidence of contamination was noted in the soil borings.
- While not encountered prior to refusal outside of the UST field, groundwater was measured at a depth of approximately 4.25 feet bgs in the two temporary monitoring wells (TW-01 and TW-02) installed within the UST field. A faint petroleum-like odor and a discontinuous sheen were noted on purge water

from each temporary monitoring well; however, no evidence of gross contamination [light non-aqueous phase liquid (LNAPL), heavy odors, continuous sheen, etc.] was detected.

- Field evidence of suspected petroleum contamination (odors and elevated PID readings) were observed from approximately 5-10 feet bgs at SSB-04 and from approximately 0 to 4 feet bgs at SSB-08. The petroleum-related VOCs ethylbenzene and total xylenes (the sum of o-xylene and m,p-xylenes) were detected in up to two soil samples at concentrations above their respective UUSCOs and above their respective PGWSCOs in one sample (SSB-08_2-4_20221110), but below their respective RRSCOs. The field screening and associated laboratory analytical results indicated the presence of petroleum-related VOCs in soil associated with the out-of-service USTs and dispensing system. Methylene chloride was detected at a concentration above its UUSCO and PGWSCO, but below its RRSCO in one sample (SSB-04_9-10_20221110). Methylene chloride is a common laboratory contaminant and its presence in one soil sample was likely related to laboratory contamination and may not be reflective of actual soil conditions at the Site (although it was not detected in the associated laboratory blank samples).
- Lead and mercury were detected in up to three of the soil samples at concentrations above their respective UUSCOs, but below their respective RRSCOs and PGWSCOs; arsenic was detected above its UUSCO, RRSCO, and PGWSCO in one sample (SSB-08_2-4_20221110). The metals detected in the soil samples was likely attributable to historic fill material, which was observed in each of the soil borings advanced, and not to a release or other source area.
- The petroleum-related VOCs benzene, isopropylbenzene, MTBE, and m,p-xylenes were detected at concentrations above their respective AWQSGVs in one or both of the groundwater samples collected. The field screening and associated laboratory analytical results indicated the presence of petroleum-related VOCs in groundwater associated with the out-of-service USTs and dispensing system.

3.1 Areas of Concern (AOCs)

Based on the Site’s history and previous reports prepared for the Site, the AOCs for the RI include:

1. The Site’s historic automotive, commercial, industrial, and manufacturing operations.
2. Elevated concentrations of VOCs, SVOCs, and metals in soil.
3. Elevated concentrations of VOCs in groundwater.
4. Elevated concentrations of VOCs in soil vapor.

Soil concentrations above the UUSCOs and RRSCOs, and groundwater concentrations above the AWQSGVs are shown on Figure 4 and 5, respectively. Soil vapor detections are shown on Figure 6.

4.0 FIELD PROGRAM

The RI 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 provide defensible analytical data to develop a remedial action.

4.1 Field Program Summary

The field program will include: the advancement of 8 soil borings (RI-SB-01 through RI-SB-08) with continuous sample collection and laboratory analysis of soil samples from each boring; the installation of one temporary groundwater monitoring well (RI-MW-01) with the collection and laboratory analysis of one groundwater sample from the newly-installed well and groundwater samples from the four existing groundwater monitoring wells installed during previous investigations; and the installation of seven temporary soil vapor points (RI-SV-01through RI-SV-07) with the collection and laboratory analysis of seven soil vapor samples and one ambient air sample. Although not anticipated, if groundwater is encountered in MW-05, a groundwater sample will be collected from the well. The proposed soil boring, monitoring well, and soil vapor sample locations are shown on Figure 7.

The soil boring and soil vapor sample locations will be surveyed using a Global Positioning System (GPS) and will be measured using fixed points in the field. 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 scope of work 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 scope of work.

4.2 Geophysical Survey

Geophysical surveys were conducted prior to drilling during previous investigations conducted at the Site by AKRF. Therefore, the survey reports from those investigations will be used as references during the RI work detailed in this RIWP.

4.3 Soil Boring Advancement and Soil Sampling

A Geoprobe® direct push drill rig will be used to advance soil borings RI-SB-01 through RI-SB-08 at the approximate locations shown on Figure 7. Soil cores will be collected in dedicated acetate liners. Soil borings will be advanced to bedrock or the groundwater table, whichever is encountered first. 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 with an 11.6 electron Volt (eV) lamp, and logged using the modified Burmister soil classification system.

At each soil boring, discrete grab samples will be collected from the interval exhibiting the highest level of field contamination. In the absence of contamination, one sample will be collected from the top 2 feet below the Site cover (concrete slab, asphalt, etc.). 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 (NYSDOH Environmental Laboratory Approval Program (ELAP)-certified laboratory. Soil samples will be analyzed for Part 375 VOCs by EPA Method 8260, Part 375 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, and PFAS by Modified EPA Method 1633.

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 Division of Environmental Remediation (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 surface will be patched with asphalt.

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

Table II
Proposed Soil Sample Rationale

Sample Location	Sample Intervals for Laboratory Analysis	Location	Rationale
RI-SB-01	Interval displaying greatest field evidence of contamination and 2-foot interval above boring termination*	Northern	To assess/confirm soil quality in the northern portion of the Site in area of the former gasoline pumps and tank piping
RI-SB-02	Interval displaying greatest field evidence of contamination and 2-foot interval above boring termination*	Northeastern	To assess/confirm soil quality in the northeastern portion of the Site adjacent to the former gasoline pumps and tank piping
RI-SB-03	Interval displaying greatest field evidence of contamination and 2-foot interval above boring termination*	Northeastern	To assess/confirm soil quality in the northeastern portion of the Site within the UST grave
RI-SB-04	Interval displaying greatest field evidence of contamination and 2-foot interval above boring termination*	East-central	To assess/confirm soil quality in the east-central portion of the Site within the former automotive repair shop
RI-SB-05	Interval displaying greatest field evidence of contamination and 2-foot interval above boring termination*	West-central	To assess/confirm soil quality in the west-central portion of the Site and confirm presence of SVOCs and metals identified in SB-09
RI-SB-06	Interval displaying greatest field evidence of contamination and 2-foot interval above boring termination*	Central	To assess/confirm soil quality in the central portion of the Site
RI-SB-07	Interval displaying greatest field evidence of contamination and 2-foot interval above boring termination*	Southeastern	To assess/confirm soil quality in the southeastern portion of the Site to confirm laboratory results from SB-12.
RI-SB-08	Interval displaying greatest field evidence of contamination and 2-foot interval above boring termination*	South-central	To assess/confirm soil quality in the south-central portion of the Site

Note:
* Two samples will be collected only if boring advanced deeper than 5 feet below surface grade.

4.4 Groundwater Elevation Survey

Five permanent groundwater monitoring wells were installed by AKRF during previous investigations conducted at the Site, identified as MW-01 through MW-05 on Figures 2 and 7. 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 confirm 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.

4.5 Groundwater Sampling

In addition to the five existing permanent groundwater monitoring wells, one groundwater sample will also be collected from a temporary groundwater well installed in the UST grave on the northeastern portion of the Site. The temporary groundwater monitoring well will be installed based on field observations from perched groundwater in a 1-inch polyvinyl chloride (PVC) well with a 5-foot screen straddling the water table and a sand pack around the well screen. Prior to collecting groundwater samples, the wells will be gauged to determine the total well depths and depth to groundwater using an electronic interface meter. A bailer will be used to measure any separate phase liquid. The rationale for the proposed soil sample locations is summarized in Table III.

Table III
Proposed Groundwater Sample Rationale

Groundwater Monitoring Well ID	Location	Rationale
MW-01	Northeastern	To assess/confirm groundwater quality in the northeastern portion of the Site and determine Site-specific groundwater flow direction and elevation.
MW-02	North-adjoining Sidewalk	To assess/confirm groundwater quality upgradient of the Site and determine Site-specific groundwater flow direction and elevation.
MW-03	Northeastern	To assess/confirm groundwater quality in the northeastern portion of the Site and determine Site-specific groundwater flow direction and elevation.
MW-04	Central	To assess/confirm groundwater quality in the central portion of the Site and determine Site-specific groundwater flow direction and elevation.
MW-05*	Southern	To assess/confirm groundwater quality in the southern portion of the Site and determine Site-specific groundwater flow direction and elevation.
RI-GW-03	Northeastern	To assess groundwater quality in the northeastern portion of the Site within the UST grave.
Note: Groundwater was not encountered in MW-05 during previous investigations; the proposed sample will only be collected if groundwater is present in the well.		

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 ±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 Part 375 VOCs by EPA Method 8260, Part 375 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 Modified EPA Method 1633, and 1,4-dioxane by EPA Method 8270 selected ion monitoring (SIM). Filtering will occur in the field. Sampling for PFAS will be conducted in accordance with the April 2023 NYSDEC-issued sampling protocol, with the exception that a low-density polyethylene (LDPE) bladder will be used as no industry-approved high-density polyethylene (HDPE) alternative currently exists. Category B deliverables will be requested from the laboratory. Well sampling details will be noted on groundwater sampling logs, included as an appendix to the RIR.

4.6 Soil Vapor Sampling

Six soil vapor samples (RI-SV-01 through RI-SV-06) will be collected from six temporary vapor monitoring probes at the approximate locations shown on Figure 7. 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).

If the slab at interior sampling locations is competent, the vapor samples will be collected from 6 inches below the slab. At exterior locations and interior areas without a competent slab, vapor samples will be collected from approximately 5 feet below surface grade or above refusal on bedrock if encountered before 5 feet below surface grade. The temporary sub-slab and soil vapor points will be installed by advancing an expendable drive point using a direct-push drill rig 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 around and above the screen. Hydrated bentonite will be used to fill the remaining void around the sampling tubing to the ground surface.

Prior to sample collection, the sub-slab soil vapor and 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 2-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 collected over a 2-hour period 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. Immediately after opening the flow control valve equipped with a 2-hour regulator, the initial SUMMA® canister vacuum (inches of mercury) will be noted. After 2 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. Concurrently with the vapor samples, an ambient air sample will also be collected.

The soil vapor and ambient air 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 IV.

Table IV
Proposed Soil Vapor Sample Rationale

Vapor Point ID	Sample Location	Rationale
RI-SV-01	Northwestern	To confirm concentrations of VOCs on the northwestern portion of the Site near SV-04.
RI-SV-02	Northeastern	To confirm concentrations of VOCs on the northeastern portion of the Site near SV-02 and SV-03.
RI-SV-03	West-central	To confirm concentrations of VOCs on the west-central portion of the Site near SV-04.
RI-SV-04	East-central	To confirm concentrations of VOCs on the east-central portion of the Site near SV-01.
RI-SV-05	West-central	To confirm concentrations of VOCs on the west-central portion of the Site near SV-06.
RI-SV-06	South-central	To determine concentrations of VOCs on the south-central portion of the Site.
RI-SV-07	Southeastern	To confirm concentrations of VOCs on the southeastern portion of the Site near SV-07.

4.7 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 at least 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. Additionally, one equipment blank will be collected for each day of groundwater sampling and analyzed for PFAS by EPA Method 1633 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 validated DUSR will then be submitted to the NYSDEC Environmental Quality Information System (EQuIS). The QAPP, included as Appendix A, describes the QA/QC protocols and procedures that will be followed during implementation of this RIWP.

4.8 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.

4.9 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 workday 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 patched at the surface with asphalt cold patch. 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 RIWP or other sensitive or time critical information. However, such conditions will also be included in the daily reports. Emergency conditions and changes to the RIWP 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, an RIR will be prepared 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.

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 summary of soil vapor 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. Vapor 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 V
Proposed Project Schedule

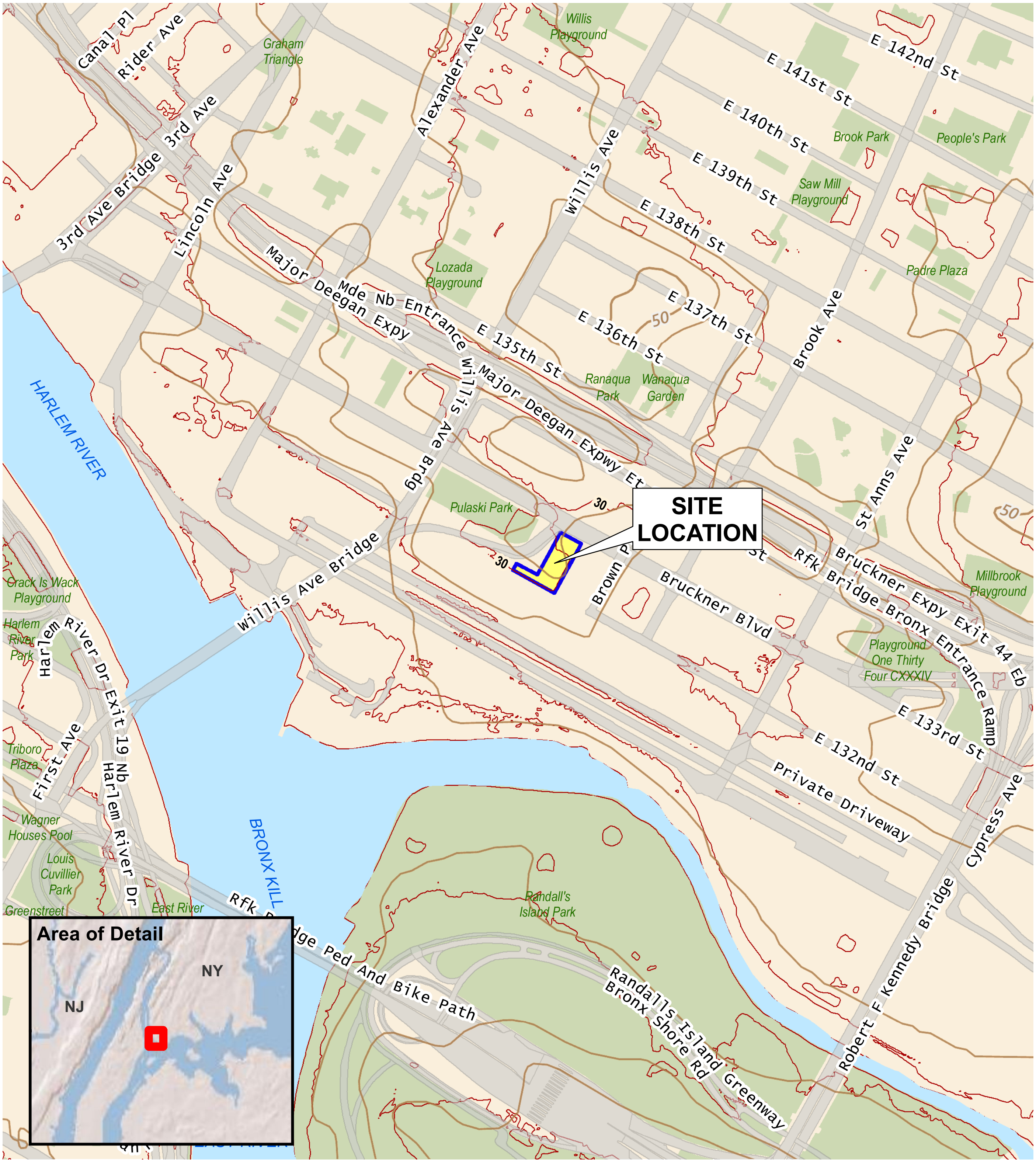
Activity	Time To Complete
Submittal of Citizen Participation Plan (CPP)	November 2023
Submittal of Draft Remedial Investigation Work Plan (RIWP)	November 2023
30-day RIWP Public Comment Period Is Initiated	December 2023
RIWP Approved	January 2024
Remedial Investigation	February 2024
Draft Remedial Investigation Report (RIR) Submitted to NYSDEC	April 2024
NYSDEC/NYSDOH Issues RIR comments	June 2024
Revised RIR Submitted to NYSDEC	July 2024
NYSDEC Approves RIR	August 2024
Draft Remedial Action Work Plan (RAWP) Submitted	September 2024
45-day Public Comment Period for RAWP	October 2024
NYSDEC Approves RAWP and Issues Decision Document	December 2024
Issue Remedial/Construction Notice Fact Sheet	January 2025
Begin Redevelopment (Construction) with Implementation of RAWP	February 2025
Execution of Environmental Easement (if required)	June 2025
Draft Site Management Plan (SMP) Submitted to NYSDEC (if required)	August 2025
Draft Final Engineering Report Submitted to NYSDEC	September 2025
Certificate of Completion and Fact Sheet	December 2025
Completion of Building (first occupancy)	December 2026

7.0 CERTIFICATION

I, Marc Godick, certify that I am currently a Qualified Environmental Professional as defined in 6 NYCRR Part 375 and that this 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).

Marc Godick		November 27, 2023
Name	*Signature*	*Date*

FIGURES



Service Layer Credits: USGS The National Map: 3d Elevation Program, Data Refreshed July, 2020

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SCALE IN FEET

©2023 AKRF Q:\Projects\200328 - BETTINA - BRUCKNER PROPERTIES\Technical\GIS and Graphics\SAR\Phase II\200328 Fig 1 Site location.mxd11/15/2023 8:38:25 AM mveilleux

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440 Park Avenue South, New York, NY 10016

102 Bruckner Boulevard

Bronx, New York

SITE LOCATION MAP

DATE

11/15/2023

PROJECT NO.

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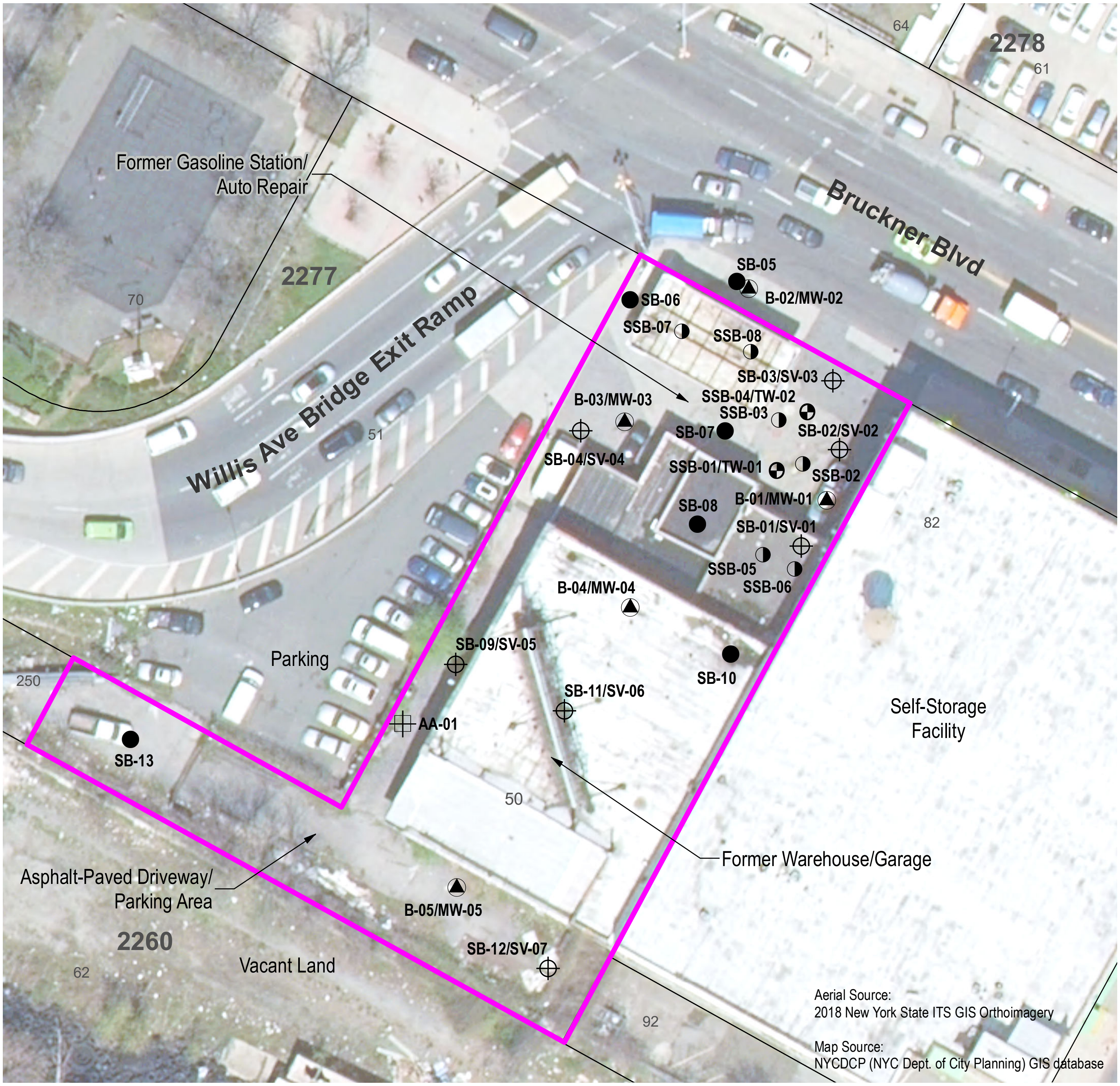
FIGURE

1



Aerial Source:
2018 New York State ITS GIS Orthoimagery

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

LEGEND

▭	PROPERTY BOUNDARY	●	SOIL BORING LOCATION (2021)
50	LOT BOUNDARY AND TAX LOT NUMBER	▲	SOIL BORING/MONITORING WELL LOCATION (2021)
2277	BLOCK NUMBER	⊕	SOIL BORING/SOIL VAPOR SAMPLE LOCATION (2021)
◑	SOIL BORING LOCATION (2022)	╬	AMBIENT AIR SAMPLE LOCATION (2021)
◕	SOIL BORING/TEMPORARY MONITORING WELL LOCATION (2022)		

0 50 100
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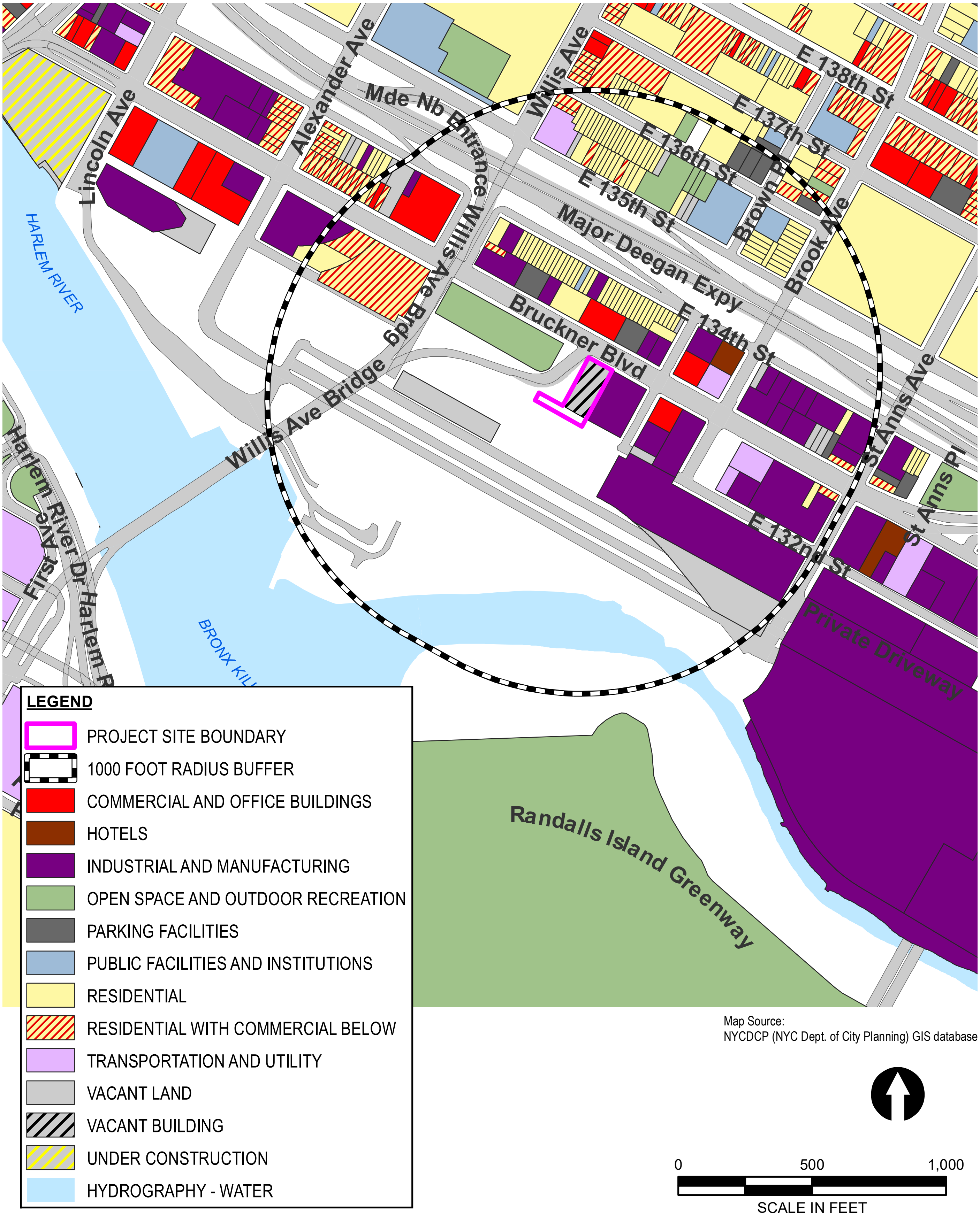
SITE PLAN AND PREVIOUS SAMPLE LOCATIONS

DATE
11/21/2023
PROJECT NO.
200328
FIGURE
2



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

©2023 AKRF Q:\Projects\200328 - BETTINA - BRUCKNER PROPERTIES\Technical\GIS and Graphics\SAR\Phase II\200328 Fig 3 Surrounding Land Use map.mxd11/15/2023 9:38:49 AM mveilleux

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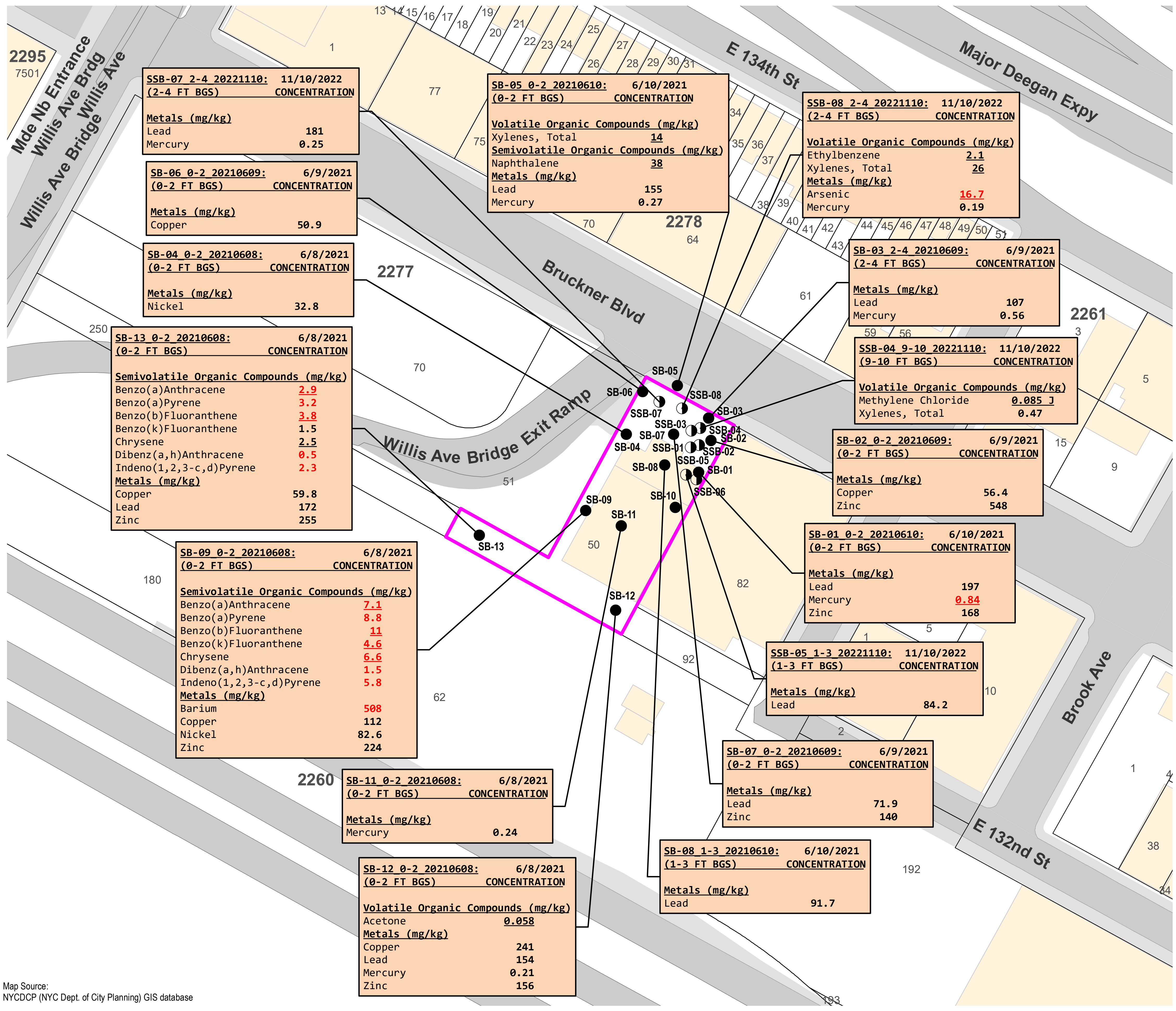
SURROUNDING LAND USE

DATE
11/15/2023

PROJECT NO.
200328

FIGURE
3



SSB-07 2-4 20221110: 11/10/2022
(2-4 FT BGS) CONCENTRATION

Metals (mg/kg)	
Lead	181
Mercury	0.25

SSB-06 0-2 20210609: 6/9/2021
(0-2 FT BGS) CONCENTRATION

Metals (mg/kg)	
Copper	50.9

SB-04 0-2 20210608: 6/8/2021
(0-2 FT BGS) CONCENTRATION

Metals (mg/kg)	
Nickel	32.8

SB-13 0-2 20210608: 6/8/2021
(0-2 FT BGS) CONCENTRATION

Semivolatile Organic Compounds (mg/kg)	
Benzo(a)Anthracene	2.9
Benzo(a)Pyrene	3.2
Benzo(b)Fluoranthene	3.8
Benzo(k)Fluoranthene	1.5
Chrysene	2.5
Dibenz(a,h)Anthracene	0.5
Indeno(1,2,3-c,d)Pyrene	2.3
Metals (mg/kg)	
Copper	59.8
Lead	172
Zinc	255

SB-09 0-2 20210608: 6/8/2021
(0-2 FT BGS) CONCENTRATION

Semivolatile Organic Compounds (mg/kg)	
Benzo(a)Anthracene	7.1
Benzo(a)Pyrene	8.8
Benzo(b)Fluoranthene	11
Benzo(k)Fluoranthene	4.6
Chrysene	6.6
Dibenz(a,h)Anthracene	1.5
Indeno(1,2,3-c,d)Pyrene	5.8
Metals (mg/kg)	
Barium	508
Copper	112
Nickel	82.6
Zinc	224

SB-11 0-2 20210608: 6/8/2021
(0-2 FT BGS) CONCENTRATION

Metals (mg/kg)	
Mercury	0.24

SB-12 0-2 20210608: 6/8/2021
(0-2 FT BGS) CONCENTRATION

Volatile Organic Compounds (mg/kg)	
Acetone	0.058
Metals (mg/kg)	
Copper	241
Lead	154
Mercury	0.21
Zinc	156

SB-05 0-2 20210610: 6/10/2021
(0-2 FT BGS) CONCENTRATION

Volatile Organic Compounds (mg/kg)	
Xylenes, Total	14
Semivolatile Organic Compounds (mg/kg)	
Naphthalene	38
Metals (mg/kg)	
Lead	155
Mercury	0.27

SSB-08 2-4 20221110: 11/10/2022
(2-4 FT BGS) CONCENTRATION

Volatile Organic Compounds (mg/kg)	
Ethylbenzene	2.1
Xylenes, Total	26
Metals (mg/kg)	
Arsenic	16.7
Mercury	0.19

SB-03 2-4 20210609: 6/9/2021
(2-4 FT BGS) CONCENTRATION

Metals (mg/kg)	
Lead	107
Mercury	0.56

SSB-04 9-10 20221110: 11/10/2022
(9-10 FT BGS) CONCENTRATION

Volatile Organic Compounds (mg/kg)	
Methylene Chloride	0.085 J
Xylenes, Total	0.47

SB-02 0-2 20210609: 6/9/2021
(0-2 FT BGS) CONCENTRATION

Metals (mg/kg)	
Copper	56.4
Zinc	548

SB-01 0-2 20210610: 6/10/2021
(0-2 FT BGS) CONCENTRATION

Metals (mg/kg)	
Lead	197
Mercury	0.84
Zinc	168

SSB-05 1-3 20221110: 11/10/2022
(1-3 FT BGS) CONCENTRATION

Metals (mg/kg)	
Lead	84.2

SB-07 0-2 20210609: 6/9/2021
(0-2 FT BGS) CONCENTRATION

Metals (mg/kg)	
Lead	71.9
Zinc	140

SB-08 1-3 20210610: 6/10/2021
(1-3 FT BGS) CONCENTRATION

Metals (mg/kg)	
Lead	91.7

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

LEGEND

▭	PROJECT SITE BOUNDARY
50	LOT BOUNDARY AND TAX LOT NUMBER
2277	BLOCK NUMBER
▭	BUILDING
●	SOIL BORING LOCATION (2021)
◑	SOIL BORING LOCATION (2022)

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.

Exceedances of NYSDEC Protected Groundwater Soil Cleanup Objectives (PGWSCOs) are presented in underline.

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

J: The concentration given is an estimated value.

	PGWSCO mg/kg	RRSCO mg/kg	UUSCO mg/kg
Volatile Organic Compounds			
Acetone	0.05	100	0.05
Ethylbenzene	1	41	1
Methylene Chloride	0.05	100	0.05
Naphthalene	12	100	12
Xylenes, Total	1.6	100	0.26
Semivolatile Organic Compounds			
Benzo(a)Anthracene	1	1	1
Benzo(a)Pyrene	22	1	1
Benzo(b)Fluoranthene	1.7	1	1
Benzo(k)Fluoranthene	1.7	3.9	0.8
Chrysene	1	3.9	1
Dibenz(a,h)Anthracene	1000	0.33	0.33
Indeno(1,2,3-c,d)Pyrene	8.2	0.5	0.5
Metals			
Arsenic	16	16	13
Barium	820	400	350
Copper	1720	270	50
Lead	450	400	63
Mercury	0.73	0.81	0.18
Nickel	130	310	30
Zinc	2480	10000	109

Sample ID
Sample Date

SSB-07 2-4 20221110: 11/10/2022
(2-4 FT BGS) CONCENTRATION

Metals (mg/kg)	
Lead	181
Mercury	0.25

Analyte/Compound
Concentration

0 50 100 200
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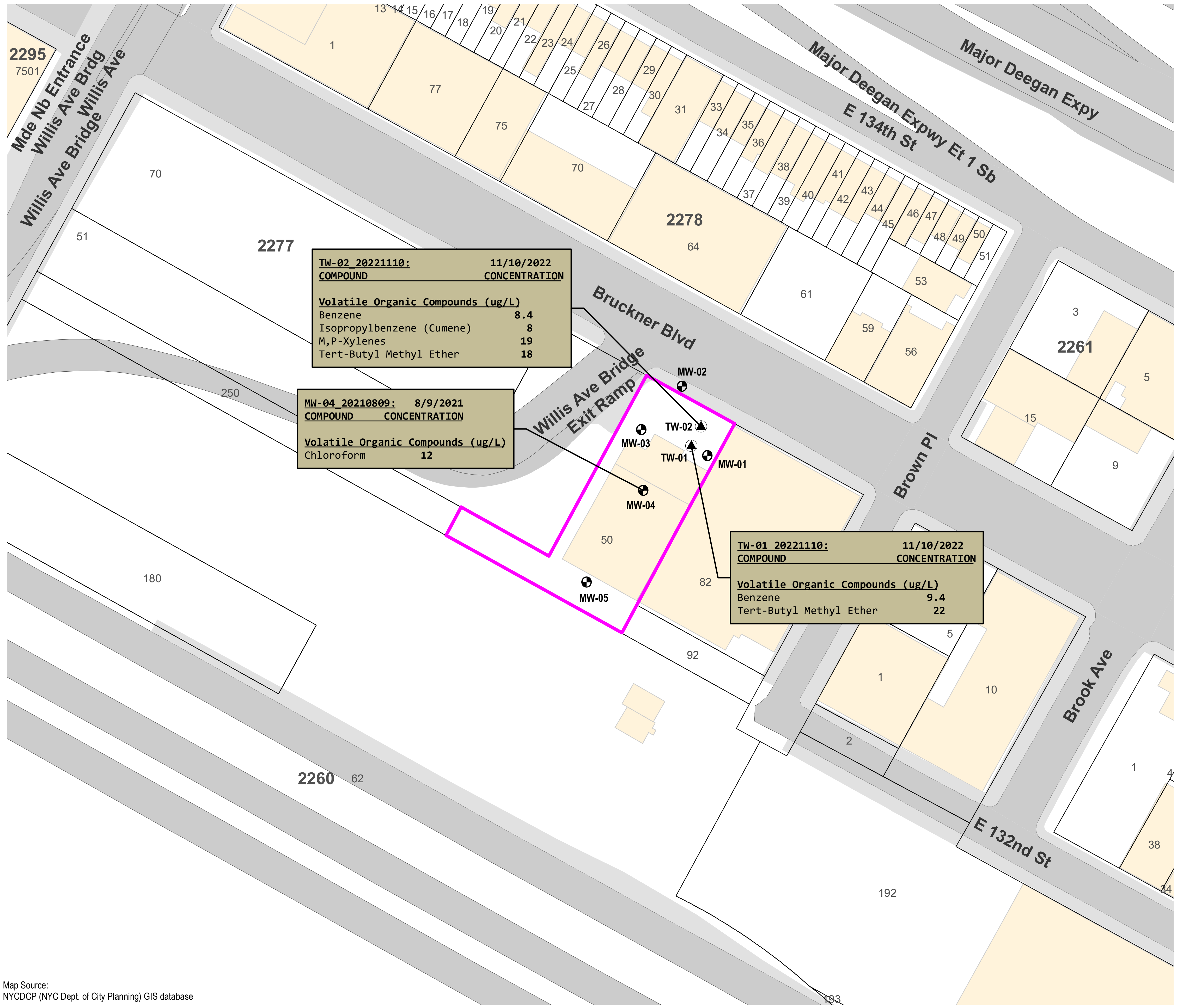
SOIL SAMPLE CONCENTRATIONS ABOVE NYSDEC UUSCOS, RRSCOS, AND/OR PGWSCOS

DATE
11/15/2023

PROJECT NO.
200328

FIGURE
4

©2023 AKRF Q:\Projects\200328 - BETTINA - BRUCKNER PROPERTIES\Technical\GIS and Graphics\SAR\Phase II\200328 Fig 4 Soil Sample Concentrations Above NYSDEC UUSCOs, RRSCOs, and/or PGWSCOs.mxd11/15/2023 9:43:35 AM mveilleux



TW-02_20221110: 11/10/2022

COMPOUND	CONCENTRATION
Volatile Organic Compounds (ug/L)	
Benzene	8.4
Isopropylbenzene (Cumene)	8
M,P-Xylenes	19
Tert-Butyl Methyl Ether	18

MW-04_20210809: 8/9/2021

COMPOUND	CONCENTRATION
Volatile Organic Compounds (ug/L)	
Chloroform	12

TW-01_20221110: 11/10/2022

COMPOUND	CONCENTRATION
Volatile Organic Compounds (ug/L)	
Benzene	9.4
Tert-Butyl Methyl Ether	22

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

LEGEND

- ▭ PROJECT SITE BOUNDARY
- 50 LOT BOUNDARY AND TAX LOT NUMBER
- 2277 BLOCK NUMBER
- ▨ BUILDING
- ▲ MONITORING WELL (2021)
- ● TEMPORARY MONITORING WELL (2022)

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 2021 *Draft Addendum to the Technical and Operational Guidance (TOGS) No. 1.1.1.*

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

Only Exceedances of NYSDEC AWQSGVs are shown in bold font.

	NYSDEC AWQSGVs ug/l
Volatile Organic Compounds	
Benzene	1
Chloroform	7
Isopropylbenzene (Cumene)	5
Tert-Butyl Methyl Ether (MTBE)	10
Xylenes, M,P	5

Sample ID — Sample Date

MW-04_20210809: 8/9/2021

COMPOUND	CONCENTRATION
Volatile Organic Compounds (ug/L)	
Chloroform	12

Analyte/Compound — Concentration

0 50 100 200
SCALE IN FEET

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Bronx, New York

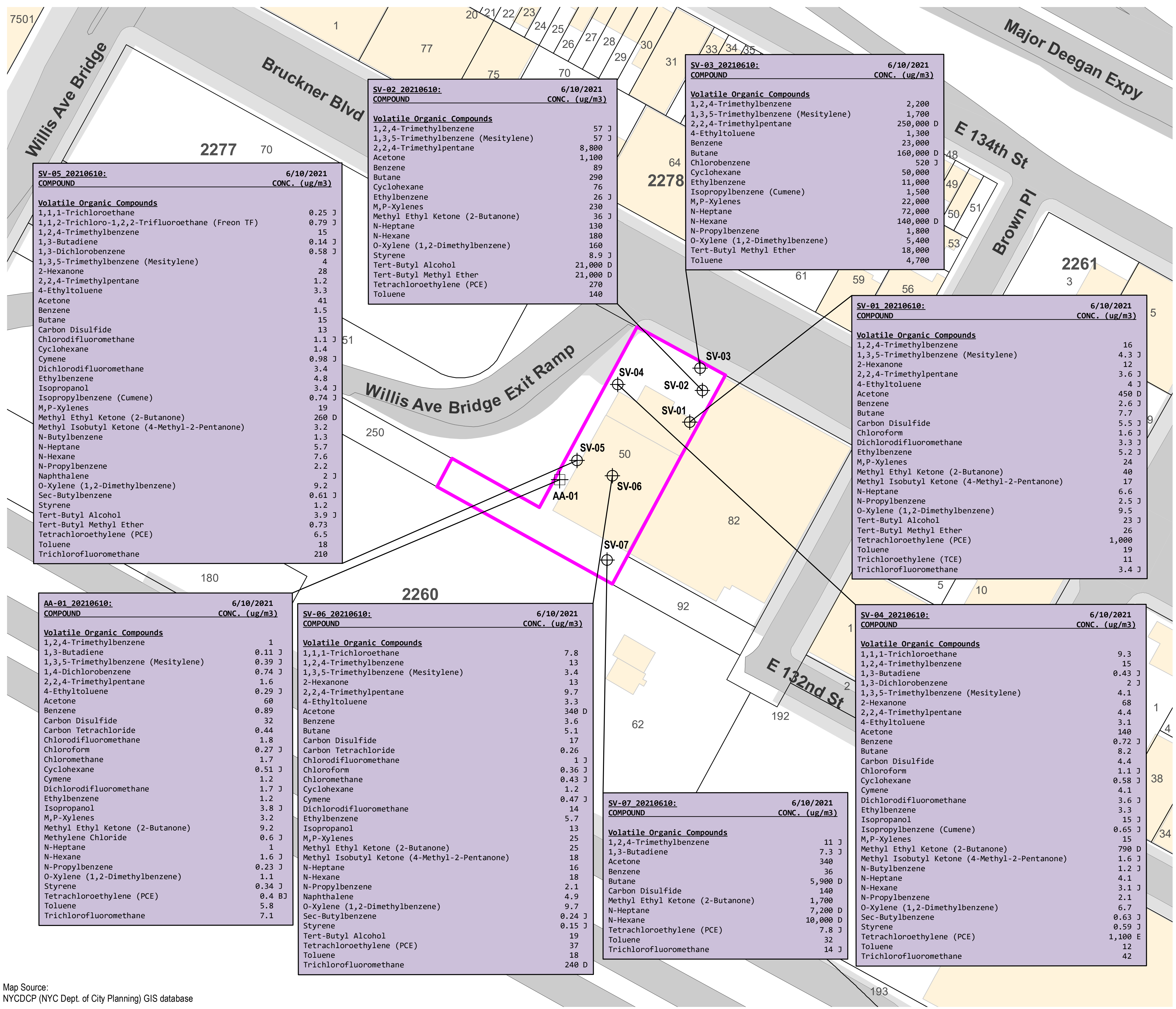
GROUNDWATER SAMPLE CONCENTRATIONS ABOVE NYSDEC AWQSGVS

DATE
11/15/2023

PROJECT NO.
200328

FIGURE
5

©2023 AKRF Q:\Projects\200328 - BETTINA - BRUCKNER PROPERTIES\Technical\GIS and Graphics\SAR\Phase II\200328 Fig 5 Groundwater Sample Concentrations Above NYSDEC AWQSGVs.mxd11/15/2023 9:47:02 AM mveilleux



SV-05_20210610:	6/10/2021
COMPOUND	CONC. (ug/m3)
Volatile Organic Compounds	
1,1,1-Trichloroethane	0.25 J
1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon TF)	0.79 J
1,2,4-Trimethylbenzene	15
1,3-Butadiene	0.14 J
1,3-Dichlorobenzene	0.58 J
1,3,5-Trimethylbenzene (Mesitylene)	4
2-Hexanone	28
2,2,4-Trimethylpentane	1.2
4-Ethyltoluene	3.3
Acetone	41
Benzene	1.5
Butane	15
Carbon Disulfide	13
Chlorodifluoromethane	1.1 J
Cyclohexane	1.4
Cymene	0.98 J
Dichlorodifluoromethane	3.4
Ethylbenzene	4.8
Isopropanol	3.4 J
Isopropylbenzene (Cumene)	0.74 J
M,P-Xylenes	19
Methyl Ethyl Ketone (2-Butanone)	260 D
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	3.2
N-Butylbenzene	1.3
N-Heptane	5.7
N-Hexane	7.6
N-Propylbenzene	2.2
Naphthalene	2 J
O-Xylene (1,2-Dimethylbenzene)	9.2
Sec-Butylbenzene	0.61 J
Styrene	1.2
Tert-Butyl Alcohol	3.9 J
Tert-Butyl Methyl Ether	0.73
Tetrachloroethylene (PCE)	6.5
Toluene	18
Trichlorofluoromethane	210

SV-02_20210610:	6/10/2021
COMPOUND	CONC. (ug/m3)
Volatile Organic Compounds	
1,2,4-Trimethylbenzene	57 J
1,3,5-Trimethylbenzene (Mesitylene)	57 J
2,2,4-Trimethylpentane	8,800
Acetone	1,100
Benzene	89
Butane	290
Cyclohexane	76
Ethylbenzene	26 J
M,P-Xylenes	230
Methyl Ethyl Ketone (2-Butanone)	36 J
N-Heptane	130
N-Hexane	180
O-Xylene (1,2-Dimethylbenzene)	160
Styrene	8.9 J
Tert-Butyl Alcohol	21,000 D
Tert-Butyl Methyl Ether	21,000 D
Tetrachloroethylene (PCE)	270
Toluene	140

SV-03_20210610:	6/10/2021
COMPOUND	CONC. (ug/m3)
Volatile Organic Compounds	
1,2,4-Trimethylbenzene	2,200
1,3,5-Trimethylbenzene (Mesitylene)	1,700
2,2,4-Trimethylpentane	250,000 D
4-Ethyltoluene	1,300
Benzene	23,000
Butane	160,000 D
Chlorobenzene	520 J
Cyclohexane	50,000
Ethylbenzene	11,000
Isopropylbenzene (Cumene)	1,500
M,P-Xylenes	22,000
N-Heptane	72,000
N-Hexane	140,000 D
N-Propylbenzene	1,800
O-Xylene (1,2-Dimethylbenzene)	5,400
Tert-Butyl Methyl Ether	18,000
Toluene	4,700

SV-01_20210610:	6/10/2021
COMPOUND	CONC. (ug/m3)
Volatile Organic Compounds	
1,2,4-Trimethylbenzene	16
1,3,5-Trimethylbenzene (Mesitylene)	4.3 J
2-Hexanone	12
2,2,4-Trimethylpentane	3.6 J
4-Ethyltoluene	4 J
Acetone	450 D
Benzene	2.6 J
Butane	7.7
Carbon Disulfide	5.5 J
Chloroform	1.6 J
Dichlorodifluoromethane	3.3 J
Ethylbenzene	5.2 J
M,P-Xylenes	24
Methyl Ethyl Ketone (2-Butanone)	40
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	17
N-Heptane	6.6
N-Propylbenzene	2.5 J
O-Xylene (1,2-Dimethylbenzene)	9.5
Tert-Butyl Alcohol	23 J
Tert-Butyl Methyl Ether	26
Tetrachloroethylene (PCE)	1,000
Toluene	19
Trichloroethylene (TCE)	11
Trichlorofluoromethane	3.4 J

AA-01_20210610:	6/10/2021
COMPOUND	CONC. (ug/m3)
Volatile Organic Compounds	
1,2,4-Trimethylbenzene	1
1,3-Butadiene	0.11 J
1,3,5-Trimethylbenzene (Mesitylene)	0.39 J
1,4-Dichlorobenzene	0.74 J
2,2,4-Trimethylpentane	1.6
4-Ethyltoluene	0.29 J
Acetone	60
Benzene	0.89
Carbon Disulfide	32
Carbon Tetrachloride	0.44
Chlorodifluoromethane	1.8
Chloroform	0.27 J
Chloromethane	1.7
Cyclohexane	0.51 J
Cymene	1.2
Dichlorodifluoromethane	1.7 J
Ethylbenzene	1.2
Isopropanol	3.8 J
M,P-Xylenes	3.2
Methyl Ethyl Ketone (2-Butanone)	9.2
Methylene Chloride	0.6 J
N-Heptane	1
N-Hexane	1.6 J
N-Propylbenzene	0.23 J
O-Xylene (1,2-Dimethylbenzene)	1.1
Styrene	0.34 J
Tetrachloroethylene (PCE)	0.4 BJ
Toluene	5.8
Trichlorofluoromethane	7.1

SV-06_20210610:	6/10/2021
COMPOUND	CONC. (ug/m3)
Volatile Organic Compounds	
1,1,1-Trichloroethane	7.8
1,2,4-Trimethylbenzene	13
1,3,5-Trimethylbenzene (Mesitylene)	3.4
2-Hexanone	13
2,2,4-Trimethylpentane	9.7
4-Ethyltoluene	3.3
Acetone	340 D
Benzene	3.6
Butane	5.1
Carbon Disulfide	17
Carbon Tetrachloride	0.26
Chlorodifluoromethane	1 J
Chloroform	0.36 J
Chloromethane	0.43 J
Cyclohexane	1.2
Cymene	0.47 J
Dichlorodifluoromethane	14
Ethylbenzene	5.7
Isopropanol	13
M,P-Xylenes	25
Methyl Ethyl Ketone (2-Butanone)	25
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	18
N-Heptane	16
N-Hexane	18
N-Propylbenzene	2.1
Naphthalene	4.9
O-Xylene (1,2-Dimethylbenzene)	9.7
Sec-Butylbenzene	0.24 J
Styrene	0.15 J
Tert-Butyl Alcohol	19
Tetrachloroethylene (PCE)	37
Toluene	18
Trichlorofluoromethane	240 D

SV-07_20210610:	6/10/2021
COMPOUND	CONC. (ug/m3)
Volatile Organic Compounds	
1,2,4-Trimethylbenzene	11 J
1,3-Butadiene	7.3 J
Acetone	340
Benzene	36
Butane	5,900 D
Carbon Disulfide	140
Methyl Ethyl Ketone (2-Butanone)	1,700
N-Heptane	7,200 D
N-Hexane	10,000 D
Tetrachloroethylene (PCE)	7.8 J
Toluene	32
Trichlorofluoromethane	14 J

SV-04_20210610:	6/10/2021
COMPOUND	CONC. (ug/m3)
Volatile Organic Compounds	
1,1,1-Trichloroethane	9.3
1,2,4-Trimethylbenzene	15
1,3-Butadiene	0.43 J
1,3-Dichlorobenzene	2 J
1,3,5-Trimethylbenzene (Mesitylene)	4.1
2-Hexanone	68
2,2,4-Trimethylpentane	4.4
4-Ethyltoluene	3.1
Acetone	140
Benzene	0.72 J
Butane	8.2
Carbon Disulfide	4.4
Chloroform	1.1 J
Cyclohexane	0.58 J
Cymene	4.1
Dichlorodifluoromethane	3.6 J
Ethylbenzene	3.3
Isopropanol	15 J
Isopropylbenzene (Cumene)	0.65 J
M,P-Xylenes	15
Methyl Ethyl Ketone (2-Butanone)	790 D
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	1.6 J
N-Butylbenzene	1.2 J
N-Heptane	4.1
N-Hexane	3.1 J
N-Propylbenzene	2.1
O-Xylene (1,2-Dimethylbenzene)	6.7
Sec-Butylbenzene	0.63 J
Styrene	0.59 J
Tetrachloroethylene (PCE)	1,100 E
Toluene	12
Trichlorofluoromethane	42

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

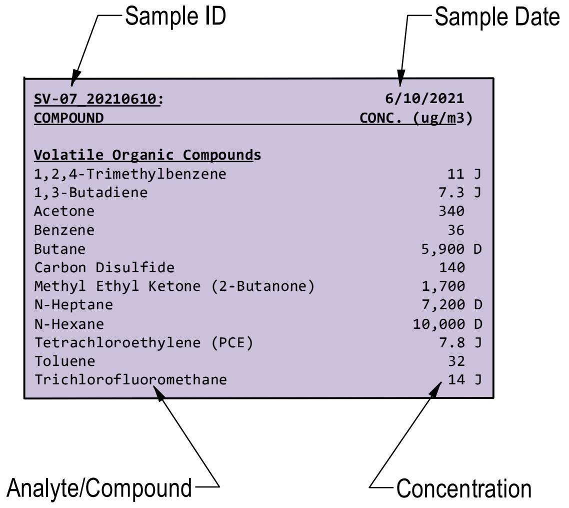
LEGEND

▭	PROJECT SITE BOUNDARY
50	LOT BOUNDARY AND TAX LOT NUMBER
2277	BLOCK NUMBER
▭	BUILDING
⌖	SOIL VAPOR SAMPLE LOCATION (2021)
⌖	AMBIENT AIR SAMPLE LOCATION (2021)

SOIL VAPOR

μg/m³- micrograms per cubic meter

B: Indicates the analyte is detected in the associated blank as well as in the sample.
D: Analyte concentration obtained from dilution.
J: The concentration given is an estimated value.
E: Result exceeded calibration range.



SV-07_20210610:	6/10/2021
COMPOUND	CONC. (ug/m3)
Volatile Organic Compounds	
1,2,4-Trimethylbenzene	11 J
1,3-Butadiene	7.3 J
Acetone	340
Benzene	36
Butane	5,900 D
Carbon Disulfide	140
Methyl Ethyl Ketone (2-Butanone)	1,700
N-Heptane	7,200 D
N-Hexane	10,000 D
Tetrachloroethylene (PCE)	7.8 J
Toluene	32
Trichlorofluoromethane	14 J

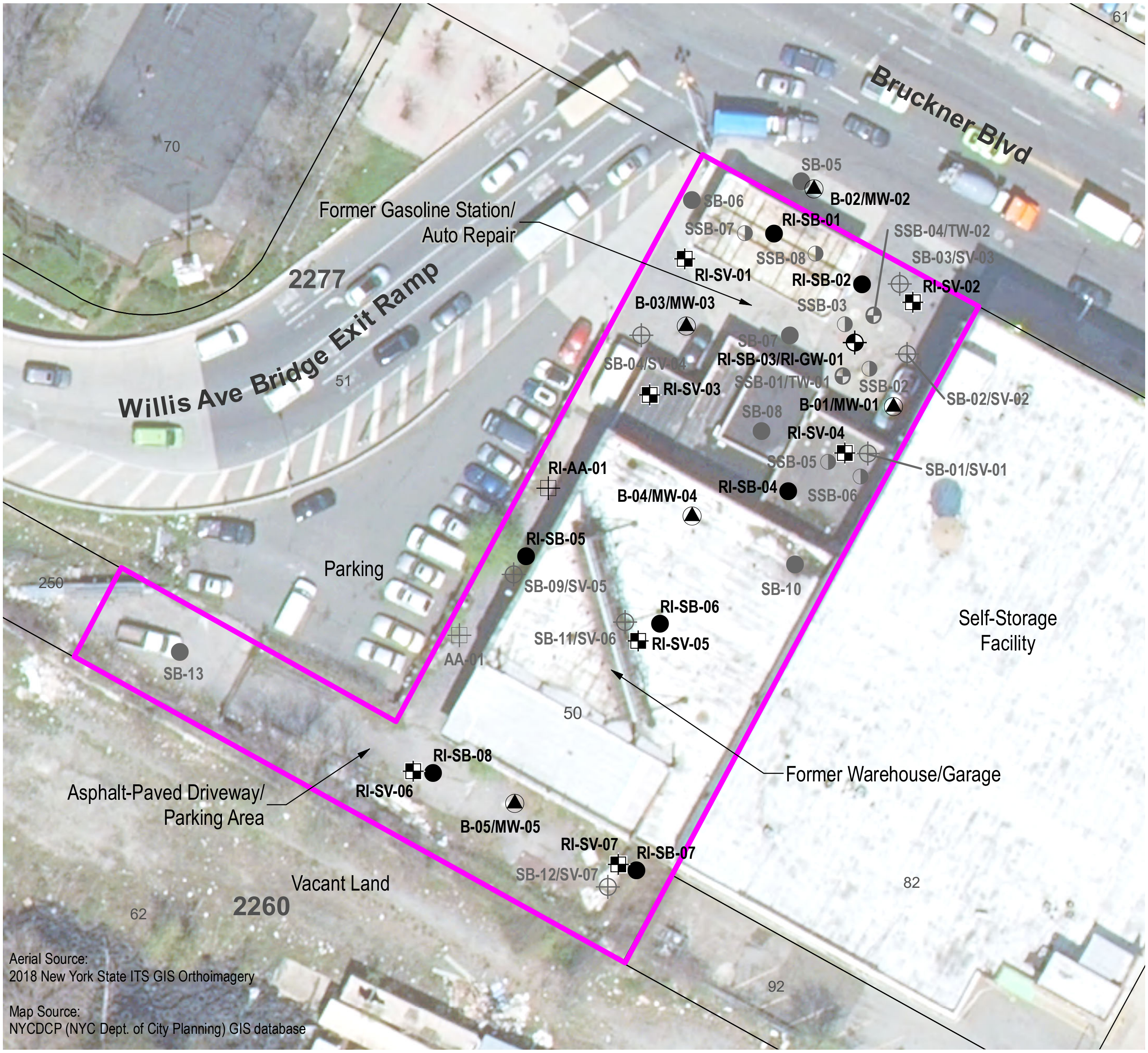
0 50 100 200
SCALE IN FEET

AKRF
440 Park Avenue South, New York, NY 10016

102 Bruckner Boulevard
Bronx, New York

SOIL VAPOR DETECTIONS

DATE
11/15/2023
PROJECT NO.
200328
FIGURE
6



Aerial Source:
2018 New York State ITS GIS Orthoimagery

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

LEGEND

▭	PROPERTY BOUNDARY
50	LOT BOUNDARY AND TAX LOT NUMBER
2277	BLOCK NUMBER
●	SOIL BORING LOCATION (2021)
▲	SOIL BORING/MONITORING WELL LOCATION (2021)
⊕	SOIL BORING/SOIL VAPOR SAMPLE LOCATION (2021)
⌗	AMBIENT AIR SAMPLE LOCATION (2021)
◑	SOIL BORING LOCATION (2022)
◕	SOIL BORING/TEMPORARY MONITORING WELL LOCATION (2022)
⌗	PROPOSED AMBIENT AIR SAMPLE LOCATION
●	PROPOSED SOIL BORING LOCATION
⊕	PROPOSED SOIL BORING/GROUNDWATER SAMPLE LOCATION
▚	PROPOSED SOIL VAPOR SAMPLE LOCATION

0 50 100
SCALE IN FEET

AKRF
440 Park Avenue South, New York, NY 10016

102 Bruckner Boulevard
Bronx, New York

PROPOSED SITE PLAN AND SAMPLE LOCATIONS

DATE
11/21/2023
PROJECT NO.
200328
FIGURE
7

©2023 AKRF Q:\Projects\200328 - BETTINA - BRUCKNER PROPERTIES\Technical\GIS and Graphics\SAR\Phase II\200328 Fig 7 Proposed Site Plan and Sample Locations.mxd11/15/2023 11:06:01 AM mveilleux

APPENDIX A

QUALITY ASSURANCE PROJECT PLAN

102 BRUCKNER BOULEVARD

BRONX, NEW YORK

Quality Assurance Project Plan

NYSDEC BCP Site Number: C203168
AKRF Project Number: 200328

Prepared For:

New York State Department of Environmental Conservation
Division of Environmental Remediation
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Prepared On Behalf Of:

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NOVEMBER 2023

TABLE OF CONTENTS

IN-TEXT TABLES

FIGURES

ATTACHMENTS

1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) describes the protocols and procedures that will be followed during implementation of the Remedial Investigation Work Plan (RIWP) for the property located at 102 Bruckner Boulevard in the Port Morris 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 2277, Lot 50 (formerly Lots 78, 94, and 50). A Site location map is provided on Figure 1. The proposed sample locations are shown on Figure 2.

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. C203168). 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 Code of Federal Regulations (CFR) Part 1910. The following sections describe the key project personnel and their responsibilities.

2.1 Quality Assurance/Quality Control (QA/QC) Officer

Marc Godick, QEP, will serve as the QA/QC officer and will be responsible for adherence to the QAPP. The QA/QC officer 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 QA/QC officer 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. Mr. Godick'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 RIWP. The project manager will prepare reports and participate in meetings with the Site owner/Applicant, and/or the NYSDEC. Timothy McClintock will serve as the project manager for the RIWP. Mr. McClintock'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 RIWP. 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. Stephen Schmid will be the field team leader. The field team leader alternate is Antonio Cardenas of AKRF. Mr. Schmid and Mr. Cardenas' 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 (within Eurofins Environment Testing Northeast LLC), 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 Thirty-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 regarding 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.

3.0 DATA QUALITY OBJECTIVES

The objectives for the sampling include:

- During the Remedial Investigation (RI) soil, groundwater, and soil vapor samples will be collected from soil borings, permanent groundwater monitoring wells, and temporary soil vapor points, respectively.
- Samples will be collected to further define and characterize the nature and extent of on-site contamination and assist with determining the appropriate remedial action.

Who will use the data?

- The collected data will be used by NYSDEC, NYSDOH, the Volunteer, and AKRF as part of the Site's participation in the BCP.

What types of data are needed?

- Soil samples will be collected from soil borings advanced across the Site. Samples will be analyzed for Part 375 list volatile organic compounds (VOCs) by US Environmental Protection Agency (EPA) Method 8260, Part 375 list semivolatile organic compounds (SVOCs) by EPA Method 8270, polychlorinated biphenyls (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, perfluorinated compounds (PFAS) by Modified EPA Method 1633 with Category B deliverables.
- Groundwater samples will be collected from permanent monitoring wells installed during previous investigations and from one newly installed temporary well, and analyzed for Part 375 list VOCs by EPA Method 8260, Part 375 list 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 Modified EPA Method 1633, and 1,4-Dioxane by EPA Method 8270 Selective Ion Monitoring (SIM) using Category B deliverables.
- Soil vapor samples will be collected from temporary soil vapor points installed across the Site. Soil vapor samples will be analyzed for VOCs by Method TO-15 using Category B deliverables.

How much data are needed?

- Up to approximately 16 soil samples will be collected from eight borings.
- Up to six groundwater samples will be collected from five permanent monitoring wells and one temporary groundwater monitoring well.
- Seven soil vapor samples will be collected from seven temporary vapor points. One ambient air sample will also be collected.

Where, when, and how should the data be collected/generated?

- Soil samples will be collected from the eight borings outlined in the RIWP and at the approximate locations shown on Figure 2. Borings will be advanced using a Geoprobe® direct push drill rig. 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 photoionization detector (PID) with an 11.6 electron Volt (eV) lamp, and logged using the modified Burmister soil classification system. Soil samples will be placed in laboratory-supplied containers by AKRF personnel and shipped to the laboratory via a courier with chain-of-custody (COC) documentation in accordance with appropriate EPA protocols to a NYSDOH ELAP-certified laboratory.

- Groundwater samples will be collected in accordance with EPA low-flow sampling protocols. Samples will be collected by AKRF personnel using a submersible bladder pump. During sampling, water quality parameters will be recorded on log sheets until the parameters have stabilized within ±10% and turbidity is below 50 nephelometric turbidity units (NTUs). 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.
- 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)." The soil vapor and ambient air samples will be collected over a 2-hour period 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. After 2 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.

Who will collect and generate the data?

- AKRF, and any subcontractor, will be responsible for performing the sampling. All samples will be analyzed by Eurofins Edison, Eurofins Burlington, Eurofins Denver, and/or Eurofins Lancaster (subcontracted by AKRF), NYSDOH-certified laboratories. AKRF will be responsible for collecting, reviewing, assessing, and disseminating validated data. Third-party data validation and the preparation of a DUSR will be prepared by Ms. Lori Beyer of L.A.B. Validation Corporation.

How will the data be reported?

- The data will be reported in the Remedial Investigation Report (RIR), and as Environmental Quality Information System (EQuIS)™-compatible electronic data deliverables (EDDs) submitted to NYSDEC.

How will the data be archived?

- All hard-copy data will be maintained at AKRF offices for a minimum of one year. Field logbooks and forms/sampling logs will be scanned and all electronic data will be archived on the AKRF corporate server.

4.0 STANDARD OPERATING PROCEDURES (SOPS)

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

4.1 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.

4.2 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.

5.0 SAMPLING AND LABORATORY PROCEDURES

5.1 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 VOCs using a PID equipped with a 11.6 eV lamp.
- A list of acceptable equipment is provided below, but other equipment may be considered appropriate based on sampling conditions.
  - stainless steel spoon
  - stainless steel bowl
  - steel hand auger or shovel without any coatings
- Collect an aliquot of soil from each proposed sample location, place in laboratory-supplied glassware, label the sample in accordance with Section 5.6.1, and place in an ice-filled cooler for shipment to the laboratory. Samples analyzed for 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 4.1 of this QAPP. Standard two-step decontamination using detergent (Alconox) and clean, PFAS-free water will be performed for sampling equipment.

5.2 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 11.6 eV lamp.
- A list of acceptable equipment is provided below, but other equipment may be considered appropriate based on sampling conditions.
  - stainless steel inertia pump with high-density polyethene (HDPE) tubing
  - peristaltic pump equipped with HDPE tubing and silicone tubing
  - stainless steel bailer with stainless steel ball
  - bladder pump (identified as PFAS-free) with HDPE tubing [a low-density polyethylene (LDPE) bladder will be used as no industry-approved HDPE alternative currently exists]
- Collect the groundwater sample from each proposed sample location in laboratory-supplied glassware, label the sample in accordance with Section 5.6.1, and place in an ice-filled cooler for shipment to the laboratory. Samples analyzed for PFAS will be contained in a separate cooler and the sample containers will 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 4.1 of this QAPP. Standard two-step decontamination using detergent (Alconox®) and clean, PFAS-free water will be performed for sampling equipment.

5.3 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 11.6 eV lamp.
- Collect the soil vapor samples from each proposed sample locations in laboratory-supplied SUMMA® canisters, label the sample in accordance with Section 5.6.1, 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.

5.4 Laboratory Methods

Table I summarizes the laboratory methods that will be used to analyze field samples and the sample container type, preservation, and applicable holding times. TestAmerica of Edison, NJ Burlington, VT, Denver, CO and/or Lancaster, PA, NYSDOH ELAP-certified laboratories 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 I
Laboratory Analytical Methods for Analysis Groups

Matrix	Analysis	EPA Method	Bottle Type	Preservative	Hold Time
Soil and Soil QA/QC	VOCs	8260C	EnCore® samplers (3) and 2 oz. plastic jar	≤ 4 °C	48 hours to extract; 14 days to analyze
	SVOCs	8270D	8 oz. Glass Jar	≤ 4 °C	14 days to extract; 40 days to analyze
	TAL Metals, and Hexavalent Chromium	6000/7000 Series, 6010C, and 7196A	8 oz. Glass Jar	≤ 4 °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	≤ 4 °C	14 days to extract; 40 days to analyze
	PCBs	8082A	8 oz. Glass Jar	≤ 4 °C	14 days to extract; 40 days to analyze
	PFAS	1633	4 oz. HDPE Container	≤ 4 °C	90 days to extract; 28 days to analyze
Groundwater and Groundwater QA/QC	VOCs	8260C	5 40 mL Glass Vials	HCl to pH < 2 and ≤ 4 °C	48 hours to extract; 14 days to analyze
	SVOCs	8270D	2,000 mL Amber Jar	≤ 4 °C	7 days to extract; 40 days to analyze
	1,4-Dioxane	8270D Selective Ion Monitoring (SIM); 0.35 µg/L RL	1 L Amber Jar	≤ 4 °C	7 days to extract; 40 days to analyze
	TAL Metals	6000/7000 Series	2,000 mL Amber Jar	HNO_3 to pH < 2	6 months for metals; 28 days for mercury; 24 hours for hex. chromium
	Pesticides	8081B	2,000 mL Amber Jar	≤ 4 °C	7 days to extract; 40 days to analyze
	PCBs	8082A	2,000 mL Amber Jar	≤ 4 °C	7 days to extract; 40 days to analyze
	PFAS	1633	3 x 250 mL Polypropylene Bottles	≤ 4 °C, Trizma	14 days to analyze
Soil Vapor/Ambient AIr	VOCs	TO-15	6L SUMMA® Canister	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/L – parts per billion
ng/L – parts per trillion

5.5 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. QC 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. The QA/QC samples are summarized in Table II below.

Table II
Field Sample and QA/QC Sample Quantities

Sample Type	Parameters	EPA Method[1]	Field Samples	QA/QC Samples				
				Duplicate[2]	**MS/MSD[2]**	**Field Blank[2]**	**Trip Blank[2]**	**Equipment Blank[3]**
Soil	VOCs	EPA 8260C	16 (estimated)	1/20 (1)	1/20 (1)	1/20 (1)	1(Laboratory-Supplied)	NA
	SVOCs, TAL Metals, Hex. Chromium, PCBs, Pesticides, and PFAS	EPA 8270D, 6010C/7471B, 8082A, 8081B, and 1633	16 (estimated)	1/20 (1)	1/20 (1)	1/20 (1)	NA	NA
Groundwater	VOCs	EPA 8260C	6	1/20 (1)	1/20 (1)	1/20 (1)	1 (Laboratory-Supplied)	NA
	SVOCs, Total/Dissolved, TAL Metals, PCBs, Pesticides, and PFAS	EPA 8270D, 6010C/7471B, 8082A, 8081B, and 1633	6	1/20 (1)	1/20 (1)	1/20 (1)	NA	1 per day for PFAS analysis only
Soil Vapor	VOCs	TO-15	7	NA	NA	NA	NA	NA

Notes:
MS/MSD - matrix spike/matrix spike duplicate
NA – Not Applicable
[1] – NYSDEC July 2005 ASP Category B deliverables
[2] – One MS/MSD, blind duplicate, field blank, and trip blank sample per 20 field samples per media
[3] – One equipment blank will be collected per day of groundwater sampling for PFAS analysis only

5.6 Sample Handling

5.6.1 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. Special characters, including primes/apostrophes ('), will not be used for sample nomenclature. Table III provides examples of the sampling identification scheme for samples collected during the RI.

Table III
Remedial Investigation Sample Nomenclature

Sample Description	Sample Designation
Groundwater sample collected from groundwater monitoring well MW-01 on March 1, 2024	RI-MW-01_20240301
Blind duplicate sample of groundwater sample collected from groundwater monitoring well MW-03 on March 2, 2024	RI-MW-X_20240302
Second field blank collected during the RI on March 2, 2024 with the soil samples	RI-FB-S-02_20240302
Soil sample collected from soil boring RI-SB-06 between 0 and 2 feet below grade on March 1, 2024	RI-SB-06_0-2_20240301
Soil vapor sample collected from temporary vapor point RI-SV-06 on March 4, 2024	RI-SV-06_20240304

Sample Labeling and Shipping

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

- Project identification, including Site name and 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.

5.7 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 11.6 eV lamp and will be calibrated each day using 100 parts per million (ppm) isobutylene standard gas in accordance with the manufacturer’s standards.

5.8 Quality Assurance (QA)

All soil, groundwater, soil vapor, and ambient air 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. The RIR will include a detailed description of endpoint sampling activities, data summary tables, concentration map showing sample locations and concentrations, DUSR, and laboratory reports.

FIGURES

Service Layer Credits: USGS The National Map: 3d Elevation Program,
Data Refreshed July, 2020

©2023 AKRF Q:\Projects\200328 - BETTINA - BRUCKNER PROPERTIES\Technical\GIS and Graphics\SAR\Phase II\200328 Fig 1 Site location.mxd11/15/2023 8:38:25AM mveilleux

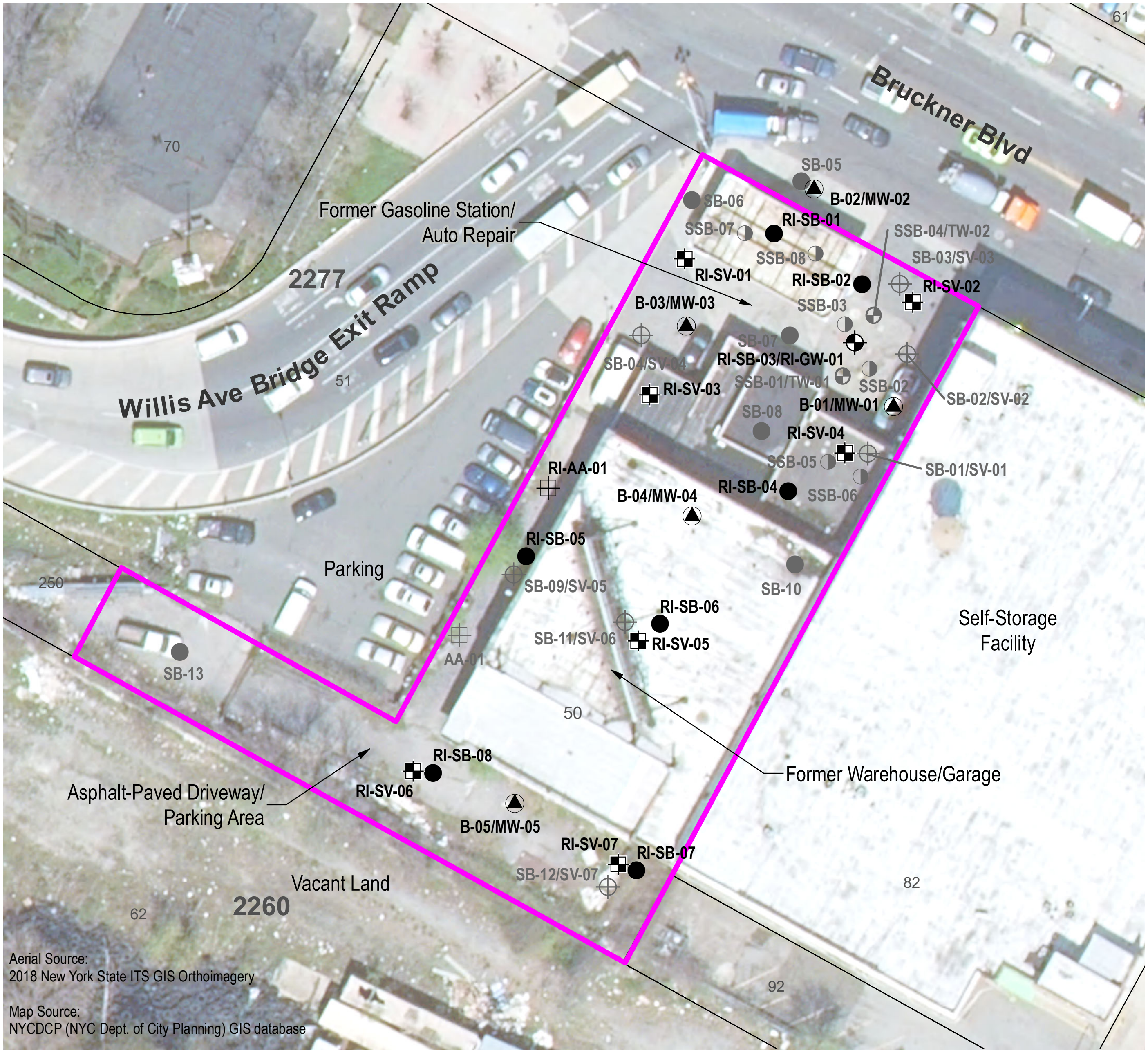
AKRF

440 Park Avenue South, New York, NY 10016

102 Bruckner Boulevard
Bronx, New York

SITE LOCATION MAP

DATE	**11/15/2023**
PROJECT NO.	**200328**
FIGURE	**1**



Aerial Source:
2018 New York State ITS GIS Orthoimagery

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

LEGEND

- ▭ PROPERTY BOUNDARY
- 50 LOT BOUNDARY AND TAX LOT NUMBER
- 2277 BLOCK NUMBER
- ● SOIL BORING LOCATION (2021)
- ▲ SOIL BORING/MONITORING WELL LOCATION (2021)
- ⊕ SOIL BORING/SOIL VAPOR SAMPLE LOCATION (2021)
- ⊞ AMBIENT AIR SAMPLE LOCATION (2021)
- ◑ SOIL BORING LOCATION (2022)
- ◒ SOIL BORING/TEMPORARY MONITORING WELL LOCATION (2022)
- ⊞ PROPOSED AMBIENT AIR SAMPLE LOCATION
- ● PROPOSED SOIL BORING LOCATION
- ⊕ PROPOSED SOIL BORING/GROUNDWATER SAMPLE LOCATION
- ▚ PROPOSED SOIL VAPOR SAMPLE LOCATION

0 50 100
SCALE IN FEET

AKRF
440 Park Avenue South, New York, NY 10016

102 Bruckner Boulevard
Bronx, New York

PROPOSED SITE PLAN AND SAMPLE LOCATIONS

DATE
11/21/2023

PROJECT NO.
200328

FIGURE
2

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

MARC S. GODICK, LEP

SR. VICE PRESIDENT

Marc S. Godick, a Senior Vice President of the firm, has over 27 years of experience in the environmental consulting industry. Mr. Godick has broad-based environmental experience includes expertise in brownfield redevelopment, site assessment, remedial investigation, design and implementation of remedial measures, compliance assessment, and litigation support.

Education

M.E., Engineering Science/Environmental Engineering, Pennsylvania State University, 1998

B.S., Chemical Engineering, Carnegie Mellon University, 1989

Licenses/Certifications

Licensed Environmental Professional (License # 396) – State of Connecticut – 2003 - Present

40 Hour HAZWOPER and Annual Refresher Training, 1990 - Present

Supervisors of Hazardous Waste Operations (8 Hour), 1990

Professional Memberships

Chairman, Village of Larchmont/Town of Mamaroneck Coastal Zone Management Commission, 1997 – Present

Member, Westchester County Stormwater Advisory Board, 2011 – Present

Chairman/Member, Westchester County Soil and Water Conservation District, 2005 - 2010

Board of Directors, Sheldrake Environmental Center, Larchmont, New York, 2006 - 2008

Member, NYSDEC Risk-Based Corrective Action (RBCA) Advisory Group for Petroleum-Impacted Sites, 1997

Community Leadership Alliance, Pace University School of Law, 2001

Years of Experience

Year started in company: 2002

Year started in industry: 1990

RELEVANT EXPERIENCE

New York City Department of Design and Construction, East Side Coastal Resiliency, Manhattan, NY

Mr. Godick leads the environmental investigation and related support for a multidisciplinary design team selected by the New York City agency partnership of DDC, DPR, and ORR for the Feasibility Study and Pre-Scoping Services for East Side Coastal Resiliency (ESCR) project. The AKRF Team is providing design services, for 100+ year storm protection with anticipated sea level rise along the east side of Lower Manhattan. The ESCR subsurface exploration program involved a review of available utility plans and environmental reports involving manufactured gas plant (MGP) and potential petroleum-related contamination along a 2.5 mile study area from Montgomery Street to East 25th Street to develop a Subsurface Investigation Work Plan, which was approved by the NYCDEP.

The program included both public and private utility mark-out services across vast areas of the project site containing critical infrastructure to enable the installation of numerous shallow and deep borings and groundwater wells. Mr. Godick supervised the implementation of the investigation, which was completed in two phases. He was also responsible for the interpreting the wide-range of chemical parameters to evaluate critical cost and environmental impacts for the City and design team, and to prepare technical reports for submission and approval by the NYCDEP to satisfy for City Environmental Quality Review (CEQR) requirements. In addition, he continues to support the design and environmental review team, including preparation of the Hazardous Materials chapter for the Environmental Impact Statement, estimating cost impacts to the project for design and cost recovery purposes, and developing a Soil Management Plan. Mr. Godick also managed a hydrogeologic modeling study to evaluate potential hydraulic and contaminant migration impacts associated with construction of the proposed flood control structure. Mr. Godick continues to coordinate with the NYC team, NYSDEC, and Con Edison to ensure that the design incorporates appropriate remedial measures to be implemented prior to and/or in conjunction with construction.

Remedial Design, Gowanus Canal First Street Turning Basin, New York City Department of Design and Construction (DDC)

Mr. Godick is managing the remedial design for restoration of the filled-in former First Street Turning Basin in Brooklyn, New York. The remediation is being conducted as part of an Order of Consent between the City of New York and EPA for the Gowanus Canal Superfund Site. The remedial design will include removal of fill and sediment within the fill-in basing in an approximately 475-foot by 50-foot area. The restored basin will provide enhanced waterfront access to the community and a boat launch for canoes and kayaks. Design considerations include geotechnical concerns related to adjacent buildings and new, existing bulkheads; soil, and water management; landscape design; and access/construction logistics. The design in anticipated to be completed in late 2017.

Remediation & Litigation Support, 3200 Jerome Avenue, Bronx, NY (Former PS 151)

Mr. Godick managed the investigation and remediation of a former public school in the Bronx under the New York State Department of Environmental Conservation (NYSDEC) Brownfields Cleanup Program (BCP). The site was contaminated with trichloroethylene (TCE) from historic operations at the property prior to use as a school. The remedial investigation included soil, groundwater, and vapor intrusion assessment both on-site and off-site. The remedial design included excavation of the source area, in-situ chemical oxidation of groundwater, and installation of a sub-slab depressurization system (SSDS) to address to potential vapor intrusion. Implementation of the remedy was complete in late 2014. The completed remediation allows for future multi-family residential, educational, childcare, and/or medical uses. Mr. Godick also provided litigation support in connection with a cost recovery claim against the former operator of the site.

Remediation & Litigation Support, Queens West Project, Avalon Bay Communities, Queens, NY

For over 20 years, AKRF has played a key role in advancing the Queens West development, which promises to transform an underused industrial waterfront property into one of largest and most vibrant mixed-use communities just across the East River from the United Nations. AKRF prepared an Environmental Impact Statement (EIS) that examines issues pertaining to air quality, land use and community character, economic impacts, historic and archaeological resources, and infrastructure. As part of this project, Mr. Godick managed one of the largest remediation projects completed under the NYSDEC BCP at the time that was contaminated by coal tar and petroleum. The remedy included the installation of a hydraulic barrier (sheet pile cut off wall), excavation of contaminated soil under a temporary structure to control odors during remediation, a vapor mitigation system below the buildings, and implementation of institution controls. The investigation, remediation design, and remedy implementation, and final sign-off (issuance of Certificate of Completion) were completed in two years. Total remediation costs were in excess of $13 million. Following completion of the remediation, Mr. Godick developed a cost allocation model and provided litigation support for a cost recovery action against a former operator of the site, including participation in a deposition as a fact witness prior to settlement between the parties.

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

Mr. Godick 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 developed a remedial plan for a former gas station site in the Bronx and implemented a remedial plan for capping a park site in Staten Island. In addition, Mr. Godick is providing 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.

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

Mr. Godick is managing an on-call contract with the SCA for environmental assessment, remedial design, and plumbing disinfection. 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. 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 a report 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. Mr. Godick also manages AKRF's potable water sampling (for lead) work for SCA, including providing recommendations for mitigating exceedances.

Remediation, Former Industrial Laundry/Dry Cleaning Plant, 2350 Fifth Avenue. New York, NY

Mr. Godick managed the assessment, cleanup and post-remedial operations, maintenance and monitoring of the only 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 a sub-slab vapor extraction system retrofitted into the existing building. Mr. Godick coordinated with the regulatory agencies, site owner and occupants; and managed the investigation, remedial design, and remedial implementation activities. 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. 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). Mr. Godick continues to manage the project, including operations, maintenance and monitoring of the SSDS and SVE system under the NYSDEC-approved Site Management Plan.

606 West 57th Street, New York, NY, TF Cornerstone

AKRF has been retained by TF Cornerstone to provide environmental services for the proposed redevelopment of a portion of the block bounded by Eleventh and Twelfth Avenues and West 56th and 57th Streets. The proposed actions included a zoning map amendment, zoning text amendments, a special permit, and an authorization to facilitate development of approximately 1.2 million square feet of residential and retail space. AKRF prepared an Environmental Impact Statement (EIS) for the New York City Department of City Planning (DCP) to analyze the effects of the proposed actions and development of the proposed building. The EIS addressed the full range of environmental impacts associated with the proposed development.

Mr. Godick was responsible for the elements of the EIS pertaining to hazardous materials, including coordination of a Phase I ESA and summarizing pertinent site information for the hazardous materials and construction chapters. Mr. Godick provided pre-acquisition support to TF Cornerstone, which included development of a remedial cost estimate report to outline remediation cost during site development. Mr. Godick also managed work related to the subsurface investigation, localized remediation (chemical injection and limited excavation beneath the building basement) and regulatory closure of a petroleum spill on a portion of the project site to satisfy NYSDEC requirements. After EIS certification, Mr. Godick coordinated approvals with NYCOER, the regulatory agency overseeing remedial measures related to the redevelopment of the site. The Site has an (E) Designation and is participating in the New York City Voluntary Cleanup Program. Mr. Godick managed the preparation of a Phase II Investigation Work Plan, Remedial Investigation Report, Remedial Action Work Plan (RAWP), and contractor specifications for soil management and tank and hydraulic lift removal. Mr. Godick managed implementation of the remediation in accordance with the RAWP.

164 Kent Avenue, Brooklyn, NY (AKA Northside Piers and 1 North 4th Place), RD Management, L&M Development, Toll Brothers, and Douglaston Development

The project was a multi-phase development consisting of a large waterfront block in the Williamsburg Rezoning Area. The project site has been developed with mixed-use residential-commercial high-rise towers with an esplanade and a pier along the East River. AKRF provided acquisition and development support, including performing Phase I and II environmental site assessments and development of remedial cost estimates for development, and preparation of Remedial Action Plans (RAPs) and Construction Health and Safety Plan (CHASPs) for approval by DEP and OER. AKRF provided assistance with construction oversight during soil handling activities and managing the Community Air Monitoring Plan (CAMP) activities. Closure reports were prepared and the project is fully built-out and occupied.

Site Investigation–Over 20 Facilities, Con Edison, New York, NY

Mr. Godick managed site investigations associated with petroleum, dielectric fluid, and PCB releases at over 20 Con Edison facilities including service centers, substations, generating stations, and underground transmission and distribution systems. Site investigations have included due diligence site reviews, soil boring installation, monitoring well installation, hydrogeologic testing, and water quality sampling. Risk-based closures were proposed for several sites.

Underground Storage Tank Closure and Site Remediation–Program Management, Con Edison, New York, NY

Mr. Godick provided technical assistance to Con Edison in developing technical submittals and budgets associated with tank closures at over 50 facilities. Technical summaries were prepared for submittal of contractor-prepared closure reports to the NYSDEC. The summaries included a review of historic pre-closure assessments, tank closure data, and provided recommendations for additional assessment, remediation or closure. Subsequently, a three-year program budget was developed for implementation of the UST investigation/remedial program, which Con Edison utilized for internal budgeting purposes.

Site Investigation–7 World Trade Center Substation, Con Edison, New York, NY

Mr. Godick managed the site investigation at the former 7 World Trade Center Substation in an effort to delineate and recover approximately 140,000 gallons of transformer and feeder oil following the collapse of the building. The project involved coordination with several crews, Con Edison, and other site personnel.

Site Investigation–Former Manufactured Gas Plant (MGP) Facilities, Con Edison, New York, NY

Mr. Godick managed site investigations at four former manufactured gas plant (MGP) facilities. The investigations were completed at Con Edison substations, a flush pit facility, and a service center to support remedial design and expansion at select locations. The findings from these characterizations were used by Con Edison to make appropriate changes to the design specifications and to plan for appropriate handling of impacted materials and health and safety protocols during future construction activities.

National Grid – Halesite Manufactured Gas Plant Site Remediation, Town of Huntington, NY

Mr. Godick managed the remedial design and engineering work associated with remediation of National Grid's former MGP located in the Town of Huntington. The site is situated in a sensitive location along the waterfront, surrounded by commercial and residential properties, and half the property where the remediation was conducted was a steep slope. The remedy consisted of soil removal, oxygen injection, and non-aqueous phase liquid recovery. Mr. Godick was responsible for the development of the remedial work plans, design/construction documents, landscape architecture, confirmatory sampling, air monitoring, supervision, and preparation of closeout documentation in accordance with NYSDEC requirements.

Verizon, Investigation & Remediation, Various Locations, NY, PA and DE

Mr. Godick managed over 50 environmental investigations and remediation projects related to petroleum releases at various facilities. Responsibilities included annual budgeting, day-to-day project management, development and implementation of soil and ground water investigation workplans, ground water modeling, risk evaluation, remedial action work plans, remedial design, system installation, waste disposal, well abandonment, and operation and maintenance. Many of the assessment and remedial projects followed a risk-based approach. Remedial technologies implemented included air sparging, soil vapor extraction, bioremediation, pump and treat, soil excavation, and natural attenuation.

Storage Tank Management, Verizon, Various Locations, NY, PA, DE, and MA

Mr. Godick managed the removal and replacement of underground and aboveground storage tank systems for Verizon in New York, Pennsylvania, Delaware, and Massachusetts. Responsibilities included the management of design, preparation of specifications, contractor bidding, construction oversight, project budget, and documentation. For selected AST sites, managed the development of Spill Control, Contingency and Countermeasures (SPCC) plans.

Litigation Support, Cost Recovery Action, Gowanus Superfund Site, New York

Mr. Godick provided technical support to one of the 40+ potential responsible parties (PRPs) associated with a Federal Superfund site in New York State, which included conducting a liability assessment for the various parties and development of a cost allocation model.

Litigation Support, Cost Recovery Action, New York State Superfund Site

Mr. Godick provided technical support for the former owner of a New York State Superfund site in upstate New York. The owner of the property brought a cost recovery action against our client as a PRP. Mr. Godick completed a technical review of the draft Remedial Investigation/Feasibility Study prepared by the opposing party’s consultant to develop a more cost effective remedial strategy and to better position the client for liability allocation as part of future settlement negotiations. Mr. Godick also developed a cost allocation report that included a model for settlement negotiations, as well as participated in mediation.

Litigation Support & Remediation, Former Service Station, Brooklyn, New York

Mr. Godick took over management of remediation of an inactive service station (formerly conducted by another firm). His approach outlined additional characterization and remediation efforts, which resulted in successful closure of the spill by NYSDEC within two years. Mr. Godick testified as an expert witness at a hearing in the New York State Supreme Court of Kings County to determine the adequacy of the remediation efforts.

Litigation Support, Cost Recovery Action, Town of Carmel, New York

Mr. Godick served as an expert witness representing the owner of a property in a landlord-tenant dispute, which was used as a gasoline station and oil change facility. Mr. Godick prepared exhibits, testified, and participated in meetings with NYSDEC to support the landlord's claim that the oil change tenant's practices were poor and were adversely affecting the environment and the overall facility systems at the site.

Litigation Support, Cost Recovery Action, New York State Petroleum Spill Site, New York, NY

Mr. Godick provided technical support for the former owner of a New York City multi-unit residential apartment building. The State of New York brought a cost recovery action against our client as a result of a previous spill from a former underground storage tank. Mr. Godick reviewed invoices and project documentation to dispute work performed by the NYSDEC, which provided the basis for settlement at a fraction of the initial claim.

Litigation Support, Class Action Lawsuit, Confidential Client, NJ

Mr. Godick provided technical support for a class action suit involving a petroleum-impacted community water supply in southern New Jersey. The technical assistance included analysis of expert testimony and coordination with legal counsel in preparing for cross-examination of the opposing party's lead expert witness.

Cost Analysis, Environmental Insurance Claims, Various Locations

Mr. Godick provided technical support for cost analyses completed for a large national insurance company related to several former MGP and other industrial sites. Responsibilities included evaluation and development of cost-effective remedial strategies, as well as compilation of detailed costs for remedial action implementation and closure.

TIMOTHY MCCLINTOCK

ENVIRONMENTAL SCIENTIST

Timothy McClintock has over 12 years of environmental consulting experience primarily in environmental investigation, remediation oversight and project management throughout the northeast. His experience includes writing proposals; planning, implementing and managing Phase I Environmental Site Assessments, Phase II Environmental Site Investigations and Remedial Investigations; overseeing remedial action programs including soil excavation, groundwater handling, remediation system installation, and operation and maintenance; project management and reporting. Many of his remediation projects have been successfully remediated and obtained closure from the New York State Department of Environmental Conservation (NYSDEC), New Jersey Department of Environmental Protection (NJDEP), Pennsylvania Department of Department of Environmental Protection (PADEP), Connecticut Department of Energy & Environmental Protection (CTDEEP) and Massachusetts Department of Environmental Protection (MassDEP).

BACKGROUND

Education

B.S. Environmental Science/Earth Science, University at Albany, 2008

Licenses & Certifications

OSHA 40-hour Health & Safety Training for Hazardous Waste Operations (February, 2018)
NJDEP Subsurface Evaluator & UST Closure (December, 2019)
NYSDOH Certified Asbestos Inspector & Mold Assessor (November, 2018)
USEPA Lead Paint Inspector (October, 2017)

Years of Experience

Date started at AKRF: August, 2017
Prior industry experience: Dorson Environmental Management, Inc. – August 2008 to August 2017 (9 years)

RELEVANT EXPERIENCE

Former Farm Gasoline Underground Storage Tank Remediation, Somerset County, NJ

Mr. McClintock has been serving as the field team leader and deputy project manager for the LSRP-led remediation of a former gasoline UST located on a farm property in the Watchung Mountain region of New Jersey. Following performance of a site investigation (contamination screening), AKRF is currently conducting an investigation to bioremediate groundwater at the site, which contains primarily residual benzene and MTBE. As the project environmental scientist, Mr. McClintock assisted with the preparation of a Remedial Action Workplan (RAWP), and completed groundwater sampling investigations, a biotreatability study, and an evaluation of data resulting from the site work.

White Plains Mall, 200 Hamilton Avenue, White Plains, New York - Spill Investigation and Brownfield Cleanup Program Enrollment

Mr. McClintock served as the field team leader for the Spill Investigation work associated with historic gasoline stations at the White Plains Mall. As the project environmental scientist, Mr. McClintock assisted senior project staff with the evaluation of historical assessment information, and the development and implementation of a Spill Investigation to delineate the extent of petroleum-contaminated soil and groundwater. Mr. McClintock directed the field effort including the collection of soil and groundwater samples, completed an evaluation of data resulting from the site work, and prepared investigation reports. The project would apply for the NYSDEC Brownfield Cleanup Program.

New York City School Construction Authority, New York, NY

AKRF provides the New York City School Construction Authority (NYCSCA) with hazardous materials consulting services under an on-call contract. Mr. McClintock has served as field team leader and deputy project manager at various NYCSCA project sites related to due diligence and environmental assessments. As the project environmental scientist, Mr. McClintock has completed Phase I Environmental Site Assessments (ESAs), Phase II (Subsurface) Investigations, Indoor Air Quality (IAQ) Assessments, and underground storage tank (UST) and aboveground storage tank (AST) inspections and closures.

Confidential Client: New York City Institutional Site - Soil Classification:

Mr. McClintock served as the field team leader for the soil classification work associated with the proposed development of an addition at a New York City institutional site. As the project environmental scientist, Mr. McClintock assisted senior project staff with the coordination of site work, and directed the field effort including the collection of soil samples to characterize the current subsurface conditions. Mr. McClintock's role also included evaluating the data resulting from the site work and project reporting.

Proposed Public School, Queens, New York - Phase II Investigation

Mr. McClintock served as field team leader for the Phase II Investigation work associated with proposed development of NYCDOE Public School at a vacant lot in Queens, New York. As the project environmental scientist, Mr. McClintock assisted senior project staff with the evaluation of historical assessment information and the development and implementation of the Phase II Investigation to characterize the current subsurface conditions. Mr. McClintock directed the field effort including the collection of soil, soil vapor, and groundwater samples, completed an evaluation of the data resulting from the site work, and prepared investigation reports.

900 King Street Property, 900 King Street, Rye Brook, NY

Mr. McClintock served as field team leader for the Phase II Investigation work associated with proposed development of the 900 King Street property in Rye Brook, NY. As the project environmental scientist, Mr. McClintock assisted senior project staff with the evaluation of historical assessment information and the development and implementation of the Phase II Investigation to characterize the current subsurface conditions. Mr. McClintock directed the field effort including the collection of soil, soil vapor, and groundwater samples, completed an evaluation of the data resulting from the site work, and prepared investigation reports.

1-65 North 12th Street, Brooklyn, New York

The former Bayside Fuel Oil Company operated a commercial petroleum bulk storage facility at the property for several decades. Soil and groundwater contamination resultant of on-site and off-site petroleum releases, off-site manufactured gas plant (MGP) releases, and historic fill have been identified throughout the property. The site is currently owned by the City of New York Department of Parks and Recreation (DPR) and the New York City Economic Development Corporation (EDC) is implementing a demolition project to remove all above grade structures at the property. Mr. McClintock assisted senior AKRF project staff with the evaluation of historical assessment information and the preparation of a Remedial Action Plan (RAP) and Construction Health and Safety Plan (CHASP) for the proposed demolition project.

Petroleum Release/Oil Tank Remediation Projects – New York, New Jersey, Pennsylvania and Connecticut (2008 – 2017)

While at another firm, Mr. McClintock completed the design and implementation of environmental investigations and remediation projects associated with petroleum releases at residential and commercial sites throughout the northeast. Tasks included project design, site investigation, project direction and oversight, soil and groundwater sampling, data evaluation, client and contractor coordination, regulatory agency interaction and associated reporting and deliverable production.

Phase I Environmental Site Assessment and Phase II Environmental Site Investigation Projects – New York and New Jersey (2008 – 2017)

During his time with Dorson Environmental Management, Inc., Mr. McClintock completed Phase I and Phase II environmental site assessments (ESAs) and investigations (ESIs) at residential and commercial properties associated with real estate transactions. Tasks included site inspections, historic environmental data report and regulatory record evaluations, environmental media sampling, client and contractor coordination, and associated reporting and deliverable production.

Storm Water Investigation Projects – New York (2008 – 2017)

Mr. McClintock assisted senior project staff with the investigation of actual and suspected storm water discharges at various sites throughout New York while at Dorson Environmental Management, Inc. Tasks included investigation into suspected non-permitted storm water discharges for environmental attorneys, preparation of Storm Water Pollution Prevention Plans (SWPPP) to assist property owners with obtaining the NYSDEC General Permit for Storm Water Discharges, storm water sampling, storm water drainage mapping, data evaluation, and associated reporting and deliverable production.

Former Flamingo Cleaners, 149 North Avenue, New Rochelle, New York

Mr. McClintock completed site investigations, developed a Remedial Action Work Plan (RAWP), provided remediation oversight and regulatory agency interaction, conducted environmental media sampling, and prepared report packages associated with comingled petroleum and chlorinated contamination at a former dry cleaning facility. The work was conducted in accordance with the NYSDEC Brownfield Cleanup Program and included site characterization, excavation and disposal of contaminated source material, removal and treatment of contaminated groundwater, in situ chemical oxidation of residual contamination and the implementation of institutional and engineering controls.

Former Gasoline Station, 66 Milton Road, Rye, NY

Mr. McClintock designed and implemented a site investigation and remedial excavation program to address historic contamination at a former gasoline station. The site work included the delineation of the residual soil and groundwater contamination, excavation of contaminated source material, removal of contaminated groundwater, post-remedial soil and groundwater sampling and associated reporting to close the NYSDEC spill number associated with the property. All site work was coordinated through the current building management and tenant association, the NYSDEC and the City of Rye.

Water and Mold Damage Investigation and Remediation Projects – New York, New Jersey, and Connecticut (2008 – 2017)

Mr. McClintock completed the design and implementation of environmental investigations, cause and origin analyses, and remedial projects associated with water and mold damage claims for various insurance carriers during his tenure with Dorson Environmental Management. Tasks included site investigation, cause and origin determination, project direction and oversight, environmental media sampling, data evaluation, client and contractor coordination, and associated reporting and deliverable production.

STEPHEN SCHMID

ENVIRONMENTAL SCIENTIST

Stephen Schmid is an Environmental Scientist in AKRF's Hazardous Materials Department with ten years of experience. He has experience in Phase I and II site assessments, asbestos surveying and monitoring, and construction/remediation. Mr. Schmid is a 2011 graduate from the University of New Hampshire, where he studied marine and freshwater biology, and environmental conservation. Prior to joining AKRF Mr. Schmid conducted fieldwork, water sampling and analysis in addition to assisting in a study of lakes in the North Eastern United States.

BACKGROUND

Education

BS Marine & Freshwater Biology, University of New Hampshire, Durham, NH

Licenses/Certifications

40 Hour OSHA HAZWOPER

30 Hour OSHA Construction Health and Safety

10 Hour OSHA Construction Health and Safety

10 Hour OSHA NYC Site Safety Training

Asbestos Project Monitor, Air Sampling Technician, Inspector and Investigator

Years of Experience

Year started in company: 2012

Year started in industry: 2011

RELEVANT EXPERIENCE

Willets Point, Queens, NY

AKRF supported the New York City Economic Development Corporation (EDC) with Phase 1 of the Willets Point Redevelopment Plan, which includes the demolition of existing structures. Mr. Schmid performed pre-demolition asbestos-containing materials and universal waste surveys of approximately 70 structures throughout the 23-acre area site in Queens along with an AKRF licensed NYC asbestos investigator.

Adelaar, Monticello, NY

The project is a multi-phase development consisting of approximately 1,700 acres. The project site has been developed with a mixed-use residential-commercial hotel, casino, water park and entertainment village. AKRF provided acquisition and development support, including performing Phase I and II environmental site assessments. Mr. Schmid provided assistance with Phase I assessments, oversight during remedial soil handling activities and conducted inspections in accordance with the Stormwater Pollution and Prevention Plans.

NYCHA Randolph Houses, W 114th Street, Harlem, NY

AKRF was directed to survey 14 five story affordable housing apartment buildings for potential asbestos containing materials prior to the renovation of the buildings. Mr. Schmid along with AKRF licensed NYC asbestos investigators performed the collection of bulk samples throughout the building's main floors, basements and roofs to confirm the presence of asbestos in some of the building materials.

25 Broad Street, Manhattan, NY

AKRF was contracted by LCOR during the demolition of a residential building on a property which will eventually be redeveloped. AKRF was responsible for creating and implementing a community air monitoring program during demolition activities. As the environmental scientist Mr. Schmid was the on-site monitor responsible for calibrating equipment and monitoring levels of volatile organic compounds and particulate matter for the surrounding area and construction personnel. Reports of the daily activity including data collected throughout the day were prepared for submittal to the client.

Kent Avenue, Brooklyn, NY (AKA Northside Piers and 1 North 4th Place)

The project was a multi-phase development consisting of a waterfront block in the Williamsburg Rezoning Area. The project site has been developed with a mixed-use residential-commercial high rise towers with an esplanade and a pier along the East River. AKRF provided acquisition and development support, including performing Phase I and II environmental site assessments, and preparation of Remedial Action Plans (RAPs) and Construction Health and Safety Plan (CHASPs) for approval by DEP and OER. As the environmental scientist Mr. Schmid provided assistance with construction oversight during soil handling activities and managing the Community Air Monitoring Plan (CAMP) activities.

Residential Redevelopment Site, Brooklyn, NY

AKRF was retained to investigate and remediate this former industrial property in the Williamsburg section of Brooklyn, New York in connection with site redevelopment. The site is approximately 50,000 square feet, and redevelopment included a six story residential building and parking garage. The work was completed to satisfy the requirements of the NYC E-designation Program and NYC Voluntary Cleanup Program (NYC VCP). AKRF completed a Remedial Investigation (RI) to evaluate the nature and extent of site contamination, and developed a Remedial Action Work Plan (RAWP) to properly address site contamination during redevelopment. Remediation included removal of underground storage tanks, more than 7,500 tons of contaminated soil, and installation of a vapor barrier and site cap across the entire property. The remediation was completed under oversight of the NYC Office of Environmental Remediation (OER), and in a manner that has rendered the Site protective of public health and the environment consistent with residential use of the property. As the environmental scientist Mr. Schmid conducted construction oversight and community air monitoring during the removal of contaminated soil.

Pier 40, 353 West Street, New York, NY

AKRF was directed to survey the property for potential asbestos containing materials prior to renovations and upgrades to multiple rooms. As the environmental scientist Mr. Schmid collected bulk samples to test for asbestos along with an AKRF licensed NYC asbestos investigator. Results confirmed the presence of asbestos in some of the rooms and Mr. Schmid subsequently provided project monitoring and the collection of air samples during the abatement.

137-44 94th Avenue, Queens, NY

AKRF was contracted to survey the building for potential asbestos containing materials prior to demolition. As the environmental scientist Mr. Schmid collected bulk samples to test for asbestos along with an AKRF licensed NYC asbestos investigator. Results confirmed the presence of asbestos in an office, trailer and the roof. During abatement Mr. Schmid served as the project monitor and collected daily air samples.

The Home Depot, Rego Park, NY

AKRF has designed, installed and performed upgrades to an air sparging and soil vapor extraction system being used to remediate tetrachloroethene contamination at this site under the NYSDEC Voluntary Cleanup Program. As the environmental scientist Mr. Schmid has performed low flow, indoor air and effluent sampling as part of ongoing monitoring activities to assess the progress of the cleanup.

AP-Williamsburg, LLC, 50 North 5th Street Development, Brooklyn, NY

AKRF directed the remedial program at a 55,000-square foot site located in the Williamsburg section of Brooklyn, New York. The site had an industrial and manufacturing history for over 100 years that included a barrel making factory, use of kilns, and a carpet and flooring materials warehouse. AKRF completed a Remedial Investigation (RI) to evaluate the nature and extent of site contamination, and developed a Remedial Action Work Plan (RAWP) to properly address site contamination during redevelopment. Remediation included removal of more than 5,000 tons of contaminated soil, and installation of a vapor barrier and sub-slab depressurization system (SSDS) beneath the site building. The remediation was completed in a manner that has rendered the Site protective of public health and the environment consistent with commercial and residential use of the property, and in accordance with the requirements of the NYC OER E-designation program. The site includes a seven story residential apartment building with street level retail space and a parking garage. As the environmental scientist Mr. Schmid provided oversight and community air monitoring during construction activities.

Gedney Way Leaf and Yard Waste Composting Facility, White Plains, NY

AKRF directed the remediation and landfill closure project at the existing composting facility. The project included investigation to document disposal history, extent of landfill materials and a solvent plume, preparation of a landfill closure plan, and management of landfill closure and cap construction. The landfill investigation and closure activities were completed to satisfy the requirements of a New York State Department of Environmental Conservation's (NYSDEC) consent order, and were completed in compliance with NYSDEC DER-10 and 6NYCRR Part 360. As the environmental scientist Mr. Schmid performed construction oversight and low-flow groundwater sampling during construction activities.

443 Greenwich Street, New York, NY

AKRF was retained to investigate and remediate this property in the Tribeca section of Manhattan, New York in connection with site redevelopment for a multi-story residential building. AKRF completed a Remedial Investigation (RI) to evaluate the nature and extent of site contamination, and developed a Remedial Action Work Plan (RAWP) to properly address site contamination during redevelopment. Remediation included removal of contaminated soil and installation of a vapor barrier. The remediation was completed under oversight of the NYC Office of Environmental Remediation (OER), and in a manner that has rendered the Site protective of public health and the environment consistent with residential use of the property. As the environmental scientist Mr. Schmid conducted construction oversight and community air monitoring during the removal of contaminated soil.

606 W 57th Street, New York, NY

AKRF was retained to investigate and remediate this property in Manhattan, New York in connection with site redevelopment for a multi-story residential structure. The work is being completed to satisfy the requirements of the NYC E-designation Program. AKRF completed a Remedial Investigation (RI) to evaluate the nature and extent of site contamination, and developed a Remedial Action Work Plan (RAWP) to properly address site contamination during redevelopment. Remediation includes removal of underground storage tanks and contaminated soil. The remediation is being completed under oversight of the NYC Office of Environmental Remediation (OER), and in a manner that has rendered the Site protective of public health and the environment consistent with residential use of the property. As the environmental scientist Mr. Schmid conducted construction oversight and community air monitoring during the removal of contaminated soil.

NYCEDC Office of Environmental Remediation (OER) On-Call Environmental Consulting Services

Second Farms, Bronx, NY

AKRF, Inc. was contracted by OER 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. As the environmental scientist Mr. Schmid assisted in the investigation which included a geophysical survey and utility mark-outs, and the collection and analysis of soil, groundwater, soil vapor, indoor air and ambient air samples.

Former Nelson Foundry, Long Island City, NY

AKRF, Inc. was contracted by OER to conduct a subsurface investigation around the perimeter of a former foundry property in Long Island City, New York under the USEPA Brownfield Assessment Grant program. The work included preparation of a rigorous investigation work plan, Quality Assurance Project Plan, and Health and Safety Plan. The investigation will include a geophysical survey and utility mark-outs and the collection and analysis of soil, groundwater, soil vapor, and ambient air samples. The project also requires careful coordination of investigation-derived waste due to lack of on-site storage and daily drum pick-ups. As the environmental scientist Mr. Schmid conducted low flow sampling for the analysis of groundwater.

APPENDIX B

HEALTH AND SAFETY PLAN

102 BRUCKNER BOULEVARD

BRONX, NEW YORK

Health and Safety Plan

NYSDEC BCP Site Number: C203168
AKRF Project Number: 200328

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:

132 Willis Associates, LLC
c/o Bettina Equities Management LLC
230 East 85th Street
New York, NY 10028

Prepared by:

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

NOVEMBER 2023

TABLE OF CONTENTS

FIGURES

ATTACHMENTS

1.0 INTRODUCTION

This environmental Health and Safety Plan (HASP) has been developed for the implementation of a Remedial Investigation (RI) by AKRF, Inc. (AKRF) personnel and its subcontractors at the property located at 102 Bruckner Boulevard in the Port Morris 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 2277, Lot 50 (formerly Lots 78, 94, and 50).

Currently, the Site buildings are unoccupied, and the Site is secured by a chain link fence. The Site is developed with a pump island from the former gasoline station, a one-story slab-on-grade building formerly used as an auto repair shop and a convenience store, and a one-story slab-on-grade former warehouse/garage with a loft. The remainder of the Site is concrete- and asphalt-paved with some sparse vegetation. A Site Location Map is provided as Figure 1.

The Site was entered into the Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP) on July 23, 2023 (NYSDEC BCP Site No. C203168; BCA Index No. C203168-07-23). Two Subsurface (Phase II) Investigations and a Supplemental Subsurface (Phase II) Investigation were conducted by AKRF, as documented in the September 2021 Subsurface (Phase II) Investigation Report, October 2021 Subsurface (Phase II) Investigation Report, and December 2022 Supplemental Subsurface (Phase II) Investigation Report. Results of the investigations identified elevated levels of volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs) and metals in soil; VOCs in groundwater; and petroleum-related and chlorinated VOCs in soil vapor.

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. This HASP also includes supplemental requirements to minimize potential exposure related to COVID-19 (see Attachment D). 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 RI implementation include: historical fill material containing petroleum and/or solvent-related VOCs, SVOCs, polychlorinated biphenyls (PCBs), and/or metals.

2.1.4 Chemicals of Concern

Chemical	REL/PEL/STEL	Health Hazards
Arsenic	REL C: 0.002 mg/m^3 PEL: 0.010 mg/m^3	Ulceration of nasal septum, dermatitis, gastrointestinal disturbances, peripheral neuropathy, resp irritation, hyperpigmentation of skin, [potential occupational carcinogen].
Barium	REL: 0.5 mg/m^3 PEL: 0.5 mg/m^3	Vomiting, abdominal cramps, diarrhea, difficulties in breathing, increased or decreased blood pressure, numbness around the face, and muscle weakness.
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].
Ethylbenzene	REL = 100 ppm PEL = 100 ppm	Irritation eyes, skin, mucous membrane; headache; dermatitis; narcosis, coma.
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).
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.

Chemical	**REL/PEL/STEL**	**Health Hazards**
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.
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.
Particulates	PEL = 15 mg/m^3 (total) PEL = 5 mg/m^3 (respirable)	Irritation eyes, skin, throat, upper respiratory system.
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].
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.

Chemical	REL/PEL/STEL	Health Hazards
Notes: REL: Recommended exposure limit (NIOSH) PEL: Permissible exposure limit (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 below.

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 Code of Federal Regulations (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 RI, 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) and Monitoring

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.

2.6.1 Work Zone Air Monitoring

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.

Airborne Particulate Monitoring

A DustTrak® or equivalent would be used to measure real-time concentrations of total particulates 10 micrometers or less (PM_{10}). 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.

Work zone monitoring action levels and response actions are provided in the table below.

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

2.7 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:	Lincoln Medical Center Emergency Room
Phone Number:	(718) 579-5784
Address:	234 E 149th Street, Bronx, NY 10451
Directions:	1. Turn left out of the Site on Bruckner Boulevard (heading west toward Willis Avenue). 2. Turn right onto Lincoln Avenue. 3. Turn left onto East 135th Street. 4. Continue onto Park Avenue. The emergency room entrance is mid-block on the right after passing East 146th Street on the right.

3.2 Emergency Contacts

Company	Individual Name	Title	Contact Number
AKRF	Marc Godick	QA/QC Officer, QEP	(914) 922-2356
	Timothy McClintock	Project Manager	(914) 922-2374
	Stephen Schmid	Field Team Leader/Site Safety Officer (SSO)	(914) 400-9736
	Antonio Cardenas	Alternate Field Team Leader/SSO	(718) 551-7193
132 Willis Associates, LLC	Benny Caiola	Volunteer Representative	(212) 772-8830
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 this HASP must be kept by the SSO on-site during all work subject to this document.

4.2 Affidavit

I have read the Health and Safety Plan (HASP) for the project located at 102 Bruckner Boulevard, Bronx, NY. 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: ________
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Signed: ______________________ Company: ____________________ Date: ________

FIGURES

Service Layer Credits: USGS The National Map: 3d Elevation Program, Data Refreshed July, 2020

©2023 AKRF Q:\Projects\200328 - BETTINA - BRUCKNER PROPERTIES\Technical\GIS and Graphics\SAR\Phase II\200328 Fig 1 Site location.mxd11/15/2023 8:38:25 AM mveilleux

AKRF
440 Park Avenue South, New York, NY 10016

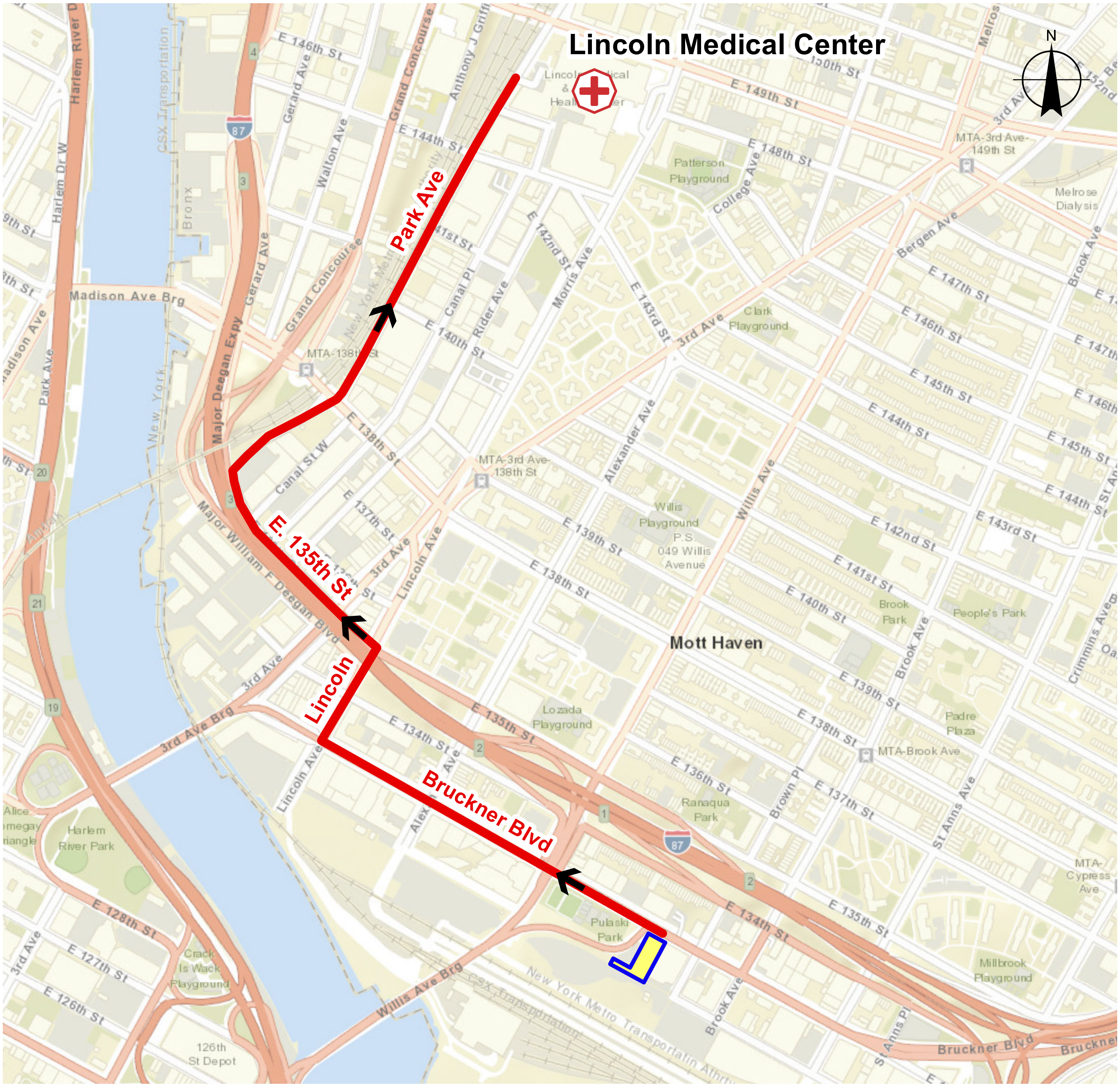
102 Bruckner Boulevard
Bronx, New York

SITE LOCATION MAP

DATE
11/15/2023

PROJECT NO.
200328

FIGURE
1



Service Layer Credits: ESRI World Street Map 2021

Lincoln Medical Center Emergency Room
234 E 149th Street
Bronx, NY 10451
(718) 579-5784

LEGEND

- ▨ PROJECT SITE BOUNDARY
- ✚ HOSPITAL LOCATION
- → ROUTE TO HOSPITAL

0 800 1,600
SCALE IN FEET

AKRF
440 Park Avenue South, New York, NY 10016

102 Bruckner Boulevard
Bronx, New York

HOSPITAL ROUTE MAP

DATE	**11/15/2023**
PROJECT NO.	**200328**
FIGURE	**2**

ATTACHMENT A

POTENTIAL HEALTH EFFECTS FROM ON-SITE CONTAMINANTS

ATSDR
AGENCY FOR TOXIC SUBSTANCES
AND DISEASE REGISTRY

ARSENIC
CAS # 7440-38-2

Division of Toxicology ToxFAQs™ December 2003

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

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

What is arsenic?

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

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

What happens to arsenic when it enters the environment?

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

How might I be exposed to arsenic?

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

How can arsenic affect my health?

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

Ingesting or breathing low levels of inorganic arsenic for a long time can cause a darkening of the skin and the appearance of small "corns" or "warts" on the palms, soles, and torso.

Skin contact with inorganic arsenic may cause redness and swelling.

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

How likely is arsenic to cause cancer?

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

How can arsenic affect children?

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

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

How can families reduce the risk of exposure to arsenic?

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

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

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

Has the federal government made recommendations to protect human health?

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

The Occupational Safety and Health Administration has set limits of 10 µg arsenic per cubic meter of workplace air (10 $\mu g/m^3$) for 8 hour shifts and 40 hour work weeks.

Source of Information

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

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

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ASBESTOS
CAS # 1332-21-4

Division of Toxicology ToxFAQs™ September 2001

This fact sheet answers the most frequently asked health questions (FAQs) about asbestos. 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, individual susceptibility and personal habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to asbestos usually occurs by breathing contaminated air in workplaces that make or use asbestos. Asbestos is also found in the air of buildings that are being torn down or renovated. Asbestos exposure can cause serious lung problems and cancer. This substance has been found at 83 of the 1,585 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is asbestos?

Asbestos is the name given to a group of six different fibrous minerals (amosite, chrysotile, crocidolite, and the fibrous varieties of tremolite, actinolite, and anthophyllite) that occur naturally in the environment. Asbestos minerals have separable long fibers that are strong and flexible enough to be spun and woven and are heat resistant. Because of these characteristics, asbestos has been used for a wide range of manufactured goods, mostly in building materials (roofing shingles, ceiling and floor tiles, paper products, and asbestos cement products), friction products (automobile clutch, brake, and transmission parts), heat-resistant fabrics, packaging, gaskets, and coatings. Some vermiculite or talc products products may contain asbestos.

What happens to asbestos when it enters the environment?

Asbestos fibers can enter the air or water from the breakdown of natural deposits and manufactured asbestos products. Asbestos fibers do not evaporate into air or dissolve in water. Small diameter fibers and particles may remain suspended in the air for a long time and be carried long distances by wind or water before settling down. Larger diameter fibers and particles tend to settle more quickly.

Asbestos fibers are not able to move through soil. Asbestos fibers are generally not broken down to other compounds and will remain virtually unchanged over long periods.

How might I be exposed to asbestos?

We are all exposed to low levels of asbestos in the air we breathe. These levels range from 0.00001 to 0.0001 fibers per milliliter of air and generally are highest in cities and industrial areas.

People working in industries that make or use asbestos products or who are involved in asbestos mining may be exposed to high levels of asbestos. People living near these industries may also be exposed to high levels of asbestos in air.

Asbestos fibers may be released into the air by the disturbance of asbestos-containing material during product use, demolition work, building or home maintenance, repair, and remodeling. In general, exposure may occur only when the asbestos-containing material is disturbed in some way to release particles and fibers into the air.

Drinking water may contain asbestos from natural sources or from asbestos-containing cement pipes.

How can asbestos affect my health?

Asbestos mainly affects the lungs and the membrane that surrounds the lungs. Breathing high levels of asbestos fibers for a long time may result in scar-like tissue in the lungs and in the pleural membrane (lining) that surrounds the lung. This disease is called asbestosis and is usually found in workers exposed to asbestos, but not in the general public. People with asbestosis have difficulty breathing, often a cough, and in severe cases heart enlargement. Asbestosis is a serious disease and can eventually lead to disability and death.

Breathing lower levels of asbestos may result in changes called plaques in the pleural membranes. Pleural plaques can occur in workers and sometimes in people living in areas with high environmental levels of asbestos. Effects on breathing from pleural plaques alone are not usually serious, but higher exposure can lead to a thickening of the pleural membrane that may restrict breathing.

How likely is asbestos to cause cancer?

The Department of Health and Human Services (DHHS), the World Health Organization (WHO), and the EPA have determined that asbestos is a human carcinogen.

It is known that breathing asbestos can increase the risk of cancer in people. There are two types of cancer caused by exposure to asbestos: lung cancer and mesothelioma. Mesothelioma is a cancer of the thin lining surrounding the lung (pleural membrane) or abdominal cavity (the peritoneum). Cancer from asbestos does not develop immediately, but shows up after a number of years. Studies of workers also suggest that breathing asbestos can increase chances of getting cancer in other parts of the body (stomach, intestines, esophagus, pancreas, and kidneys), but this is less certain. Early identification and treatment of any cancer can increase an individual's quality of life and survival.

Cigarette smoke and asbestos together significantly increase your chances of getting lung cancer. Therefore, if you have been exposed to asbestos you should stop smoking. This may be the most important action that you can take to improve your health and decrease your risk of cancer.

How can asbestos affect children?

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

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

How can families reduce the risk of exposure to asbestos?

Materials containing asbestos that are not disturbed or deteriorated do not, in general, pose a health risk and can be left alone. If you suspect that you may be exposed to asbestos in your home, contact your state or local health department or the regional offices of EPA to find out how to test your home and how to locate a company that is trained to remove or contain the fibers.

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

Low levels of asbestos fibers can be measured in urine, feces, mucus, or lung washings of the general public. Higher than average levels of asbestos fibers in tissue can confirm exposure but not determine whether you will experience any health effects.

A thorough history, physical exam, and diagnostic tests are needed to evaluate asbestos-related disease. Chest x-rays are the best screening tool to identify lung changes resulting from asbestos exposure. Lung function tests and CAT scans also assist in the diagnosis of asbestos-related disease.

Has the federal government made recommendations to protect human health?

In 1989, EPA banned all new uses of asbestos; uses established before this date are still allowed. EPA established regulations that require school systems to inspect for damaged asbestos and to eliminate or reduce the exposure by removing the asbestos or by covering it up. EPA regulates the release of asbestos from factories and during building demolition or renovation to prevent asbestos from getting into the environment.

EPA has proposed a concentration limit of 7 million fibers per liter of drinking water for long fibers (lengths greater than or equal to 5 µm). The Occupational Safety and Health Administration has set limits of 100,000 fibers with lengths greater than or equal to 5 µm per cubic meter of workplace air for 8-hour shifts and 40-hour work weeks.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2001. Toxicological Profile for Asbestos. Update. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

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

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BARIUM AND COMPOUNDS

CAS # 7440-39-3

Division of Toxicology and Environmental Medicine ToxFAQs™ August 2007

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

HIGHLIGHTS: Exposure to barium occurs mostly in the workplace or from drinking contaminated water. Ingesting drinking water containing levels of barium above the EPA drinking water guidelines for relatively short periods of time can cause gastrointestinal disturbances and muscle weakness. Ingesting high levels for a long time can damage the kidneys. Barium and barium compounds have been found in at least 798 of the 1,684 National Priority List sites identified by the Environmental Protection Agency (EPA).

What is barium?

Barium is a silvery-white metal which exists in nature only in ores containing mixtures of elements. It combines with other chemicals such as sulfur or carbon and oxygen to form barium compounds.

Barium compounds are used by the oil and gas industries to make drilling muds. Drilling muds make it easier to drill through rock by keeping the drill bit lubricated. They are also used to make paint, bricks, ceramics, glass, and rubber.

Barium sulfate is sometimes used by doctors to perform medical tests and to take x-rays of the gastrointestinal tract.

What happens to barium when it enters the environment?

❏ Barium gets into the air during the mining, refining, and production of barium compounds, and from the burning of coal and oil.
❏ The length of time that barium will last in air, land, water, or sediments depends on the form of barium released.
❏ Barium compounds, such as barium sulfate and barium carbonate, which do not dissolve well in water, can last a long time in the environment.
❏ Barium compounds, such as barium chloride, barium nitrate, or barium hydroxide, that dissolve easily in water usually do not last in these forms for a long time in the environment. The barium in these compounds that is dissolved in water quickly combines with sulfate or carbonate that are naturally found in water and become the longer lasting forms (barium sulfate and barium carbonate).
❏ Fish and aquatic organisms can accumulate barium.

How might I be exposed to barium?

❏ Ingesting small amounts present in your food and water or breathing air containing very low levels of barium.
❏ Living in areas with unusually high natural levels of barium in the drinking water.
❏ Working in a job that involves barium production or use.
❏ Living or working near waste sites where barium has been disposed of.

How can barium affect my health?

The health effects of the different barium compounds depend on how well the compound dissolves in water or in the stomach contents. Barium compounds that do not dissolve well, such as barium sulfate, are not generally harmful.

BARIUM AND COMPOUNDS

CAS # 7440-39-3

Barium has been found to potentially cause gastrointestinal disturbances and muscular weakness when people are exposed to it at levels above the EPA drinking water standards for relatively short periods of time. Some people who eat or drink amounts of barium above background levels found in food and water for a short period may experience vomiting, abdominal cramps, diarrhea, difficulties in breathing, increased or decreased blood pressure, numbness around the face, and muscle weakness. Eating or drinking very large amounts of barium compounds that easily dissolve can cause changes in heart rhythm or paralysis and possibly death. Animals that drank barium over long periods had damage to the kidneys, decreases in body weight, and some died.

How likely is barium to cause cancer?

The Department of Health and Human Services (DHHS) and the International Agency for Research on Cancer (IARC) have not classified barium as to its carcinogenicity. The EPA has determined that barium is not likely to be carcinogenic to humans following ingestion and that there is insufficient information to determine whether it will be carcinogenic to humans following inhalation exposure.

How can barium affect children?

We do not know whether children will be more or less sensitive than adults to barium toxicity. A study in rats that swallowed barium found a decrease in newborn body weight; we do not know if a similar effect would be seen in humans.

How can families reduce the risks of exposure to barium?

The greatest potential source of barium exposure is through food and drinking water. However, the amount of barium in foods and drinking water are typically too low to be of concern.

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

There is no routine medical test to determine whether you have been exposed to barium. Doctors can measure barium in body tissues and fluids, such as bones, blood, urine, and feces, using very complex instruments. These tests cannot be used to predict the extent of the exposure or potential health effects.

The geometric mean barium level measured in the U.S. general population aged 6 and older is reported by the Centers for Disease Control and Prevention (CDC) as 1.44 µg/g creatinine (measured in urine).

Has the federal government made recommendations to protect human health?

The EPA has set a limit of 2.0 milligrams of barium per liter of drinking water (2.0 mg/L), which is the same as 2 ppm.

The Occupational Safety and Health Administration (OSHA) has set Permissible Exposure Limits (PELs) of 0.5 milligrams of soluble barium compounds per cubic meter of workplace air (0.5 mg/m^3) for 8 hour shifts and 40 hour work weeks. The OSHA limits for barium sulfate dust are 15 mg/m^3 of total dust and 5 mg/m^3 for respirable fraction.

The National Institute for Occupational Safety and Health (NIOSH) has set Recommended Exposure Limits (RELs) of 0.5 mg/m^3 for soluble barium compounds. The NIOSH has set RELs of 10 mg/m^3 (total dust) for barium sulfate and 5 mg/m^3 (respirable fraction).

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2007. Toxicological Profile for Barium and Compounds (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.

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BENZENE
CAS # 71-43-2

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

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

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

What is benzene?
(Pronounced bĕn′zēn′)

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

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

What happens to benzene when it enters the environment?

- Industrial processes are the main source of benzene in the environment.
- Benzene can pass into the air from water and soil.
- It reacts with other chemicals in the air and breaks down within a few days.
- Benzene in the air can attach to rain or snow and be carried back down to the ground.
- It breaks down more slowly in water and soil, and can pass through the soil into underground water.
- Benzene does not build up in plants or animals.

How might I be exposed to benzene?

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

How can benzene affect my health?

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

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

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

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

How likely is benzene to cause cancer?

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

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

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

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

Has the federal government made recommendations to protect human health?

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

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

Glossary

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

Carcinogen: A substance with the ability to cause cancer.

CAS: Chemical Abstracts Service.

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

Metabolites: Breakdown products of chemicals.

Milligram (mg): One thousandth of a gram.

Pesticide: A substance that kills pests.

References

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

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

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ETHYLBENZENE

CAS # 100-41-4

Agency for Toxic Substances and Disease Registry ToxFAQs June 1999

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

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

What is ethylbenzene?

(Pronounced ĕth′ əl bĕn′ zēn′)

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

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

What happens to ethylbenzene when it enters the environment?

☐ Ethylbenzene moves easily into the air from water and soil.

☐ It takes about 3 days for ethylbenzene to be broken down in air into other chemicals.

☐ Ethylbenzene may be released to water from industrial discharges or leaking underground storage tanks.

☐ In surface water, ethylbenzene breaks down by reacting with other chemicals found naturally in water.

☐ In soil, it is broken down by soil bacteria.

How might I be exposed to ethylbenzene?

☐ Breathing air containing ethylbenzene, particularly in areas near factories or highways.

☐ Drinking contaminated tap water.

☐ Working in an industry where ethylbenzene is used or made.

☐ Using products containing it, such as gasoline, carpet glues, varnishes, and paints.

How can ethylbenzene affect my health?

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

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

How likely is ethylbenzene to cause cancer?

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

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

How can ethylbenzene affect children?

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

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

How can families reduce the risk of exposure to ethylbenzene?

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

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

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

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

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

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

Has the federal government made recommendations to protect human health?

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

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

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

References

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

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

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FUEL OILS

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

Agency for Toxic Substances and Disease Registry ToxFAQs September 1996

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

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

What are fuel oils?

(Pronounced fyo͞o′əl oilz)

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

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

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

What happens to fuel oils when they enter the environment?

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

How might I be exposed to fuel oils?

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

How can fuel oils affect my health?

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

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, Public Health Service
Agency for Toxic Substances and Disease Registry

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

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

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

How likely are fuel oils to cause cancer?

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

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

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

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

Has the federal government made recommendations to protect human health?

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

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

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

Glossary

Carcinogenic: Able to cause cancer.

CAS: Chemical Abstracts Service.

Evaporate: To change into a vapor or a gas.

Hydrocarbon: Any compound made up of hydrogen and carbon.

Milligram (mg): One thousandth of a gram.

ppm: Parts per million.

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

References

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

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

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LEAD

CAS # 7439-92-1

Division of Toxicology and Environmental Medicine ToxFAQs™ August 2007

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

(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 or 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 (μg/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 μg/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.

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MERCURY

CAS # 7439-97-6

Agency for Toxic Substances and Disease Registry ToxFAQs April 1999

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 mū̃r′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, 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.

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POLYCYCLIC AROMATIC HYDROCARBONS (PAHs)

Agency for Toxic Substances and Disease Registry ToxFAQs September 1996

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

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

What are polycyclic aromatic hydrocarbons?

(Pronounced pŏl′ĭ-sī′klĭk ăr′ə-măt′ĭk hī′drə-kar′bənz)

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

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

What happens to PAHs when they enter the environment?

- ☐ PAHs enter the air mostly as releases from volcanoes, forest fires, burning coal, and automobile exhaust.
- ☐ PAHs can occur in air attached to dust particles.
- ☐ Some PAH particles can readily evaporate into the air from soil or surface waters.
- ☐ PAHs can break down by reacting with sunlight and other chemicals in the air, over a period of days to weeks.
- ☐ PAHs enter water through discharges from industrial and wastewater treatment plants.
- ☐ Most PAHs do not dissolve easily in water. They stick to solid particles and settle to the bottoms of lakes or rivers.
- ☐ Microorganisms can break down PAHs in soil or water after a period of weeks to months.
- ☐ In soils, PAHs are most likely to stick tightly to particles; certain PAHs move through soil to contaminate underground water.
- ☐ PAH contents of plants and animals may be much higher than PAH contents of soil or water in which they live.

How might I be exposed to PAHs?

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

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

How can PAHs affect my health?

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

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

How likely are PAHs to cause cancer?

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

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

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

In the body, PAHs are changed into chemicals that can attach to substances within the body. There are special tests that can detect PAHs attached to these substances in body tissues or blood. However, these tests cannot tell whether any health effects will occur or find out the extent or source of your exposure to the PAHs. The tests aren't usually available in your doctor's office because special equipment is needed to conduct them.

Has the federal government made recommendations to protect human health?

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

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

Glossary

Carcinogen: A substance that can cause cancer.

Ingest: Take food or drink into your body.

References

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

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

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POLYCHLORINATED BIPHENYLS

Division of Toxicology ToxFAQs™ February 2001

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

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

What are polychlorinated biphenyls?

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

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

What happens to PCBs when they enter the environment?

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

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

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

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

How might I be exposed to PCBs?

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

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

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

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

How can PCBs affect my health?

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

Animals that ate food containing large amounts of PCBs for short periods of time had mild liver damage and some died. Animals that ate smaller amounts of PCBs in food over several weeks or months developed various kinds of health effects, including anemia; acne-like skin conditions; and liver, stomach, and thyroid gland injuries. Other effects of PCBs in animals include changes in the immune system, behavioral alterations, and impaired reproduction. PCBs are not known to cause birth defects.

How likely are PCBs to cause cancer?

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

How can PCBs affect children?

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

How can families reduce the risk of exposure to PCBs?

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

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

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

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

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

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

Has the federal government made recommendations to protect human health?

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

References

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

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

ATSDR
AGENCY FOR TOXIC SUBSTANCES
AND DISEASE REGISTRY

TRICHLOROETHYLENE
CAS # 79-01-6

Division of Toxicology ToxFAQs™ **July 2003**

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

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

What is trichloroethylene?

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

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

What happens to trichloroethylene when it enters the environment?

❑ Trichloroethylene dissolves a little in water, but it can remain in ground water for a long time.

❑ Trichloroethylene quickly evaporates from surface water, so it is commonly found as a vapor in the air.

❑ Trichloroethylene evaporates less easily from the soil than from surface water. It may stick to particles and remain for a long time.

❑ Trichloroethylene may stick to particles in water, which will cause it to eventually settle to the bottom sediment.

❑ Trichloroethylene does not build up significantly in plants and animals.

How might I be exposed to trichloroethylene?

❑ Breathing air in and around the home which has been contaminated with trichloroethylene vapors from shower water or household products such as spot removers and typewriter correction fluid.

❑ Drinking, swimming, or showering in water that has been contaminated with trichloroethylene.

❑ Contact with soil contaminated with trichloroethylene, such as near a hazardous waste site.

❑ Contact with the skin or breathing contaminated air while manufacturing trichloroethylene or using it at work to wash paint or grease from skin or equipment.

How can trichloroethylene affect my health?

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

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

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

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

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

How likely is trichloroethylene to cause cancer?

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

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

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

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

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

Has the federal government made recommendations to protect human health?

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

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

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

Glossary

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

References

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

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

ATSDR
AGENCY FOR TOXIC SUBSTANCES
AND DISEASE REGISTRY

TETRACHLOROETHYLENE
CAS # 127-18-4

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

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 tĕt′rə-klôr′ ō-ĕth′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 tetrachloroethylene 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 performed 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.

ATSDR
AGENCY FOR TOXIC SUBSTANCES
AND DISEASE REGISTRY

TOLUENE
CAS # 108-88-3

Division of Toxicology ToxFAQs™ **February 2001**

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

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

What is toluene?

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

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

What happens to toluene when it enters the environment?

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

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

❑ Toluene does not usually stay in the environment long.

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

How might I be exposed to toluene?

❑ Breathing contaminated workplace air or automobile exhaust.

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

❑ Drinking contaminated well-water.

❑ Living near uncontrolled hazardous waste sites containing toluene products.

How can toluene affect my health?

Toluene may affect the nervous system. Low to moderate levles can cause tiredness, confusion, weakness, drunken-type actions, memory loss, nausea, loss of appetite, and hearing and color vision loss. These symptoms usually disappear when exposure is stopped.

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

High levels of toluene may affect your kidneys.

How likely is toluene to cause cancer?

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

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

How can toluene affect children?

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

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

How can families reduce the risk of exposure to toluene?

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

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

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

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

Has the federal government made recommendations to protect human health?

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

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

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

References

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

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

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
__ Property Damage
__ On-site Equipment
__ Mechanical
___ Illness
___ Fire
___ Motor Vehicle
___ Spill
___ Near Miss
___ Chemical Exposure
___ Electrical
___ 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

__ Bites

__ Blisters

__ Bruises

__ Chemical Burns

__ Cold Exposure

__ Concussion

__ Lacerations

_____ Dislocations

_____ Faint/Dizziness

_____ Fractures

_____ Frostbite

_____ Heat Burns

_____ Heat Exhaustion

_____ Heat Stroke

____ Punctures

____ Radiation Burns

____ Respiratory Allergy

____ Sprains

____ Toxic Resp. Exposure

____ Toxic Ingestion

____ Dermal Allergy

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 ensure 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**

ATTACHMENT D

SPECIAL REQUIREMENTS FOR COVID-19

ATTACHMENT E

ON-SITE AND OFF-SITE PROCEDURES TO LIMIT CONTAMINATION AND POTENTIAL SPREAD OF COVID-19

Sources: **CDC - COVID-19 Spread and Prevention Information; OSHA - Workplace Preparation Guidance; CDC - Guidance on Extended Use/Limited Reuse of Respiratory Protection**

1) Maintain minimum 6-foot separation from others whenever possible (social distancing). The virus is thought to spread mainly from person-to-person, between people who are in close contact, through respiratory droplets produced when an infected person coughs or sneezes.

2) Wash your hands frequently with soap and water. Wash for at least 20 seconds and, if no soap is present, use a hand sanitizer that contains at least 60% alcohol.

3) Wear nitrile gloves whenever possible and be especially mindful of touching common surfaces.

4) Disinfect commonly touched surfaces frequently, and items frequently used in public immediately upon returning home.

5) Face Coverings and Masks:

    a) On-site: Wear a cloth face covering or mask at all times when there is no issue with maintaining social distancing. N95/KN95 masks or respirators should be reserved for situations where social distancing on-site is difficult or impossible. Appropriate circumstances for donning an N95/KN95 mask or respirator on-site include, but are not necessarily limited to, going inside the Site trailer; and/or entering, exiting, or traversing the Site if proper social distancing cannot be achieved. This tiered approach will help maintain the supply of N95/KN95 masks so they are available for the highest risk scenarios.

    b) Off-site During Work-related Commute: The CDC now recommends wearing cloth face coverings in public settings where other social distancing measures are difficult to maintain (https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/cloth-face-cover.html). A mask or cloth face covering should worn during your commute to and from the site if you are unable to achieve proper social distancing. Appropriate times to wear a mask or cloth face covering include, but are not necessarily limited to, walking on crowded sidewalks, traveling in a shared vehicle, and/or if you are required to enter an occupied indoor space to acquire supplies for the site.

6) Wear safety glasses or goggles at all times while on-site and some form of eye covering (e.g., sunglasses, prescription and non-prescription glasses, or safety glasses) should be considered when commuting.

7) Avoid touching your face (eyes, nose, and mouth).

8) Cover your nose and mouth when coughing, sneezing, etc./ cough into elbow.

9) Do not spit.

10) Try to take your temperature regularly.

11) Talk to your supervisor if you, your friends or family members that you live with or spend time with have displayed symptoms of COVID-19, tested positive, or are afflicted with even the common cold/flu.

12) Talk to your supervisor if anyone you know at the site tested positive for the COVID-19.

13) Follow any additional health & safety protocols required at the site or elsewhere.

APPENDIX C

COMMUNITY AIR MONITORING PLAN

102 BRUCKNER BOULEVARD

BRONX, NEW YORK

Community Air Monitoring Plan

NYSDEC BCP Site Number: C203168
AKRF Project Number: 200328

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:

132 Willis Associates, LLC
c/o Bettina Equities Management LLC
230 East 85th Street
New York, NY 10028

Prepared by:

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

NOVEMBER 2023

TABLE OF CONTENTS

ATTACHMENTS

Attachment A – Special Requirements CAMP

1.0 INTRODUCTION

This Community Air Monitoring Plan (CAMP) has been developed for the implementation of a Remedial Investigation (RI) by AKRF, Inc. (AKRF) personnel and its subcontractors at the property located at 102 Bruckner Boulevard in the Port Morris 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 2277, Lot 50 (formerly Lots 78, 94, and 50).

Currently, the Site buildings are unoccupied, and the Site is secured by a chain link fence. The Site is developed with a pump island from the former gasoline station, a one-story slab-on-grade building formerly used as an auto repair shop and a convenience store, and a one-story slab-on-grade former warehouse/garage with a loft. The remainder of the Site is concrete- and asphalt-paved with some sparse vegetation. The area surrounding the Site is primarily commercial, with some residential uses, parkland, and vacant land.

Two Subsurface (Phase II) Investigations and a Supplemental Subsurface (Phase II) Investigation were conducted by AKRF, as documented in the September 2021 Subsurface (Phase II) Investigation Report, October 2021 Subsurface (Phase II) Investigation Report, and December 2022 Supplemental Subsurface (Phase II) Investigation Report. Results of the investigations identified elevated levels of volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs) and metals in soil; VOCs in groundwater; and petroleum-related and chlorinated VOCs in soil vapor.

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 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).

2.1.1 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 mg/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 mg/m^3 above the background, work must be stopped until dust suppression measures bring particulate levels to below 0.15 mg/m^3 above background.

2.2 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.

2.3 Special Requirements CAMP

As the Site is located within 20 feet of potentially occupied structures, a Special Requirements CAMP will be implemented. The fixed CAMP stations will be located near potentially exposed individuals. Commercial-use buildings are located west-adjacent to the Site.

The additional CAMP provisions included in the Special Requirements CAMP are as follows:

- Use of engineering controls such as vapor/dust barriers or special ventilation devices will be considered; and
- Special consideration will be given to implementing planned activities when potentially exposed populations are at a minimum.

The following Site-Specific CAMP provisions will be implemented at the Site, as necessary:

- If total VOC concentrations near the outside walls or next to intake vents of the east-adjacent occupied structures exceed 1 ppm, air monitoring should occur within the occupied structures; and
- If total particulate concentrations near the outside walls or next to intake vents of the west-adjacent occupied structures exceed 0.15 mg/m^3, work activities should be suspended until controls are implemented.

Additional information regarding the Special Requirements CAMP is provided in Attachment A.

2.4 Reporting

CAMP summary reports will be prepared and submitted to NYSDEC and NYSDOH for review as part of the daily 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.

ATTACHMENT A

SPECIAL REQUIREMENTS CAMP

Special Requirements for Work Within 20 Feet of Potentially Exposed Individuals or Structures

When work areas are within 20 feet of potentially exposed populations or occupied structures, the continuous monitoring locations for VOCs and particulates must reflect the nearest potentially exposed individuals and the location of ventilation system intakes for nearby structures. The use of engineering controls such as vapor/dust barriers, temporary negative-pressure enclosures, or special ventilation devices should be considered to prevent exposures related to the work activities and to control dust and odors. Consideration should be given to implementing the planned activities when potentially exposed populations are at a minimum, such as during weekends or evening hours in non-residential settings.

- If total VOC concentrations opposite the walls of occupied structures or next to intake vents exceed 1 ppm, monitoring should occur within the occupied structure(s). Background readings in the occupied spaces must be taken prior to commencement of the planned work. Any unusual background readings should be discussed with NYSDOH prior to commencement of the work.

- If total particulate concentrations opposite the walls of occupied structures or next to intake vents exceed 150 mcg/m^3, work activities should be suspended until controls are implemented and are successful in reducing the total particulate concentration to 150 mcg/m^3 or less at the monitoring point.

- Depending upon the nature of contamination and remedial activities, other parameters (e.g., explosivity, oxygen, hydrogen sulfide, carbon monoxide) may also need to be monitored. Response levels and actions should be pre-determined, as necessary, for each site.

Special Requirements for Indoor Work With Co-Located Residences or Facilities

Unless a self-contained, negative-pressure enclosure with proper emission controls will encompass the work area, all individuals not directly involved with the planned work must be absent from the room in which the work will occur. Monitoring requirements shall be as stated above under “Special Requirements for Work Within 20 Feet of Potentially Exposed Individuals or Structures” except that in this instance “nearby/occupied structures” would be adjacent occupied rooms. Additionally, the location of all exhaust vents in the room and their discharge points, as well as potential vapor pathways (openings, conduits, etc.) relative to adjoining rooms, should be understood and the monitoring locations established accordingly. In these situations, it is strongly recommended that exhaust fans or other engineering controls be used to create negative air pressure within the work area during remedial activities. Additionally, it is strongly recommended that the planned work be implemented during hours (e.g. weekends or evenings) when building occupancy is at a minimum.