

# JAMAICA WORKS

95-25 149<sup>TH</sup> STREET  
QUEENS, NEW YORK

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## INTERIM REMEDIAL MEASURE WORK PLAN

NYSDEC BCP Site Number: C241252  
AKRF Project Number: 200278



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**Prepared On Behalf Of:**

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### LIST OF ACRONYMS

Acronym	Definition
AGV	Air Guidance Value
ASTM	American Society for Testing and Materials
AWQSGVs	Ambient Water Quality Standards and Guidance Values
BCP	Brownfield Cleanup Program
CAMP	Community Air Monitoring Plan
CSCOs	Commercial Soil Cleanup Objectives
CVOCs	Chlorinated Volatile Organic Compounds
DER-10	Division of Environmental Remediation Technical Guide 10
DOT	Department of Transportation
EPA	United States Environmental Protection Agency
ESA	Environmental Site Assessment
GAC	Granular Activated Carbon
GPR	Ground Penetrating Radar
HASP	Health and Safety Plan
HVAC	Heating, Ventilation, and Air-conditioning
IA	Indoor Air
IDW	Investigation Derived Waste
IRM	Interim Remedial Measures
IRM/R	Interim Remedial Measure Report
IRMWP	Interim Remedial Measure Work Plan
MEK	Methyl ethyl ketone
mg/kg	milligrams per kilogram
NY	New York
NYCRR	New York Codes, Rules and Regulations
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
OM&M	Operation, Maintenance, and Monitoring
PCBs	Polychlorinated Biphenyls
PCE	Tetrachloroethylene
PGWSCOs	Protection of Groundwater Soil Cleanup Objectives
PID	Photoionization detector
PVC	Polyvinyl Chloride
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
QHHEA	Qualitative Human Health Exposure Assessment
RAWP	Remedial Action Work Plan
RCRA	Resource Conservation and Recovery Act
REC	Recognized Environmental Condition
RIR	Remedial Investigation Report
ROI	Radius of Influence
RRSCOs	Restricted Residential Soil Cleanup Objectives
SB	Soil Boring
SF	Square foot
SSD	Sub-slab Depressurization

<b>Acronym</b>	<b>Definition</b>
SSDS	Sub-Slab Depressurization System
SV	Soil Vapor
SVE	Soil Vapor Extraction
SVOCs	Semivolatile Organic Compounds
SVOCs-BNs	Semivolatile Organic Compounds-Base Neutral Fraction
TAL	Target Analyte List
TCA	Trichloroethane
TCE	Trichloroethylene
ULURP	Uniform Land Use Review Procedure
USGS	United States Geological Survey
UUSCOs	Unrestricted Use Soil Cleanup Objectives
VCP	Voluntary Cleanup Program
VOCs	Volatile Organic Compound
VSQG	Very small quantity generator
µg/L	micrograms per liter
µg/m <sup>3</sup>	micrograms per cubic meter

## **1.0 INTRODUCTION**

This Interim Remedial Measure (IRM) Work Plan (IRMWP) has been prepared by AKRF, Inc. (AKRF) on behalf of Radix 95-25 149<sup>th</sup> St LLC, 95-08 150<sup>th</sup> St LLC, and 95-12 150<sup>th</sup> St 11435 LLC (collectively referred to as the “Applicant”) for the Jamaica Works site, located in Queens, New York, hereafter referred to as the “Site.” The Site consists of an approximately 50,797-square foot (SF) parcel located at 95-25 149<sup>th</sup> Street, 95-08 150<sup>th</sup> Street, and 95-12 150<sup>th</sup> Street in the Jamaica section of Queens, New York, and is identified by the City of New York as Borough of Queens Block 10002, Lots 1, 10, and 13. Redevelopment plans for the project are in the preliminary stage; however, the lots will be merged into one lot as part of the redevelopment. The Applicant applied for acceptance into the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP) as a Volunteer, and anticipates implementing this IRMWP upon acceptance into the BCP. A Site Location Map is provided as Figure 1. The proposed BCP Site boundaries are shown on the Site Plan, Figure 2.

A Remedial Investigation Report (RIR) has not been prepared for the Site; however, a Phase II Environmental Site Assessment (ESA) was conducted by AKRF between August 26 and October 26, 2020. Based on an evaluation of the data and information from the November 2020 Phase II ESA report, there is solvent-related volatile organic compound (VOC) contamination present in soil vapor at the Site that warrants mitigation. Previous on-site investigations, summarized in Section 3.0, are sufficient to delineate the nature and extent of the soil vapor contamination at the Site for the proposed IRM. A full Remedial Investigation (RI) will be scoped and performed after the Applicant is accepted into the BCP as a Volunteer.

This IRMWP has been prepared to address the potential for soil vapor intrusion into the on-site structures until a Site-wide remedy can be developed and implemented pursuant to a NYSDEC-approved Remedial Action Work Plan (RAWP), which is anticipated in 2023 or 2024, to coincide with finalizing development plans and completion of the rezoning of the Site. The IRM includes a preliminary design to retrofit the Site buildings with a sub-slab depressurization system (SSDS), sub-slab communication testing to determine design criteria for a final SSDS design, and final design and installation of an SSDS. The purpose of the SSDS is to create negative pressure (vacuum) beneath the Site buildings to mitigate the potential for soil vapor intrusion into the existing Site buildings.

The Health and Safety Plan (HASP) and Community Air Monitoring Plan (CAMP), provided as Appendix A, will be implemented during activities outlined in this IRMWP. The quality assurance/quality control (QA/QC) protocol detailed in the Quality Assurance Project Plan (QAPP), provided as Appendix B, will be adhered to for the fieldwork and sampling described in the following sections.

## 2.0 SITE DESCRIPTION AND HISTORY

### 2.1 Site Description and Surrounding Land Use

The Site is generally flat with local topography sloping gently downward to the east-southeast. Currently, the approximately 50,797-SF Site contains 11 one- to two-story structures on three tax parcels. A Site Plan is provided as Figure 2. The three tax parcels will be combined into one tax lot under an application for a tax lot merger. Lot 1 (95-25 149<sup>th</sup> Street) is 40,077-SF and contains nine structures built in approximately 1929, some of which are interconnected. Several partial basements and crawl spaces are located throughout the buildings. The majority of Lot 1 is vacant and utilized by the current Site owner for office space, storage of construction materials, and warehousing. The southernmost portion is occasionally utilized for professional films and television sets. There is a 7,500-gallon aboveground oil storage tank located indoors on the southern portion of Lot 1 that remains in-service; however, it has not been utilized since 2019. Lot 10 (95-08 150<sup>th</sup> Street) is 3,920 SF and contains a one-story brick building built in approximately 1950 with a garage, shop, and office utilized by a contractor. The uses of the three lots overlapped through the years and included operations that typically utilized solvents. According to information obtained during an interview with the current Site Owner, tetrachloroethylene (PCE) was formerly utilized during metal plating and finishing operations on Lot 10. Lot 13 (95-12 150<sup>th</sup> Street) is 6,800-SF and contains a vacant two-story building built in approximately 1910 that shared common operations with Lots 1 and 10. Based on the results of the Phase II Environmental Site Assessment, it is likely that PCE was also used for operations on Lot 13. Based on the historic uses of Lot 1, which included a metal plating shop, it is likely that PCE was also handled on Lot 1. See the detailed description of uses and operations of the Site as set forth in Section 2.3 below.

The Site is located in an industrial/commercial-zoned area of Jamaica, Queens, New York. The surrounding land use consists of predominantly commercial and/or industrial buildings on all four sides with some residential apartments, including the following:

- North – commercial/industrial buildings, warehouses, and residential apartment buildings along 95<sup>th</sup> Avenue;
- South – industrial/ commercial buildings and residential properties along 97<sup>th</sup> Avenue;
- East – Mohan’s Precast USA, Inc., Taste of Heaven Ministries, and industrial buildings and warehouses; and
- West – industrial/ commercial buildings along 149<sup>th</sup> Street.

### 2.2 Site Geology, Hydrogeology, and Subsurface Characteristics

Based on the U.S. Geological Survey (Jamaica Quadrangle), the Site lies at an elevation between 35 and 40 feet above mean sea level. Surface topography at the Site is generally level with a gentle slope towards the south-southeast. According to the USGS map titled *Water Table Altitude in Kings and Queens Counties, New York*, the general direction of groundwater flow below the Site is anticipated to be in a south to southwesterly direction. Groundwater was measured within the temporary monitoring wells between 16 and 20 feet below grade during AKRF’s November 2020 Phase II ESA. Groundwater in this part of Queens is not used as a potable source and there are no surface water bodies on or immediately adjacent to the Site. The nearest body of water is Jamaica Bay located approximately 4 miles south of the Site.

The stratigraphy beneath the Site consists of historic fill material (comprising sand, gravel, and silt, with varying amounts of brick) in the upper 3 feet below surface grade, underlain by sand and silt with fine gravel, down to the maximum boring terminus of 25 feet below grade. Bedrock was not encountered during the Phase II ESA.

### **2.3 Site History and Previous Owners**

Historic records indicate that the Site was utilized for industrial purposes since approximately 1897, including metal plating, finishing and manufacturing, machine shops, tanneries, painting rooms, a tarring house, a cap and fuse factory, and battery service. Available records indicated that Lot 1 was occupied by Jas. Macbeth Cap and Fuse Factory (manufacturer of patent blasting machinery) and private residences between approximately 1891 and 1901. The fuse factory included various uses such as a tarring house and coal and tinning houses. Lot 1 was later occupied by General Acoustic Company in 1911 and Dictagraph Products Corporation between approximately 1925 and 1951. Abbot Wire Products was identified on Lot 1 between 1963 and 2006. Other uses on Lot 1 included a metal plating shop and refuse burning.

Lots 10 and 13 were also occupied by Jas. Macbeth Cap and Fuse Factory from 1891 through 1901, and General Acoustic Company in 1911. By 1925, Lot 10 was utilized as a battery service facility and tin shop and Lot 13 was occupied by a garage and oil burner manufacturer. In 1951, Lots 10 and 13 were occupied by a paper box manufacturer until approximately 1963 when a sink top manufacturer was identified on both lots through approximately 2006. According to the 2019 Phase I ESA, the Site buildings have also been used for metal plating operations since the late 1950s. PCE was reportedly used for vaporizing operations related to metals, predominantly on Lot 10.

Past owners of Lot 1 include: 194<sup>th</sup> Street Operating Corp. prior to 1974 and Abbott Wire Products Inc. from 1974 to present. Lot 1 was listed as a Resource Conservation Recovery Act (RCRA) Very Small Quantity Generator (VSQG) of halogenated solvents (EPA ID NYD002031870). Past owners of Lots 10 and 13 include: Relnor Realty Corp. prior to 1976 and Abbott Wire Products Inc./Abbott Industries Inc. from 1976 to present.

### **2.4 Proposed Development**

The Applicant has applied to enter into the BCP as a Volunteer. Entry into the BCP would facilitate the remediation and redevelopment of the Site into a mixed-use commercial, industrial, and residential redevelopment referred to as Jamaica Works. The Applicant is under contract to acquire the Site, after which it intends to demolish three small structures on the southern end of Lot 1 to create additional on-site parking, and to install the SSDS beneath the remainder of the Site buildings to allow for safe occupancy, while redevelopment plans and regulatory approvals for the entire Site are advanced under the Uniform Land Use Review Procedure (ULURP). The three buildings on the southern portion of Lot 1 will remain unoccupied until they are demolished, and therefore, are not the subject of this IRMWP. The proposed redevelopment plans will include demolition of the remaining existing structures. The proposed future uses of the Site include affordable housing, industrial, retail, and office space. To support the proposed redevelopment, the Site is anticipated to be rezoned from M1-4 (manufacturing). Figure 3 shows the Site plan and the proposed parking area.

### **2.5 Proposed Project Schedule**

Based on the proposed project schedule detailed in Section 7.0, an IRM is required to address the potential for soil vapor intrusion into the on-site structures. Subject to the Applicant entering the BCP in May 2021, the conceptual SSDS design, described in this IRMWP, will be undergo an engineering evaluation in June 2021, the design will be finalized in June 2021, and the system will be subsequently installed and operational as soon thereafter as is practicable. The SSDS will run 24 hours a day, 7 days a week, 365 days a year until a NYSDEC-approved RAWP can be implemented, which is currently expected in 2023.

### 3.0 PREVIOUS ENVIRONMENTAL REPORTS

Phase I Environmental Site Assessment, 95-04 & 95-25 149<sup>th</sup> Street, 95-08 & 95-12 150<sup>th</sup> Street, Queens, Queens County, New York, Partridge Venture Engineering, P.C. & Lawrence ENV, LLC, November 2019

Partridge Venture Engineering P.C. (PVE) doing business as Lawrence ENV, LLC (LENV) prepared a Phase I ESA in November 2019. The Phase I ESA was conducted in conformance with the scope and limitations of American Society for Testing & Materials (ASTM) Practice E1527-13, and included a visual inspection of the Site and a review of regulatory database records and historical records. It should be noted that this Phase I ESA was prepared for a larger property, which included the Site. The assessment identified the following Recognized Environmental Conditions (RECs) in connection with the Site:

- All three tax lots within the Site contain an E-Designation for hazardous materials.
- Historically, the Site was utilized for industrial purposes since approximately 1897, including metal plating, finishing and manufacturing, machine shops, tanneries, painting rooms, a tarring house, a cap and fuse factory, and battery service. The Site's historical uses and anticipated waste generated constituted a REC.
- Nearby current and historic off-site uses with the potential to affect soil vapor beneath the Site included, a vehicle dismantling facility, a dry cleaner, auto repair shops, gasoline stations, garages with fuel oil tanks, an air conditioning manufacturer, a wire products manufacturer, and an auto painting and spraying facility. The regulatory database also identified five nearby sites in the Voluntary Cleanup Program (VCP).

Phase II Environmental Site Assessment, Abbott 149<sup>th</sup> and 150<sup>th</sup> Street Site, 95-25 149<sup>th</sup> St. and 95-08 & 95-12 150<sup>th</sup> St., Queens, New York, AKRF, November 2020

AKRF was retained by Radix 95-25 149<sup>th</sup> St. LLC to conduct a Phase II ESA between August and October 2020. The scope of work was based on the findings of the November 2019 Phase I ESA prepared by PVE and LENV. The Phase II ESA included a geophysical survey; the advancement of 10 soil borings across the Site and collection of up to two soil samples from each boring; installation of five temporary groundwater monitoring wells and collection of five groundwater samples; installation of seven temporary soil vapor points with collection of seven soil vapor samples; and collection of seven indoor air samples from the interior of buildings and one ambient (exterior courtyard) air sample.

Twelve soil samples were collected from the Site for laboratory analysis. A shallow sample (collected from a 2-foot interval within the upper 5 feet below grade) was taken from each of the 10 soil borings. A second deeper sample (from the 2-foot interval directly above the water table at the groundwater interface) was collected from borings SB-10 and SB-18. Soil samples were analyzed for volatile organic compounds (VOCs) by EPA Method 8260, semivolatile organic compounds-base neutral fraction (SVOCs-BN) by EPA Method 8270, polychlorinated biphenyls (PCBs) by EPA Method 8082, and the Target Analyte List (TAL) of metals by EPA Method 6000/7000 series. Five 1-inch diameter temporary groundwater monitoring wells were installed within five borings across the Site. The groundwater samples were analyzed for VOCs and SVOCs-BNs by EPA Methods 8260 and 8270, respectively.

Between August 26 and 27, 2020, five temporary soil vapor points (SV-09, SV-10, SV-13, SV-16, and SV-18) were installed to enable the collection of soil vapor samples for laboratory analysis. All soil vapor points were installed between 4 and 5 feet below grade with the exception of SV-16, which was installed approximately 1 to 2 feet beneath the basement slab of the northwestern building on Lot 1. Due to elevated levels of chlorinated volatile organic compounds (CVOCs) detected in the soil sample from SB-18 as well as several of the soil vapor samples, supplemental soil vapor and indoor air sampling was conducted on October 23 and 26, 2020. The supplemental sampling included the collection of additional two sub-slab soil vapor samples, seven indoor air samples, and one ambient (exterior courtyard) air sample. The soil vapor, indoor, and ambient air samples were analyzed for VOCs by EPA Method TO-15.

### *Soil Quality Conditions*

Historic fill material (comprising sand, gravel, and silt, with varying amounts of brick) was encountered in the upper 5 feet below grade, underlain by sand and silt with fine gravel, down to the maximum boring terminus of 25 feet below grade. Bedrock was not encountered during the investigation. No petroleum-like odors, staining, or elevated photoionization detector (PID) readings were detected.

In the Phase II ESA, AKRF compared the soil sample analytical results to the NYSDEC 6 NYCRR Part 375 Unrestricted Use Soil Cleanup Objectives (UUSCOs), Restricted Residential Soil Cleanup Objectives (RRSCOs), Commercial Soil Cleanup Objectives (CSCOs), and Protection of Groundwater Soil Cleanup Objectives (PGWSCOs). However, for the purposes of this BCP Application and the proposed end-use of the Site, soil samples are compared (as described below) to the UUSCOs and Restricted Residential Soil Cleanup Objectives (RRSCOs). Soil laboratory analytical results are summarized below:

- PCE was detected in sample SB-18\_3-5\_20200827 at a concentration of 14 milligrams per kilogram (mg/kg), above the UUSCO of 1.3 mg/kg, but below the RRSCO of 19 mg/kg. No other VOCs were detected above the UUSCOs and/or RRSCOs. PCE was detected in six other soil samples at concentrations below the UUSCOs. The significance of the soil data is that it indicates the Site as a source of the PCE impacts to be further assessed as a component of the Remedial Investigation Work Plan.
- SVOCs were detected at low levels up to 1.3 mg/kg, below the UUSCOs and RRSCOs.
- PCBs were not detected at concentrations above the laboratory reporting limits.
- Copper, lead, mercury, and zinc were detected at concentration above their respective UUSCOs. Copper was detected in one sample (SB-14\_2-4\_20200828) at a concentration of 1,200 mg/kg, above the UUSCO of 50 mg/kg and the RRSCO of 270 mg/kg. Mercury was detected in samples SB-10\_17-19\_20200827 and SB-11\_3-5\_20200828 at concentrations of 1.7 mg/kg and 2.5 mg/kg, respectively, above the UUSCO of 0.18 mg/kg and the RRSCO of 0.81 mg/kg. No other metals were detected at concentrations above the RRSCOs.

### *Groundwater Quality Conditions*

Groundwater was encountered between 16 and 20 feet below grade. No visual or olfactory evidence of contamination was detected in the purge water from any monitoring well. Groundwater samples were compared to the NYSDEC 6 NYCRR Part 703.5 Class GA Groundwater Quality Standards and Guidance Values (AWQSGVs)

- No VOCs were detected at concentrations above the AWQSGVs. PCE was detected in all five samples at concentrations ranging from 1.3 to 4.6 micrograms per liter ( $\mu\text{g/L}$ ), below the AWQSGV of 5  $\mu\text{g/L}$ .
- SVOCs were not detected above laboratory reporting limits in any of the groundwater samples.

### *Soil Vapor and Indoor Air Quality Conditions*

Petroleum-related VOCs, including 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, 2,2,4-trimethylpentane, 2-butanone, 2-hexanone, 4-ethyltoluene, benzene, butane, cyclohexane, ethylbenzene, isopropylbenzene, m,p-xylenes, methyl ethyl ketone (MEK), n-butylbenzene, n-heptane, n-hexane, n-propylbenzene, o-xylene, and toluene, were detected at concentrations up to 1,600 micrograms per cubic meter ( $\mu\text{g/m}^3$ ).

Chlorinated solvent-related VOCs, including PCE, trichloroethylene (TCE), 1,1,1-trichloroethane (1,1,1-TCA), carbon disulfide, carbon tetrachloride, chlorodifluoromethane, chloromethane, cis-1,2-dichloroethylene, methylene chloride, and trichlorofluoromethane, were detected at concentrations up to 54,300  $\mu\text{g/m}^3$ .

A comparison of the co-located soil vapor and indoor air sample results to the values in the New York State Department of Health (NYSDOH) Soil Vapor/Indoor Air Matrix B indicates that mitigation is warranted for PCE at all locations. A comparison of the co-located soil vapor and indoor air sample results to the values in the NYSDOH Soil Vapor/Indoor Air Matrix A indicates that mitigation is warranted for TCE at sampling locations SV-18/IA-18, SV-19/IA-19, and SV-20/IA-20. Methylene chloride was detected at 80.9 and 129  $\mu\text{g}/\text{m}^3$  in samples IA-18 and IA-20, respectively. Although, these values are above NYSDOH Soil Vapor/Indoor Air Matrix B value for methylene chloride of is 60  $\mu\text{g}/\text{m}^3$  the source of methylene chloride is likely attributable to laboratory contamination or an unidentified source within the building. A summary of the soil vapor and indoor air detections for VOCs is provided on Figure 4.

The Subsurface (Phase II) Investigation Report concluded that there was solvent-related contamination in soil, groundwater, and soil vapor and petroleum-related contamination in soil vapor at the Site. These detections appear to be related to historic uses at the Site.

## **4.0 NATURE AND EXTENT OF CONTAMINATION**

### **4.1 Conceptual Model of Site Contamination**

Elevated levels of PCE are present in soil vapor site-wide, with the highest concentrations reported beneath Lots 10 and 13. TCE, a breakdown product of PCE, is present in soil vapor samples collected from Lots 10 and 13, and Lot 1 near its eastern boundary abutting Lots 10 and 13. PCE was detected in indoor air sample IA-18, located in the garage area of Lot 10, at a concentration above the NYSDOH indoor air guidance value (AGV) of 30  $\mu\text{g}/\text{m}^3$ . PCE was also detected in soil collected from 3 to 5 feet below the asphalt parking lot of Lot 10, above its UUSCO, but below its RRSCO. Based on these findings and historic Site use as a metal plating and finishing facility which utilized PCE, a potential source(s) of PCE contamination is likely present at the Site in the at or beneath Lots 10 and 13. PCE was detected in all five groundwater samples at concentrations between 1.3  $\mu\text{g}/\text{L}$  and 4.6  $\mu\text{g}/\text{L}$ , below the Class GA AWQSGV of 5  $\mu\text{g}/\text{L}$ . Based on a comparison of PCE and TCE concentrations in soil vapor and indoor air to the NYSDOH Soil Vapor/Indoor Air Matrix Values, mitigation is warranted to safely continue occupancy of the existing Site buildings. Soil vapor and indoor air sample concentrations for VOCs are shown on Figure 4.

In addition to the presence of PCE and TCE, the metals copper, lead, mercury, and zinc were detected at concentrations above UUSCOs in at least one sample. Copper and/or mercury were detected above the RRSCOs in three soil samples. During the Phase II ESA, the fill layer beneath the Site was observed to be approximately 1 to 3 feet thick. Metals, particularly mercury, were detected in soil beneath the fill layer, indicating that some of the detections may be attributable the Site's long-term industrial usage, as opposed to the historic fill. SVOCs were detected in soil at levels beneath their applicable UUSCOs. The reported compounds are similar to compounds commonly found in historic fill materials commonly found in the New York metropolitan area.

### **4.2 Contaminated Media**

The subsurface investigations conducted at the Site concluded that CVOC-contaminated soil vapor and indoor air are present at the Site above applicable regulatory guidance values. Although PCE was only detected above its UUSCO in one sample collected from Lot 10, it is likely that a source may be present beneath the buildings occupying Lots 10 and/or 13, as soil vapor levels were much higher beneath Lot 13.

### **4.3 Qualitative Human Health Exposure Assessment (QHHEA)**

A QHHEA will be completed as part of the IRM Report. Based on the results of the Phase II ESA, there is a potential exposure pathway from soil vapor emanating from the subsurface to enter into

Site buildings as a result of any floor or lower wall openings/cracks. This IRM is intended to mitigate the exposure pathway and protect human health.

## **5.0 INTERIM REMEDIAL MEASURE (IRM): SUB SLAB DEPRESSURIZATION SYSTEM AND INDOOR AIR ASSESSMENT**

This section describes the proposed IRM for the Site, which includes chemical inventory assessment, indoor air sampling, and communication testing to aid in an engineering evaluation, followed by design, installation, startup, and operation and maintenance of an SSDS to mitigate the potential for soil vapor intrusion into on-site structures until a Site-wide remedy can be implemented under a NYSDEC-approved RAWP, currently anticipated by 2023 or 2024. The proposed SSDS targets the entire Site, except for three structures on the southern end of Lot 1 that will be demolished to create additional on-site parking and which will remain unoccupied until they are demolished. At this time, conceptual design for the SSDS includes four separate systems (three systems on Lot 1 and one system on Lots 10 and 13) with roof-mounted fans and approximately 11 suction points. Two suction points would be installed and manifolded to service Lots 10 and 13, and the vapor would be treated with granular-activated carbon (GAC) prior to discharge to the ambient air through a designated exhaust stack. The remaining nine suction points would be incorporated into the three systems to service the multiple buildings on Lot 1. As the CVOC levels in soil vapor beneath Lot 1 are lower than Lots 10 and 13, the three SSDS on Lot 1 would be constructed without GAC; however, the need for GAC will be evaluated through vapor sampling as part of the communication testing and modeling conducted in accordance with 6 NYCRR Part 212. The SSDS is expected to be operational by August 2021. A preliminary layout of the proposed SSDS is provided on Figure 5.

A communication testing study will be conducted prior to final design and installation of the full-scale SSDS to evaluate subsurface conditions and determine the actual quantity and locations of the suction points needed to create a negative pressure beneath all occupied areas, as well as the need for GAC treatment. Therefore, the location and quantity of vents are preliminary and will likely be adjusted and presented in a SSDS Design Report to NYSDEC and NYSDOH for review and approval prior to installation.

As the building tenants have recently changed, AKRF will re-evaluate the chemical inventory and current operations once the SSDS has been installed, to identify any potential sources of methylene chloride detected during the November 2020 Phase II ESA. Indoor air sampling will also be conducted at six (6) locations following SSDS startup to reassess indoor air conditions. Additionally, methylene chloride contamination will be further assessed (and investigated, as necessary) in the upcoming Remedial Investigation.

### **5.1 SSDS Treatment Area**

Soil vapor sampling conducted during the Phase II ESA identified individual CVOC concentrations up to 54,300  $\mu\text{g}/\text{m}^3$  and petroleum-related compounds at concentrations up to 257  $\mu\text{g}/\text{m}^3$ , as shown on Figure 4. The elevated concentrations were detected across the Site. The target area for the SSDS is located immediately beneath the existing building slabs across a majority of the Site with the exception of the southwestern corner of the Site, where those existing buildings (highlighted in blue) will be demolished to construct a parking lot. The proposed target area for the IRM is shown on Figure 6.

### **5.2 Communications Testing**

A geophysical contractor will be mobilized to the Site prior to the start of invasive activities to review the communications testing area, and will use a ground penetrating radar (GPR) system to

locate underground utilities. If utility lines or other anomalies are identified, any proposed applied suction or monitoring points will be adjusted to avoid conflicts.

The communication testing will be conducted by a subcontractor by installing approximately 11, 2.5-inch diameter suction points using an electric core drill to advance through the lowest level slab, and removing the underlying fill layer using a shop vacuum and hand tools. This void space will be replaced with a homogeneous gravel layer to optimize vacuum application. A specialized sub-slab diagnostic vacuum blower equipped with a GAC filter will then be connected to the suction points, and will be capable of applying a vacuum of up to 100 inches of water column to the suction point, with flow rates up to 200 cubic feet per minute. The vacuum from the blower will create a negative pressure beneath the concrete slab applied at the suction point. Vacuum induced by this activity will then be measured at several 5/16-inch diameter monitoring points installed throughout the testing area at strategic locations relative to each applied vacuum point and will provide information about the effective radius of influence (ROI) for each suction point. AKRF personnel will conduct air monitoring using a PID and particulate meter throughout the testing process. The PID will be used to monitor relative levels of VOCs in the extracted soil gas as well as ambient air concentrations in the buildings.

At each suction point, the applied vacuum and the airflow rate will be measured using a magnehelic differential pressure gauge, and a vane anemometer and/or pitot tube flow meter assembly, respectively. The induced vacuum will be measured at the smaller monitoring points using a micro manometer to assess induced vacuum at varying distances and directions from the suction point. A minimum target induced vacuum reading of 0.01 inches of water column at the monitoring points will be used to establish the vacuum ROI for the respective suction point. An additional suction point will be installed along the outer limits of this ROI, and a new test will be conducted to assess vacuum communication beneath the slab. This process will then be repeated iteratively throughout each building footprint to ensure that a sufficient vacuum can be induced throughout the portions of the Site slated for occupancy.

All temporary suction and monitoring points will be patched using concrete grout and/or caulk after completion of the communication testing. During testing, urethane caulk will be used to seal any obvious cracks or other openings in the building slab that may cause short-circuiting of indoor air to the sub-slab.

This iterative testing approach will result in the identification of key locations for permanent suction points and induced vacuum monitoring points for a final SSDS design, with a final decision on the number of suction points to be made after the Communications Test. The testing approach will also ensure a design with reliable SSDS coverage within each of the buildings, and an appropriate applied vacuum that will provide capacity for balancing and long-term coverage of the Site.

### **5.3 SSDS Effluent Vapor Sampling**

Influent vapor samples will be collected from each extraction vent during the communication testing to screen for VOCs with a PID. The sample displaying the highest PID reading from each of the four proposed SSDS would then be sampled for laboratory analysis of VOCs by EPA Method TO-15 to determine the projected emission rates, VOC mass loading, and any associated treatment requirements as part of the final SSDS design. The laboratory samples collected during the communication testing will be collected using either Summa canisters or Tedlar<sup>®</sup> bags and analyzed by a NYSDOH-certified laboratory with Category B deliverables.

### **5.4 System Location and Components**

The preliminary layout of the SSDS is shown on Figure 5. The layout of the proposed system will be adjusted based on the results of the communication testing. Each extraction vent will be installed

and constructed using the same methodology as the pilot test well (see Section 5.2) and connected to the system via a vertical riser and a horizontal leg of aboveground piping, which will then be manifolded to the other points (for each system). Any horizontal piping will be sloped at least 1% toward the suction points.

The proposed preliminary SSDS design is comprised of the following:

- Eleven suction points, risers, and manifold piping spaced throughout all remaining Site structures.
- Ancillary equipment, including flow meters, vacuum gauges, throttling valves, etc.
- Four appropriately-sized roof-mounted blowers to extract soil vapor from each of the proposed SSDS. Each blower will be selected based on the results of the communication testing program. The blower locations may be adjusted to the ground level pending an evaluation for carbon treatment and a review of building logistics.
- A control panel equipped with a telemetry system to notify select personnel of alarm conditions.
- A vapor treatment system comprised of two 200-pound GAC units in series with influent, intermediate, and effluent sample ports and pressure gauges for the SSDS installed at Lots 10 and 13.
- An effluent stack extending from each roof-mounted blower and terminating a minimum of 10 feet above the roof and at least 25 feet from any building intakes or operable windows.
- Twelve vacuum monitoring points to measure vacuum beneath the building slabs.

The proposed blower and GAC unit cut sheets are included in Appendix C.

### **5.5 Post-Installation Chemical Inventory Assessment and Indoor Air Sampling**

Following complete installation of the SSDS, AKRF will conduct a chemical inventory assessment of the Site, and collect six (6) indoor air samples (denoted as IRM-IA-01 through IRM-IA-06) at the approximate locations shown on Figure 7. The indoor air samples will be collected no sooner than 30 days after the SSDS has been installed. Indoor air samples IRM-IA-01 through IRM-IA-06 will be collected over an 8-hour time period using 6-liter, batch-certified SUMMA<sup>®</sup> canisters equipped with a vacuum gauge and flow regulator set at a maximum rate of 0.0125 liter per minute. The canisters will be placed at typical breathing zone heights (approximately 4 to 5 feet above the floor). Immediately after opening the flow control valve equipped with an 8-hour regulator, the initial SUMMA<sup>®</sup> canister vacuum (inches of mercury) will be noted. After eight 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 indoor air samples will be analyzed for VOCs by EPA Method TO-15 by a NYSDOH Environmental Laboratory Approval Program (ELAP)-certified laboratory with Category B deliverables. Samples will be shipped to the laboratory with appropriate Chain of Custody (CoC) documentation.

Results from the sampling event will be discussed in the IRM Closure Report, discussed further in Section 6.2.

### **5.6 Decontamination Procedures**

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

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

2. Rinse with tap water.
3. Scrub again with a bristle brush using a tap water/Alconox<sup>®</sup> solution.
4. Rinse with tap water.
5. Air-dry the equipment.

#### **5.7 Management of Investigation-Derived Waste (IDW)**

If evidence of contamination such as odors or elevated PID readings are observed, soil cuttings will be containerized in properly labeled Department of Transportation (DOT)-approved 55-gallon drums for future off-site disposal at a permitted facility. The drums will be sealed at the end of each workday and labeled with the date, the suction point ID(s), the type of waste (i.e., soil cuttings) and the name of an AKRF point-of-contact. All drums will be labeled "pending analysis" until laboratory data is available. All IDW will be disposed of or treated according to applicable local, state, and federal regulations. Disposable sampling equipment, including spoons, gloves, bags, paper towels, etc. that come in contact with environmental media will be double bagged and disposed of as municipal trash in a facility trash dumpster as non-hazardous refuse. If no evidence of contamination is observed the soil will be placed back in the ground which it came from and the location sealed with concrete.

## **6.0 REPORTING REQUIREMENTS**

### **6.1 Sub Slab Depressurization Design Report**

Upon completion of all fieldwork and receipt of laboratory analytical results, an SSDS Design Report will be prepared that will document field activities and include a final design for the SSDS proposed for the Site. The report will include a summary of the communication testing, vapor sampling results, emissions modeling, and finalized design details for the proposed full-scale SSDS, including any vapor treatment.

### **6.2 Interim Remedial Measure Completion Report (IRMCR)**

Upon approval of the SSDS Design Report, the systems will be installed and put into operation. An IRMCR will be prepared that will document the field activities and start-up testing (including vacuum field extension measurements), all IRM laboratory analytical results and discussions, and include as-built design details for the installed systems.

### **6.3 System Operation, Maintenance, and Monitoring (OM&M) Plan**

The IRMCR will include an OM&M Plan that will describe the measures necessary to operate, monitor, and maintain the mechanical components of the proposed SSDS. The OM&M plan will also include a contingency plan that will be updated periodically to reflect any Site or system changes.

## 7.0 SCHEDULE

**Table 1**

**Estimated Project Schedule**

<b>Activity</b>	<b>Time To Complete</b>
Submit BCP Application and Interim Remedial Measure (IRM) Work Plan to New York State Department of Environmental Conservation) NYSDEC	February 2021
30-Day Completeness Review	March 2021
30-day Public Comment Period Initiated for BCP Application & IRM Work Plan	April 2021
BCP Acceptance and Brownfield Cleanup Agreement (BCA) Execution	May 2021
Preparation and Submittal of Citizen Participation Plan (CPP) to NYSDEC	May 2021
Conduct SSDS Communication Testing and Vapor Sampling	June 2021
Preparation and Submittal of SSDS Design Report to NYSDEC	June 2021
Implement IRMW/Install and Start-up of SSDS/Post-Installation Indoor Air Sampling	July - October 2021
Preparation and Submittal of IRM Completion Report to NYSDEC	October 2021
Preparation and Submittal of Draft Remedial Investigation Work Plan (RIWP) to NYSDEC	November 2021
Distribute Fact Sheet/30-day Public Comment Period for RIWP	December 2021
Implement First Phase of Remedial Investigation (RI) Field Work	January 2022
Submit Interim Investigation Report to NYSDEC	April 2022
Rezoning application submitted for ULURP Rezoning	May 2022
Rezoning Action Under ULURP Approved and Redevelopment Plans Finalized	November 2023 (estimated 18 months from application)
Implement Second Phase of RI Field Work	December 2023
Preparation and Submittal of Final RI Report to NYSDEC	January 2024
NYSDEC Review of Final RI Report	April 2024
Preparation and Submittal of Draft Remedial Action Work Plan (RAWP)	March 2024
NYSDEC Review of Draft RAWP Report	April 2024
Finalize RI and RAWP and Distribute Fact Sheet/45-day Public Comment	May 2024
Issue Remedial/Construction Notice Fact Sheet	June 2024
Site Mobilization	July 2024
Begin Redevelopment (Construction) with Implementation of RAWP	August 2024
Draft Final Engineering Report (FER) and Fact Sheet	August 2025

**Table 1**  
**Estimated Project Schedule**

<b>Activity</b>	<b>Time To Complete</b>
NYSDEC Review of Draft FER	September 2025
Finalize FER to Address Any NYSDEC Comments	October 2025
NYSDEC Issues Certificate of Completion and Fact Sheet	December 2025

## 8.0 CERTIFICATION

I, Rebecca Kinal, P.E., certify that I am currently a NYS registered Professional Engineer as defined in 6 NYCRR Part 375 and that this Interim Remedial Measure 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).

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

Rebecca Kinal, P.E.

DRAFT

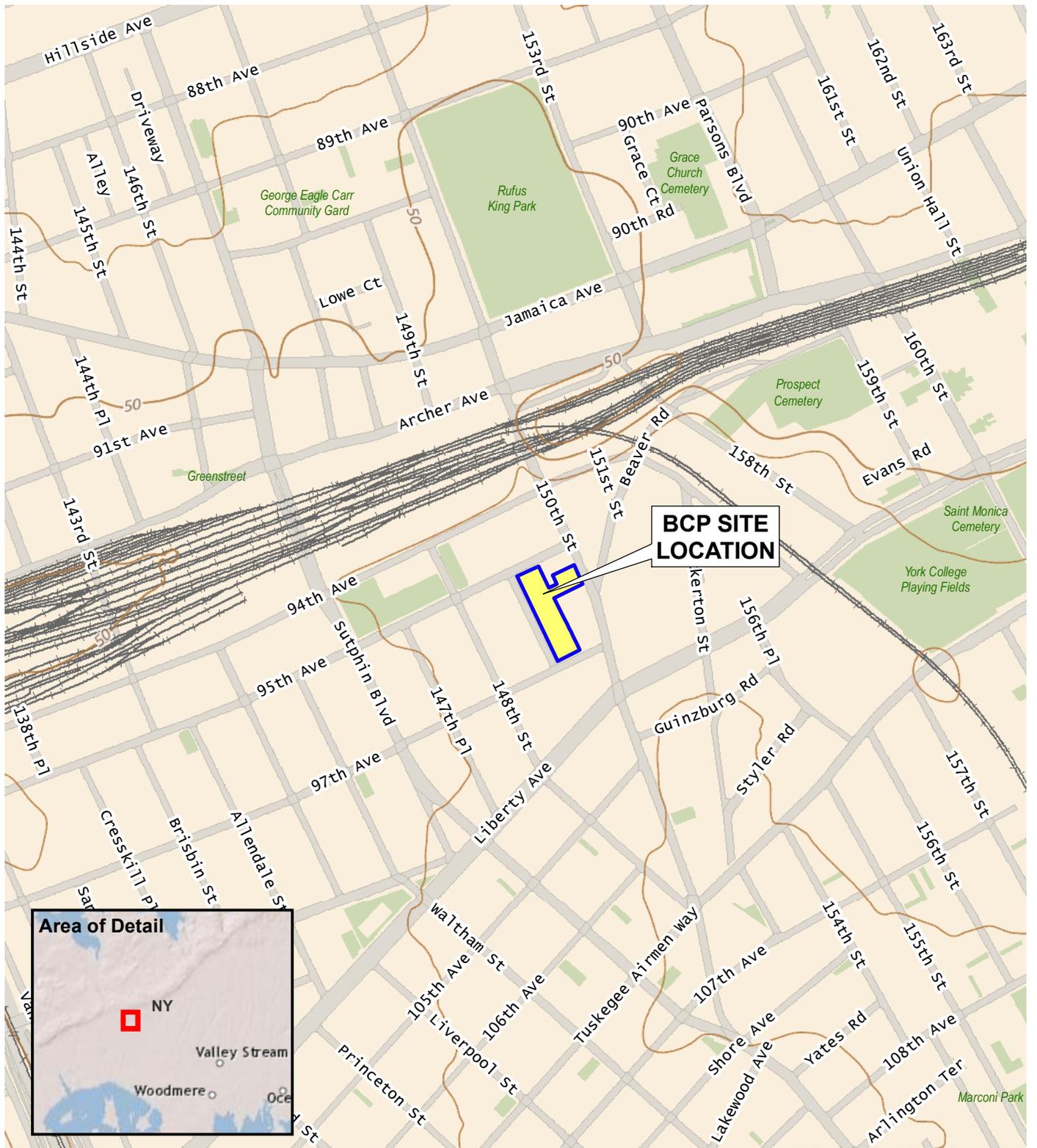
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*Name*

*Signature*

*Date*

## FIGURES



Service Layer Credits: USGS The National Map: 3d Elevation Program 2020



440 Park Avenue South, New York, NY 10016

**Jamaica Works**  
**95-25 149<sup>th</sup> Street**  
 Queens, New York

**BROWNFIELD CLEANUP PROGRAM SITE LOCATION**

DATE  
**12/21/2020**

PROJECT NO.  
**200278**

FIGURE  
**1**

©2020 AKRF W:\Projects\200278 - EMPIRE 149TH AND 150TH JAMAICA\GIS and Graphics\SAR\IRM\workplan\200278 Fig 2 Site plan with Sample Locations.mxd 12/21/2020 4:09:16 PM iszalus



**LEGEND**

-  PROJECT SITE BOUNDARY
-  LOT BOUNDARY AND TAX LOT NUMBER
- 10002** BLOCK NUMBER
-  BUILDING
-  ABOVEGROUND STORAGE TANK (AST)
-  SOIL BORING
-  SOIL BORING/TEMPORARY WELL/SOIL VAPOR POINT
-  SUPPLEMENTAL SOIL VAPOR POINT
-  INDOOR AIR SAMPLE LOCATION
-  AMBIENT AIR SAMPLE LOCATION



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

**Jamaica Works**  
**95-25 149<sup>th</sup> Street**  
Queens, New York

**SITE PLAN WITH SAMPLE LOCATIONS**

DATE	12/21/2020
PROJECT NO.	200278
FIGURE	2

© 2020 AKRF W:\Projects\200278 - EMPIRE 149TH AND 150TH JAMAICA\GIS and Graphics\SAR\IRM\workplan\200278 Fir 3 Site plan with Proposed Parking Area.mxd 12/23/2020 3:52:43 PM jzsalus



**LEGEND**

-  PROJECT SITE BOUNDARY
-  LOT BOUNDARY AND TAX LOT NUMBER
- 10002** BLOCK NUMBER
-  BUILDING
-  ABOVEGROUND STORAGE TANK (AST)
-  AREA SLATED FOR DEMOLITION TO CREATE FUTURE PARKING AREA



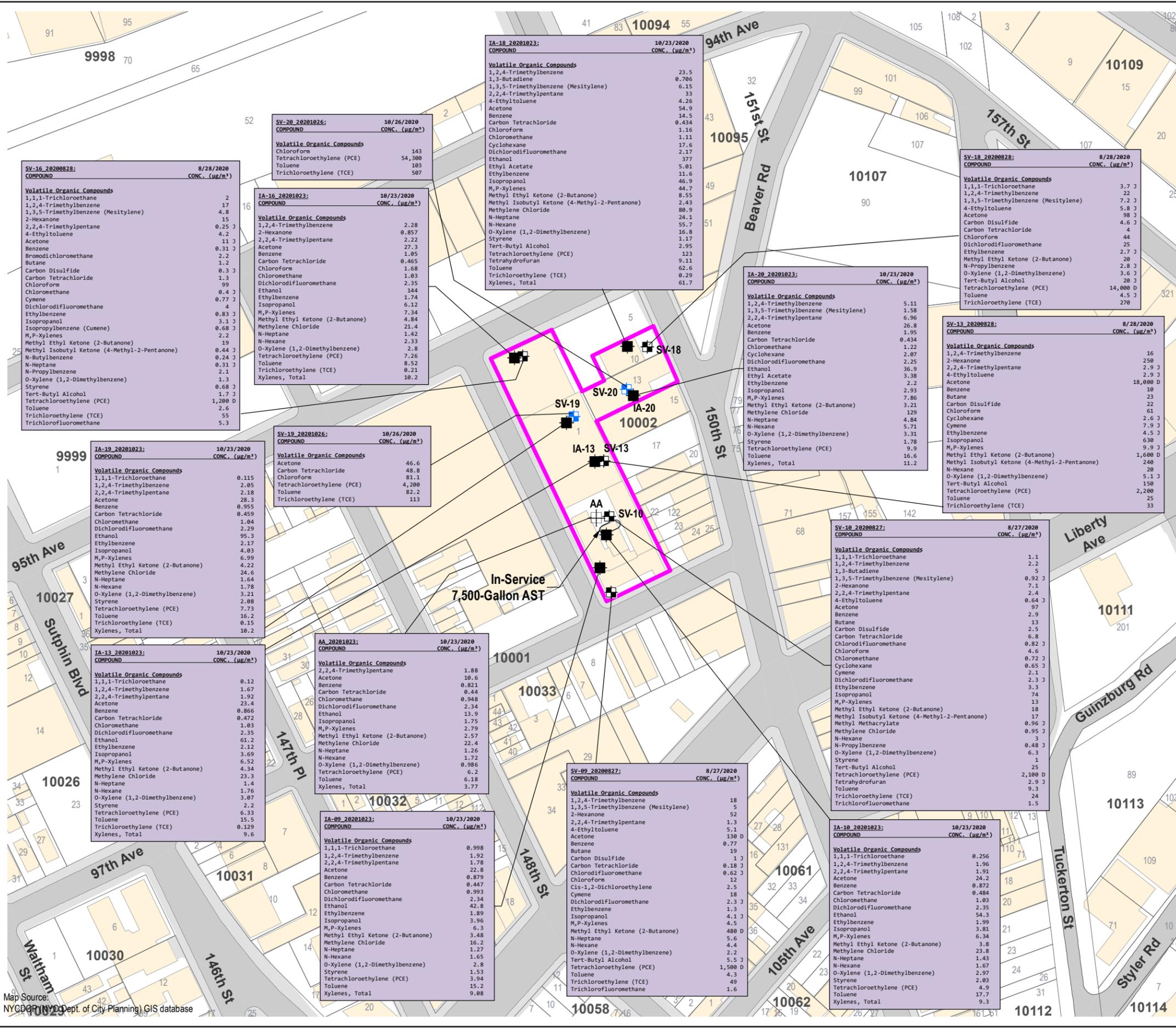
Map Source:  
NYCDP (NYC Dept. of City Planning) GIS database

**Jamaica Works**  
**95-25 149<sup>th</sup> Street**  
Queens, New York

**SITE PLAN WITH PROPOSED PARKING AREA**

DATE	12/23/2020
PROJECT NO.	200278
FIGURE	3

© 2020 AKRF W:\Projects\200278 - EMPIRE 149TH AND 150TH JAMAICANS and Graphics\SAR\IRM workplan\200278 Fig 4 Soil Vapor and Indoor Air Detections.mxd 12/23/2020 4:17:08 PM iszalus

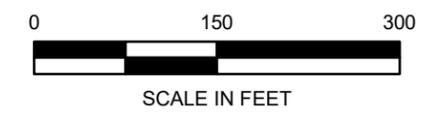
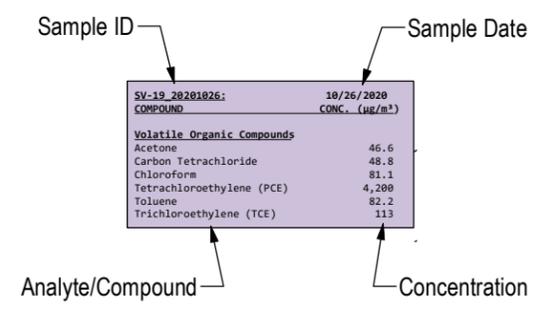


**LEGEND**

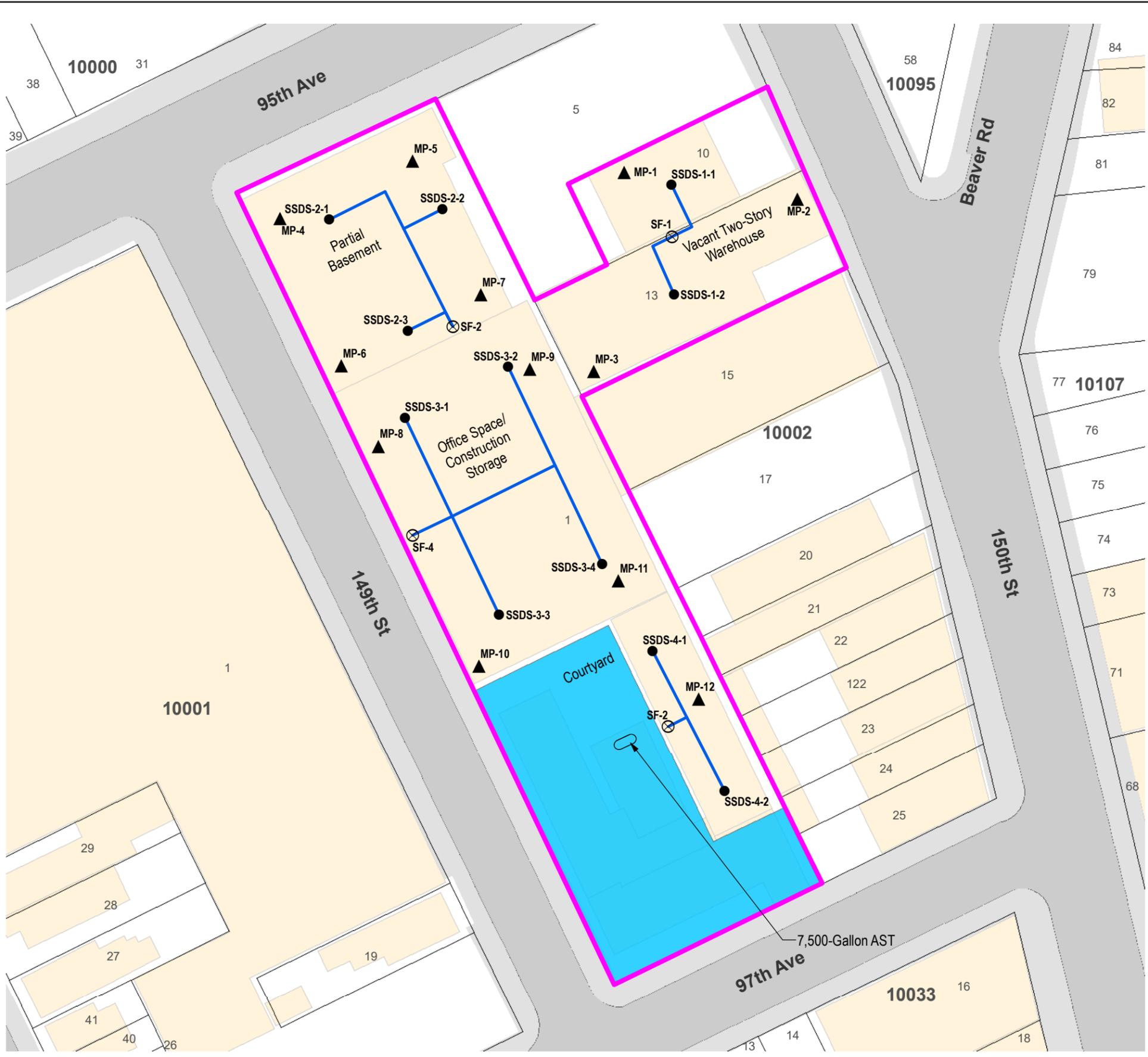
- PROJECT SITE BOUNDARY
- LOT BOUNDARY AND TAX LOT NUMBER
- 10002** BLOCK NUMBER
- BUILDING
- ABOVEGROUND STORAGE TANK (AST)
- SOIL VAPOR POINT
- SUPPLEMENTAL SOIL VAPOR POINT
- INDOOR AIR SAMPLE LOCATION
- AMBIENT AIR SAMPLE LOCATION

µg/m³ = micrograms per cubic meter

D: Analyte concentration obtained from dilution.  
J: The concentration given is an estimated value.



© 2020 AKRF W:\Projects\200278 - EMPIRE 149TH AND 150TH JAMAICA\GIS and Graphics\SAR\IRM workplan\200278 Fig 5 Preliminary Conceptual Layout of Sub-Slab Depressurization System\_SSDS.mxd 12/23/2020 4:21:10 PM iszaluis



**LEGEND**

-  PROJECT SITE BOUNDARY
-  LOT BOUNDARY AND TAX LOT NUMBER
- 10002** BLOCK NUMBER
-  BUILDING
-  ABOVEGROUND STORAGE TANK (AST)
-  AREA SLATED FOR DEMOLITION TO CREATE FUTURE PARKING AREA
-  MONITORING POINT
-  SUCTION FAN AND EXHAUST STACK
-  SSDS SUCTION POINT WITH ABOVEGROUND PIPING



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

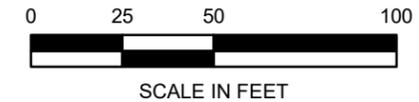
DATE	12/23/2020
PROJECT NO.	200278
FIGURE	5

© 2020 AKRF W:\Projects\200278 - EMPIRE 149TH AND 150TH JAMAICA\GIS and Graphics\SAR\IRM\workplan\200278 Fig 6 Target Area for Sub Slab Depressurization System.mxd 12/23/2020 4:58:33 PM iszalus



**LEGEND**

-  PROJECT SITE BOUNDARY
-  LOT BOUNDARY AND TAX LOT NUMBER
- 10002** BLOCK NUMBER
-  BUILDING
-  ABOVEGROUND STORAGE TANK (AST)
-  PROPOSED TARGET AREA FOR SSDS
-  AREA SLATED FOR DEMOLITION TO CREATE FUTURE PARKING AREA



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



440 Park Avenue South, New York, NY 10016

**Jamaica Works**  
**95-25 149<sup>th</sup> Street**  
Queens, New York

**TARGET AREA FOR SUB SLAB DEPRESSURIZATION SYSTEM**

DATE

**12/23/2020**

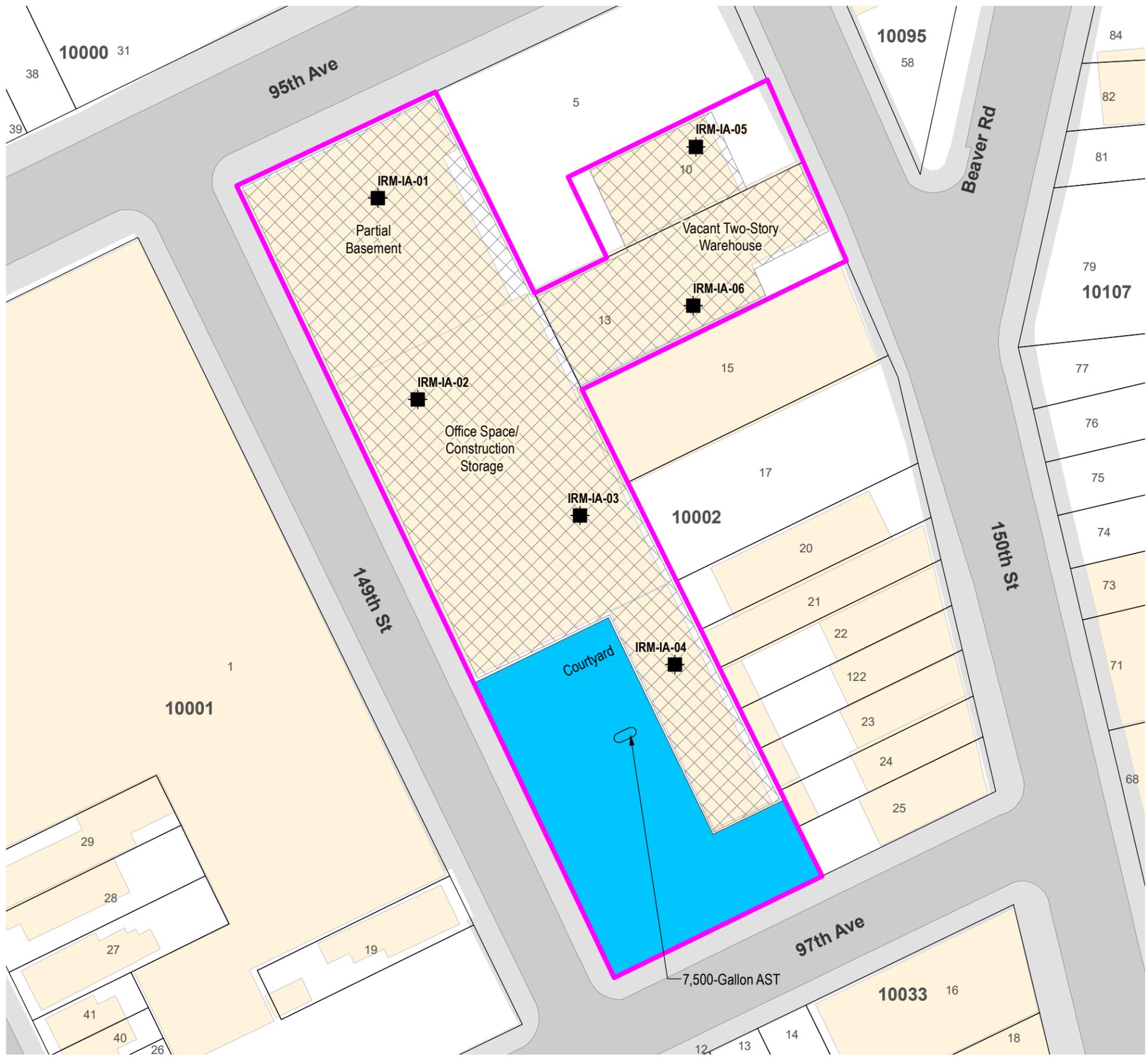
PROJECT NO.

**200278**

FIGURE

**6**

© 2021 AKRF W:\Projects\200278 - EMPIRE-JAMAICA WORKS BCP\149TH&150TH\GIS and Graphics\SAR\IRM\_workplan\200278\_Fig 7 Proposed IRM Indoor Air Sample Locations.mxd 8/13/2021 9:23:42 AM jzallus



**LEGEND**

- PROJECT SITE BOUNDARY
- LOT BOUNDARY AND TAX LOT NUMBER
- 10002** BLOCK NUMBER
- BUILDING
- ABOVEGROUND STORAGE TANK (AST)
- PROPOSED TARGET AREA FOR SSDS
- AREA SLATED FOR DEMOLITION TO CREATE FUTURE PARKING AREA
- PROPOSED INDOOR AIR SAMPLE LOCATIONS



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

**Jamaica Works**  
**95-25 149<sup>th</sup> Street**  
Queens, New York

**PROPOSED IRM INDOOR AIR SAMPLE LOCATIONS**

DATE	8/13/2021
PROJECT NO.	200278
FIGURE	7

**APPENDIX A**  
**HEALTH AND SAFETY PLAN (HASP) AND**  
**COMMUNITY AIR MONITORING PLAN (CAMP)**

# **JAMAICA WORKS**

**95-25 149<sup>TH</sup> STREET  
QUEENS, NEW YORK**

---

## **HEALTH AND SAFETY PLAN AND COMMUNITY AIR MONITORING PLAN**

**AKRF Project Number: 200278  
BCP Site Number: C241252**

### **Prepared for:**

NYSDEC Region 2  
1 Hunter's Point Plaza  
47-40 21<sup>st</sup> Street  
Long Island City, New York 11101

### **Prepared On Behalf Of:**

Radix 95-25 149<sup>th</sup> St LLC  
95-08 150<sup>th</sup> St LLC  
95-12 150<sup>th</sup> St 11435 LLC  
347 Fifth Avenue, 16<sup>th</sup> Floor  
New York, NY 10016

### **Prepared by:**



AKRF, Inc.  
440 Park Avenue South  
New York, New York 10016  
(212) 696-0670

---

**AUGUST 2021**

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- Table 3 – Work Zone Air Monitoring Action Levels
- Table 4 – Personal Protection Equipment (PPE) Requirements
- Table 5 – Hospital Directions
- Table 6 – Emergency Contacts

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- Attachment A – Special Requirements for COVID-19
- Attachment B – Potential Health Effects from On-Site Contaminants
- Attachment C – Report Forms
- Attachment D – Emergency Hand Signals

## **1.0 INTRODUCTION**

This Health and Safety Plan (HASP) and Community Air Monitoring Plan (CAMP) were prepared by AKRF, Inc. (AKRF) on behalf of Radix 95-25 149<sup>th</sup> St LLC, 95-08 150<sup>th</sup> St LLC, and 95-12 150<sup>th</sup> St 11435 LLC (collectively referred to as the “Applicant”) for the Jamaica Works site, located at 95-25 149<sup>th</sup> Street, and 95-08 and 95-12 150<sup>th</sup> Street in Queens, New York, hereafter referred to as the “Site.” The Site is identified on the New York City Tax Map as Queens Tax Block 10002, Lots 1, 10 and 13. A Site Location Map is provided as Figure 1. The Applicant is submitting an application to further investigate and remediate the Site under the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP). The HASP and CAMP described herein outline measures to protect workers and general public from potential exposure during implementation of the Interim Remedial Measure Work Plan.

The Site is composed of three parcels totaling approximately 50,797 square feet (SF) and containing 11 one- to two-story structures, some of which are interconnected and share heating systems. Several partial basements and crawl spaces are located throughout the buildings. Lot 1 (95-25 149<sup>th</sup> Street) is 40,077 SF and contains nine structures built in approximately 1929, some of which are interconnected. The majority of Lot 1 is vacant; however, the southern buildings are utilized by the current Site owner for office space, storage of construction materials, and warehousing. The southernmost portion is occasionally utilized for professional films and television sets. Lot 10 (95-08 150<sup>th</sup> Street) is 3,920 SF and contains a one-story brick building built in approximately 1950 with a garage, shop, and office utilized by a contractor. Lot 13 (95-12 150<sup>th</sup> Street) is 6,800 SF and contains a vacant two-story building built in approximately 1910. A 7,500-gallon No. 6 fuel oil aboveground storage tank (AST) is located in the southern portion of Lot 1; however, the tank has not been used since approximately 2019.

The Site is located in an industrial/commercial-zoned area of Jamaica, Queens, New York. The surrounding land use consists of predominantly commercial and/or industrial buildings on all four sides with some residential apartments, including the following:

- North – commercial/industrial buildings, warehouses, and residential apartment buildings along 95<sup>th</sup> Avenue;
- South – industrial/ commercial buildings and residential properties along 97<sup>th</sup> Avenue;
- East – Mohan’s Precast USA, Inc., Taste of Heaven Ministries, and industrial buildings and warehouses; and
- West – industrial/ commercial buildings along 149<sup>th</sup> Street.

A Phase I Environmental Site Assessment (ESA) was conducted by Partridge Venture Engineering, P.C. & Lawrence ENV, LLC in November 2019. The Phase I ESA identified environmental concerns for the Site related to historic industrial use dating back to the late 1800’s, including tanneries, machine shops, plating, painting, tarring, battery servicing, and a cap and fuse factory. Off-site concerns were identified related to a nearby auto scrap/junkyard, dry cleaner, auto repair and painting shops, and other industrial and commercial facilities. The on-site and off-site environmental concerns could have affected soil, groundwater, and soil vapor at the Site. The Site is also listed in the Department of City Planning (E) designation database for hazardous materials.

AKRF conducted a Phase II ESA at the Site in August 2020 and October 2020. The subsurface investigation included the collection of soil, groundwater, and soil vapor samples. Tetrachloroethylene (PCE) was detected at 14 milligrams per kilogram (mg/kg) in soil boring SB-18 approximately 3 to 5 feet below the asphalt parking area fronting 150<sup>th</sup> Street, above the NYSDEC Part 375 Unrestricted Use Soil

Cleanup Objective (UUSCO) of 1.3 mg/kg. PCE was detected at elevated levels in all seven soil vapor samples collected at the Site and within the indoor air of Lot 10. The highest PCE concentrations in soil vapor were detected beneath Lot 10 (14,000 micrograms per cubic meter  $\mu\text{g}/\text{m}^3$ ) and Lot 13 (54,300  $\mu\text{g}/\text{m}^3$ ). Trichloroethene (TCE), a breakdown product of PCE, was detected between 113 and 270  $\mu\text{g}/\text{m}^3$  in soil vapor samples Sv-18, SV-19, and SV-20. Based on the findings of the Phase II ESA and the Site's historical industrial and manufacturing operations, a potential source of PCE contamination may be present at the Site, particularly near soil boring SB-18 and soil vapor samples SV-18 and SV-20. Based upon the widespread detections of PCE in soil vapor at the Site, other on-site and/or off-site sources may be present. Historic fill and detections for SVOCs and metals in soil typically associated with historic fill were present throughout the Site. Other chlorinated-VOCs and petroleum-related VOCs were also detected at generally lower levels in soil vapor samples across the Site. The affected media for the existing or potential future releases at the Site include soil and soil vapor.\

The purpose of this HASP is to assign responsibilities, establish personnel protection standards and mandatory safety practices and procedures, and provide for contingencies that may arise during field activities at the Site. The HASP is intended to minimize health and safety risks resulting from the known or potential presence of contaminated materials. This HASP also includes supplemental requirements to minimize potential exposure related to COVID-19, which are presented in Attachment A.

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

## 2.0 HEALTH AND SAFETY GUIDELINES AND PROCEDURES

### 2.1 Hazard Evaluation

#### 2.1.1 Hazards of Concern

The hazards of concern include organic and inorganic chemicals, heat and cold stress, and explosive/flammable materials.

#### 2.1.2 Physical Characteristics

The physical characteristics of the hazards of concern include liquid, solid, sludge, and vapor.

#### 2.1.3 Hazardous Materials

The chemicals known and/or expected to be encountered at the Site include: VOCs, SVOCs, pesticides, petroleum, and metals; the solids include ash, asbestos, and historical fill; the solvents include chlorinated solvents; and the oils include hydraulic oil, gasoline, and fuel oil.

#### 2.1.4 Chemicals of Concern

Chemical	REL/PEL/STEL	Health Hazards
Benzene	REL: 0.1 ppm N STEL: 1 ppm PEL: 1 ppm O STEL: 5 ppm	Irritation eyes, skin, nose, respiratory system; dizziness; headache, nausea, staggered gait; anorexia, lassitude (weakness, exhaustion); dermatitis; bone marrow depression; [potential occupational carcinogen].
Copper	REL: 1 mg/m <sup>3</sup> PEL: 1 mg/m <sup>3</sup>	Irritation eyes, nose, pharynx; nasal septum perforation; metallic taste; dermatitis; In Animals: lung, liver, kidney damage; anemia.
Ethylbenzene	REL: 100 ppm N STEL: 125 ppm PEL: 100 ppm	Irritation eyes, nose, respiratory system; headache, lassitude (weakness, exhaustion), dizziness, confusion, malaise (vague feeling of discomfort), drowsiness, unsteady gait; narcosis; defatting dermatitis; possible liver injury; reproductive effects.
Fuel Oils	REL: 100 mg/m <sup>3</sup>	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 <sup>3</sup> PEL: 0.050 mg/m <sup>3</sup>	Lassitude (weakness, exhaustion), insomnia; facial pallor; anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis wrist, ankles; encephalopathy; kidney disease; irritation eyes; hypertension.

Mercury	REL: 0.05 mg/m <sup>3</sup> REL C: 0.1 mg/m <sup>3</sup> PEL: 0.1 mg/m <sup>3</sup>	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 <sup>3</sup> PEL: 0.2 mg/m <sup>3</sup>	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.
Tetrachloroethylene (PCE)	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 (TCE)	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].
Vinyl Chloride	PEL: 1 ppm PEL C: 5 ppm	Lassitude (weakness, exhaustion); abdominal pain, gastrointestinal bleeding; enlarged liver; pallor or cyanosis of extremities; liquid: frostbite; [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.

Zinc	REL: 5 mg/m <sup>3</sup> REL C: 15 mg/m <sup>3</sup> N STEL: 10 mg/m <sup>3</sup> PEL: 5 mg/m <sup>3</sup> (ZnO fume); 15 mg/m <sup>3</sup> (ZnO dust)	Chills, elevated body temperature, myalgia, cough, fatigue, chest pain, stomach cramps, nausea, anemia, changes in cholesterol levels, and vomiting.
<p>Notes: REL: Recommended exposure limit (NIOSH) PEL: Permissible exposure limits (OSHA) STEL: Short-term exposure limit N: NIOSH O: OSHA C: Ceiling</p>		

## 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 this HASP. The SSO will have experience in implementation of air monitoring and hazardous materials sampling programs. Health and safety training required for the SSO and all field personnel is outlined in Section 2.3 of this HASP.

## 2.3 Training

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

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

Each member of the field crew will be instructed in these objectives before he/she goes onto the Site. A Site safety meeting will be conducted at the start of the project. 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 contamination, ensure that proper protective equipment is donned, and provide an area for decontamination.

The Exclusion Zone is defined as the area where exposure to contaminated 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 Zone is the 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.

**Table 2  
Site Work Zones**

<b>Task</b>	<b>Exclusion Zone</b>	<b>CRZ</b>	<b>Support Zone</b>
Suction Point and Vapor Monitoring Point Installation	15 feet from hand-held coring equipment	Exterior of Building (currently unoccupied)	As Needed

**2.6 Air Monitoring Program**

The purpose of the air monitoring program is to identify any exposure of the field personnel to potential environmental hazards in the soil and soil vapor. Results of the air monitoring will be used to determine the appropriate response action, if needed.

**2.6.1 Work Zone Air Monitoring**

Real time air monitoring of VOCs and particulates will be performed in the work zone during all intrusive Site activities. Work zone air monitoring for VOCs will be performed with a hand-held photoionization detector (PID) equipped with an 11.7 electron Volt (eV) lamp. The PID will be calibrated with 100 parts per million (ppm) isobutylene standard in accordance with the manufacturer’s instructions at the start of each workday. Work zone air monitoring for particulates will be conducted using a MIE 1000 Personal DataRam or equivalent to measure the concentration of airborne respirable particulates less than 10 micrometers in size (PM<sub>10</sub>).

The SSO shall set up the equipment and confirm that it is working properly. His/her designee may oversee the air measurements during the day. Measurements will be taken prior to commencement of work and continuously during the work. Measurements will be made as close to the workers as practicable and at the breathing height of the workers. The action levels and required responses are listed in the following table:

**Table 3**  
**Work Zone Air Monitoring Action Levels**

<b>Instrument</b>	<b>Action Level</b>	<b>Response Action</b>
PID	Less than 5 ppm in breathing zone	Level D or D-Modified
	Between 5 ppm and 50 ppm	Level C
	More than 50 ppm	Stop work. Resume work when readings are less than 50 ppm
Particulate Monitor (MIE 1000 Personal DataRam™ or equivalent)	Less than 0.125 mg/m <sup>3</sup> above background in breathing zone	Level D or D-Modified
	More than 0.150 mg/m <sup>3</sup> above background in breathing zone	Stop work. Resume work when readings are less than 1.25 µg/m <sup>3</sup> .
Notes: mg/m <sup>3</sup> = milligrams per cubic meter; ppm = parts per million		

## 2.6.2 Community Air Monitoring Plan

Community air monitoring will be conducted during all intrusive Site activities in compliance with the New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan (CAMP). Real-time air monitoring for volatile compounds and dust at the perimeter of the exclusion zone will be performed as described below.

### 2.6.2.1. Roving Air Monitoring

#### VOC Monitoring

Continuous monitoring for VOCs will be conducted in the work zone during all ground intrusive activities, including soil vapor vent and monitoring point installations. Upwind and downwind concentrations will be measured at the start of each workday and periodically thereafter to establish background concentrations. Monitoring will be conducted with a PID equipped with an 11.7 eV lamp capable of calculating 15-minute running average concentrations.

#### VOC Action Levels

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

- If total organic vapor levels exceed 5 ppm above background for the 15-minute average at the CRZ (exterior of building since building is unoccupied), 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 CRZ 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 at the CRZ—is below 5 ppm above background for the 15-minute average.

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

Note: All proposed locations are inside Site structures and the communication testing will be conducted with a diagnostic vacuum equipped with a granular activated carbon filter. More frequent intervals of monitoring will be conducted if required as determined by the SSO. Exterior upwind and downwind readings will be obtained each day prior to the start of work and at the end of the work, and will be conducted in conjunction with work zone monitoring to ensure sufficient monitoring of potential VOC concerns. All PID readings will be recorded and available for NYSDEC and NYSDOH personnel to review.

#### Particulate Monitoring

Continuous monitoring for particulates will be conducted during all ground intrusive activities, which will involve the measurement of respirable dust. Upwind and downwind concentrations will be measured at the start of each workday and periodically thereafter to establish background concentrations. Community air monitoring for dust particulates will be conducted using a hand-held MIE 1000 Personal DataRam or equivalent to measure the concentration of airborne respirable particulates less than 10 micrometers in size (PM<sub>10</sub>). The particulate monitor will be capable of calculating 15-minute running average concentrations and equipped with an audible alarm to indicate exceedance of action levels. Background readings and any readings that trigger response actions will be recorded in the project logbook, which will be available on site for NYSDOH and/or NYSDEC review.

#### Particulate Action Levels

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

- If the downwind particulate concentrations are greater than 100 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) 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  $150 \mu\text{g}/\text{m}^3$  above background (upwind concentration), and provided that no visible dust is migrating from the work area.
- If particulate levels persist at  $150 \mu\text{g}/\text{m}^3$  above background, work must be stopped until dust suppression measures bring particulate levels to below  $150 \mu\text{g}/\text{m}^3$  above background.

Note: All proposed locations are inside Site structures. As the proposed testing areas will be sprayed with a water mist and hand-held equipment will be utilized to complete the drilling, the potential for dust to migrate outdoors is minimal. Exterior upwind and downwind readings will be obtained each day prior to the start of work and at the end of the work, and will be conducted in conjunction with work zone

monitoring to ensure sufficient monitoring of potential dust concerns. The SSO may increase the monitoring based on Site conditions at the time of the work.

**2.6.3 Personal Protection Equipment (PPE)**

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

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 this section.

**Table 4  
Personal Protection Equipment Requirements**

LEVEL OF PROTECTION & PPE		All Tasks
<b>Level D</b> <input checked="" type="checkbox"/> Steel Toe Shoes <input checked="" type="checkbox"/> Hard Hat (within 25 ft. of drill rig or core equipment) <input checked="" type="checkbox"/> Work Gloves	<input checked="" type="checkbox"/> Safety Glasses <input type="checkbox"/> Face Shield <input checked="" type="checkbox"/> Ear Plugs (within 25 ft. of excavator) <input checked="" type="checkbox"/> Nitrile Gloves <input checked="" type="checkbox"/> Tyvek for tank contractor if NAPL present	Yes
<b>Level C (in addition to Level D)</b> <input checked="" type="checkbox"/> Half-Face Respirator <input checked="" type="checkbox"/> Full Face Respirator <input type="checkbox"/> Full-Face PAPR	<input type="checkbox"/> Particulate Cartridge <input type="checkbox"/> Organic Cartridge <input checked="" type="checkbox"/> Dual Organic/Particulate Cartridge	If PID > 10 ppm or particulate > 5 µg/m <sup>3</sup> in breathing zone
Comments: Cartridges to be changed out at least once per shift unless warranted beforehand (e.g., more difficult to breath or any odors detected). PAPR = powered air purifying respirator		

**2.7 General Work Practices**

To protect health and safety, all 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 eyewashes. 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 driven to the Brookdale University Hospital by on-site personnel. Directions to the hospital are provided below, and a hospital route map is provided as Figure 2.

#### 3.1 Hospital Directions

**Table 5**  
**Hospital Directions**

Hospital Name	Jamaica Hospital Medical Center
Phone Number	(718) 206-6000
Address/Location	1 8900 Van Wyck Expressway, Queens, New York 11418
Directions	<ol style="list-style-type: none"><li>1. Starting at 149<sup>th</sup> Street, head southwest towards 97<sup>th</sup> Avenue and make a right turn at 97<sup>th</sup> Avenue.</li><li>2. Head west for approximately ½ mile and turn right onto Van Wyck Expressway.</li><li>3. Head north for ½ mile and take the Jamaica Avenue exit. Turn left on Jamaica Avenue.</li><li>4. Travel west under the Van Wyck Expressway and turn left at the first cross street.</li><li>5. The destination will be on the right.</li></ol>

3.2 Emergency Contacts

**Table 6**  
**Emergency Contacts**

<b>Company</b>	<b>Individual Name</b>	<b>Title</b>	<b>Contact Number</b>
AKRF	Rebecca Kinal, P.E.	Remedial Engineer	914-922-2362 (office)
	Stephen Malinowski, QEP	Project Manager and Project Director	631-574-3724 (office) 631-974-5755 (mobile)
	Adrianna Bosco	Deputy Project Manager	914-874-3358 (office) 646-388-9576 (mobile)
	Tara Simmons	Site Safety Officer (SSO)	828-550-2612 (mobile)
	John Sulich	Alternate SSO	203-517-7433 (mobile)
Radix 95-25 149 <sup>th</sup> St LLC, 95-08 150 <sup>th</sup> St LLC, and 95-12 150 <sup>th</sup> St 11435 LLC	Marc Effern	BCP Applicant Representative	347-443-4487 (mobile)
Ambulance, Fire Department, & Police Department	-	-	911
NYSDEC Spill Hotline	-	-	800-457-7362

### 4.0 APPROVAL & ACKNOWLEDGMENTS OF HASP

Signed: \_\_\_\_\_ Date: \_\_\_\_\_  
AKRF Project Manager

Signed: \_\_\_\_\_ Date: \_\_\_\_\_  
AKRF Health and Safety Officer

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

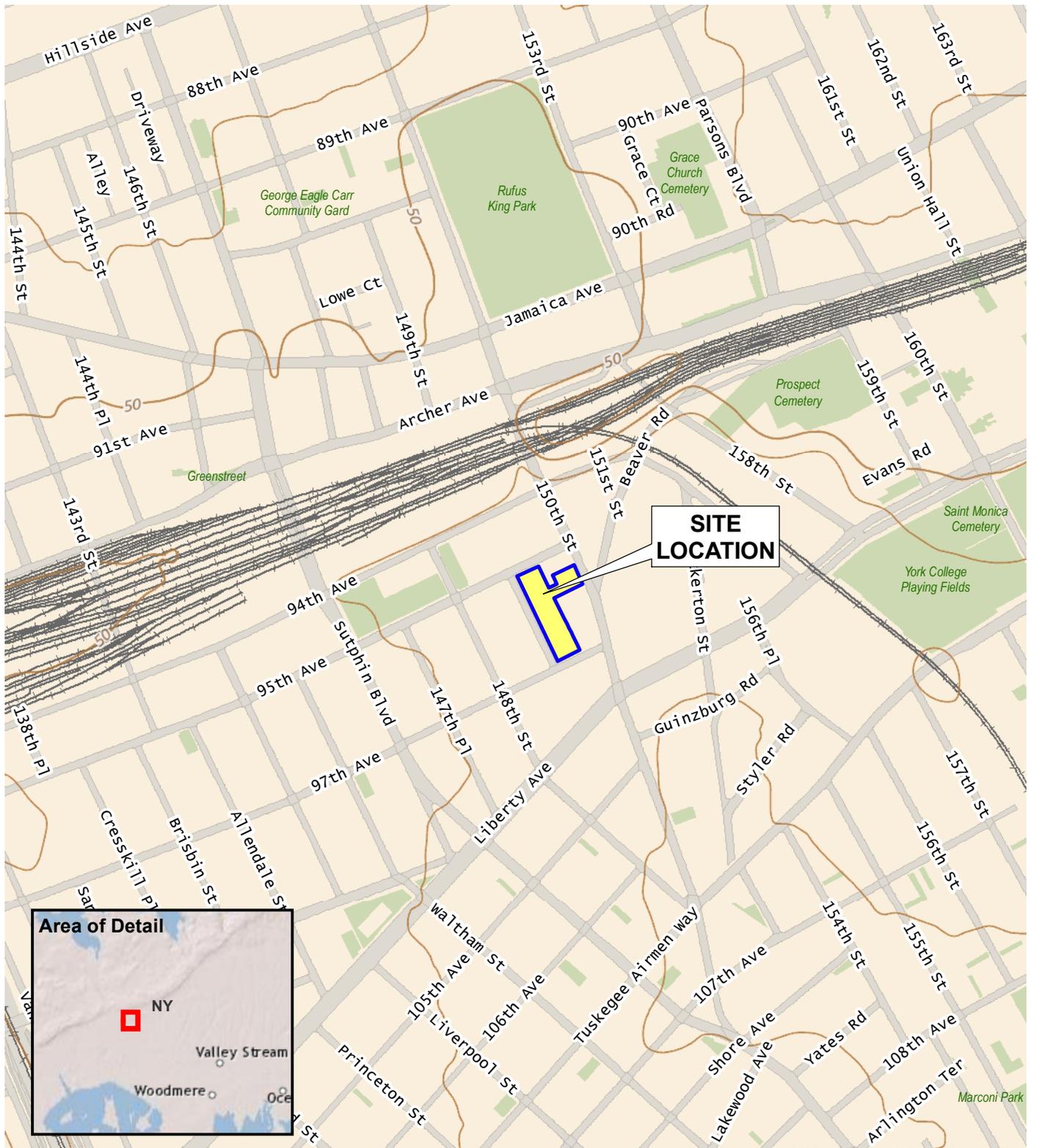
#### AFFIDAVIT

I, \_\_\_\_\_ (name), of \_\_\_\_\_ (company name), have read the HASP for the Jamaica Works site located at 95-25 149<sup>th</sup> Street and 95-08 and 95-12 150<sup>th</sup> Street in Queens, New York. I agree to conduct all on-site work in accordance with the requirements set forth in this HASP and understand that failure to comply with this HASP could lead to my removal from the Site.

Signed: _____	Company: _____	Date: _____
Signed: _____	Company: _____	Date: _____
Signed: _____	Company: _____	Date: _____
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Signed: _____	Company: _____	Date: _____

## FIGURES

© 2020 AKRF - W:\Projects\200278 - EMPIRE 149TH AND 150TH JAMAICA\GIS and Graphics\SAR\FRM\workplan\200278 Fig. 1 Site loc map.mxd 12/15/2020 6:00:28 PM iszallus



Service Layer Credits: USGS The National Map: 3d Elevation Program 2020



440 Park Avenue South, New York, NY 10016

**Jamaica Works**  
**95-25 149<sup>th</sup> Street**  
Queens, New York

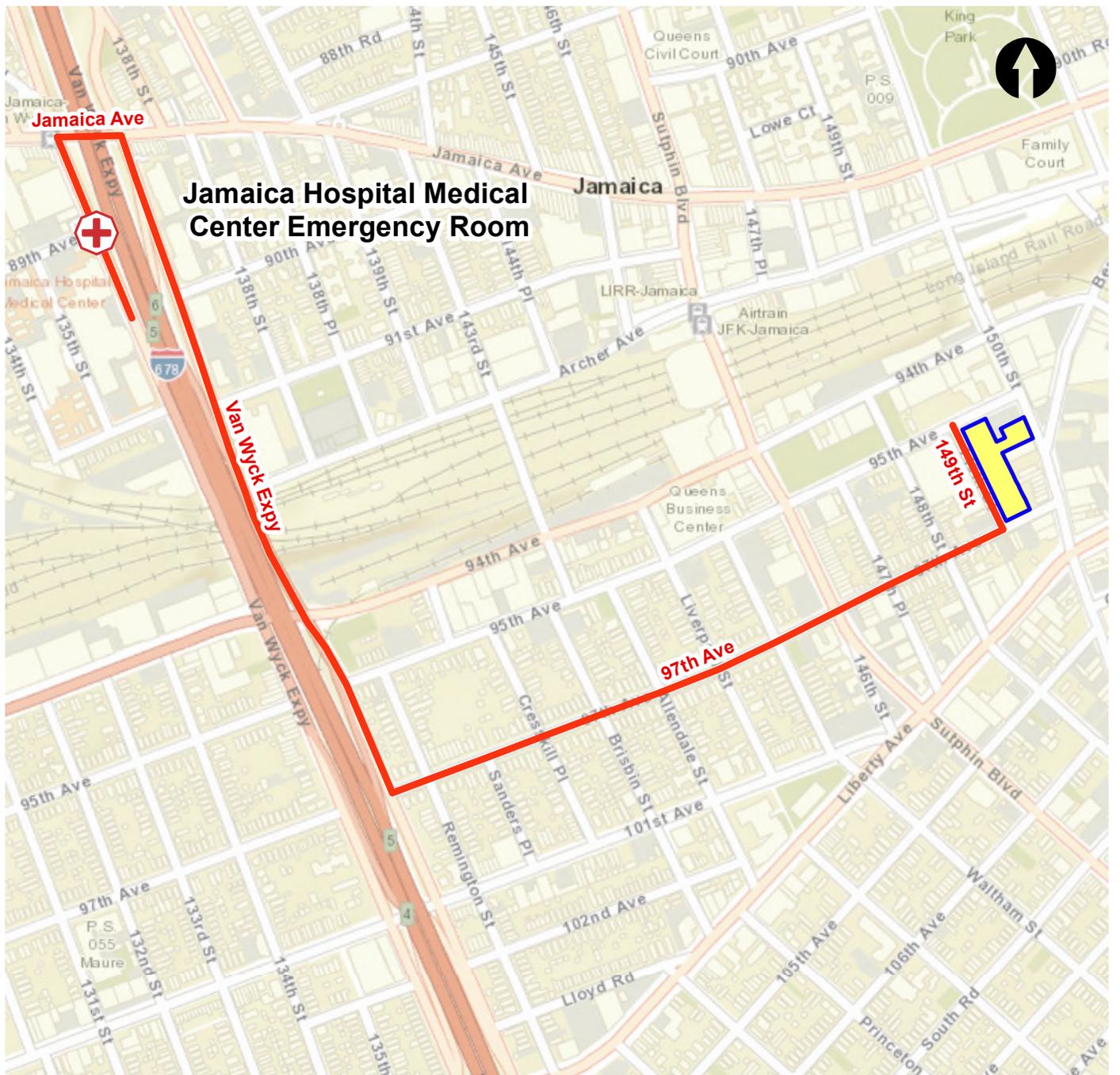
**SITE LOCATION**

DATE  
**12/15/2020**

PROJECT NO.  
**200278**

FIGURE  
**1**

© 2020 AKRF - W:\Projects\200278 - EMPIRE 149TH AND 150TH JAMAICA\GIS and Graphics\SAR\IRM workplan\200278 Fig. 1 Hospital Route Map.mxd 12/15/2020 6:02:11 PM iszalus



Service Layer Credits: ESRI World Street Map 2020

**LEGEND**

-  PROJECT SITE BOUNDARY
-  ROUTE TO HOSPITAL
-  HOSPITAL LOCATION

Hospital address:  
 Jamaica Hospital Medical Center  
 8900 Van Wyck Expy, Queens, NY 11418  
 +17182066000



440 Park Avenue South, New York, NY 10016

**Jamaica Works**  
 95-25 149<sup>th</sup> Street  
 Queens, New York

**HOSPITAL ROUTE MAP**

DATE	12/15/2020
PROJECT NO.	200278
FIGURE	2

**ATTACHMENT A**  
**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 be 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.

**ATTACHMENT B**  
**POTENTIAL HEALTH EFFECTS FROM ON-SITE CONTAMINANTS**

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

**HIGHLIGHTS:** Nickel is a naturally occurring element. Pure nickel is a hard, silvery-white metal used to make stainless steel and other metal alloys. Skin effects are the most common effects in people who are sensitive to nickel. Workers who breathed very large amounts of nickel compounds developed chronic bronchitis and lung and nasal sinus cancers. Nickel has been found in at least 882 of the 1,662 National Priority List sites identified by the Environmental Protection Agency (EPA).

### What is nickel?

Nickel is a very abundant natural element. Pure nickel is a hard, silvery-white metal. Nickel can be combined with other metals, such as iron, copper, chromium, and zinc, to form alloys. These alloys are used to make coins, jewelry, and items such as valves and heat exchangers. Most nickel is used to make stainless steel.

Nickel can combine with other elements such as chlorine, sulfur, and oxygen to form nickel compounds. Many nickel compounds dissolve fairly easy in water and have a green color. Nickel compounds are used for nickel plating, to color ceramics, to make some batteries, and as substances known as catalysts that increase the rate of chemical reactions. Nickel is found in all soil and is emitted from volcanoes. Nickel is also found in meteorites and on the ocean floor. Nickel and its compounds have no characteristic odor or taste.

### What happens to nickel when it enters the environment?

- Nickel is released into the atmosphere by industries that make or use nickel, nickel alloys, or nickel compounds. It is also released into the atmosphere by oil-burning power plants, coal-burning power plants, and trash incinerators.
- In the air, it attaches to small particles of dust that settle to the ground or are taken out of the air in rain or snow; this usually takes many days.

- Nickel released in industrial waste water ends up in soil or sediment where it strongly attaches to particles containing iron or manganese.
- Nickel does not appear to accumulate in fish or in other animals used as food.

### How might I be exposed to nickel?

- By eating food containing nickel, which is the major source of exposure for most people.
- By skin contact with soil, bath or shower water, or metals containing nickel, as well as by handling coins or touching jewelry containing nickel.
- By drinking water that contains small amounts of nickel.
- By breathing air or smoking tobacco containing nickel.
- Higher exposure may occur if you work in industries that process or use nickel.

### How can nickel affect my health?

The most common harmful health effect of nickel in humans is an allergic reaction. Approximately 10-20% of the population is sensitive to nickel. People can become sensitive to nickel when jewelry or other things containing it are in direct contact with the skin for a long time. Once a person is sensitized to nickel, further contact with the metal may produce a reaction. The most common reaction is a skin rash at the site of contact. The skin rash may also

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

occur at a site away from the site of contact. Less frequently, some people who are sensitive to nickel have asthma attacks following exposure to nickel. Some sensitized people react when they consume food or water containing nickel or breathe dust containing it.

People working in nickel refineries or nickel-processing plants have experienced chronic bronchitis and reduced lung function. These persons breathed amounts of nickel much higher than levels found normally in the environment.

Workers who drank water containing high amounts of nickel had stomach ache and suffered adverse effects to their blood and kidneys.

Damage to the lung and nasal cavity has been observed in rats and mice breathing nickel compounds. Eating or drinking large amounts of nickel has caused lung disease in dogs and rats and has affected the stomach, blood, liver, kidneys, and immune system in rats and mice, as well as their reproduction and development.

### How likely is nickel to cause cancer?

Cancers of the lung and nasal sinus have resulted when workers breathed dust containing high levels of nickel compounds while working in nickel refineries or nickel processing plants. The Department of Health and Human Services (DHHS) has determined that nickel metal may reasonably be anticipated to be a carcinogen and that nickel compounds are known human carcinogens. The International Agency for Research on Cancer (IARC) has determined that some nickel compounds are carcinogenic to humans and that metallic nickel may possibly be carcinogenic to humans. The EPA has determined that nickel refinery dust and nickel subsulfide are human carcinogens.

### How can nickel affect children?

It is likely that the health effects seen in children exposed to nickel will be similar to those seen in adults. We do not know whether children differ from adults in their susceptibility to nickel. Human studies that examined whether nickel can harm the fetus are inconclusive. Animal studies have found increases in newborn deaths and

decreased newborn weight after ingesting very high amounts of nickel. Nickel can be transferred from the mother to an infant in breast milk and can cross the placenta.

### How can families reduce the risks of exposure to nickel?

- Avoiding jewelry containing nickel will eliminate risks of exposure to this source of the metal.
- Exposures of the general population from other sources, such as foods and drinking water, are almost always too low to be of concern.

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

There are tests available to measure nickel in your blood, feces, and urine. More nickel was measured in the urine of workers who were exposed to nickel compounds that dissolve easily in water than in the urine of workers exposed to nickel compounds that are hard to dissolve. This means that it is easier to tell if you have been exposed to soluble nickel compounds than less-soluble compounds. The nickel measurements do not accurately predict potential health effects from exposure to nickel.

### Has the federal government made recommendations to protect human health?

The EPA recommends that drinking water should contain no more than 0.1 milligrams of nickel per liter of water (0.1 mg/L). To protect workers, the Occupational Safety and Health Administration (OSHA) has set a limit of 1 mg of nickel per cubic meter of air (1 mg/m<sup>3</sup>) for metallic nickel and nickel compounds in workplace air during an 8-hour workday, 40-hour workweek.

### References

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

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



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

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

### What is zinc?

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

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

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

### What happens to zinc when it enters the environment?

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

does not dissolve in water.

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

### How might I be exposed to zinc?

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

### How can zinc affect my health?

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

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

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

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

### How likely is zinc to cause cancer?

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

### How can zinc affect children?

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

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

### How can families reduce the risks of exposure to zinc?

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

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

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

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

### Has the federal government made recommendations to protect human health?

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

To protect workers, the Occupational Safety and Health Administration (OSHA) has set an average limit of 1 mg/m<sup>3</sup> for zinc chloride fumes and 5 mg/m<sup>3</sup> for zinc oxide (dusts and fumes) in workplace air during an 8-hour workday, 40-hour workweek.

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

### References

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

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



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

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

## What are polycyclic aromatic hydrocarbons?

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

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

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

## What happens to PAHs when they enter the environment?

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

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

## How might I be exposed to PAHs?

- Breathing air containing PAHs in the workplace of coking, coal-tar, and asphalt production plants; 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.

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

### How can PAHs affect my health?

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

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

### How likely are PAHs to cause cancer?

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

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

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

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

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

### Has the federal government made recommendations to protect human health?

The Occupational Safety and Health Administration (OSHA) has set a limit of 0.2 milligrams of PAHs per cubic meter of air ( $0.2 \text{ mg/m}^3$ ). The OSHA Permissible Exposure Limit (PEL) for mineral oil mist that contains PAHs is  $5 \text{ mg/m}^3$  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  $0.1 \text{ mg/m}^3$  for a 10-hour workday, within a 40-hour workweek. There are other limits for workplace exposure for things that contain PAHs, such as coal, coal tar, and mineral oil.

### Glossary

Carcinogen: A substance that can cause cancer.

Ingest: Take food or drink into your body.

### References

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

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



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

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

### What is mercury?

(Pronounced mŭr/kyə-rē)

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

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

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

### What happens to mercury when it enters the environment?

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

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

### How might I be exposed to mercury?

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

### How can mercury affect my health?

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

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

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

### How likely is mercury to cause cancer?

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

### How can mercury affect children?

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

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

### How can families reduce the risk of exposure to mercury?

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

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

Pregnant women and children should keep away from

rooms where liquid mercury has been used.

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

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

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

### Has the federal government made recommendations to protect human health?

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

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

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

### References

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

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



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

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

#### What is copper?

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

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

#### What happens to copper when it enters the environment?

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

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

#### How might I be exposed to copper?

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

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

### How can copper affect my health?

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

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

### How likely is copper to cause cancer?

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

### How can copper affect children?

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

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

### How can families reduce the risk of exposure to copper?

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

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

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

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

### Has the federal government made recommendations to protect human health?

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

The Occupational Safety and Health Administration (OSHA) has set a limit of 0.1 mg per cubic meter (0.1 mg/m<sup>3</sup>) of copper fumes (vapor generated from heating copper) and 1 mg/m<sup>3</sup> of copper dusts (fine metallic copper particles) and mists (aerosol of soluble copper) in workroom air during an 8-hour work shift, 40-hour workweek.

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

### References

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

fireplaces or heating appliances in their homes.

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

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

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

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

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

### **Has the federal government made recommendations to protect human health?**

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

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

### **References**

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

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



This fact sheet answers the most frequently asked health questions (FAQs) about 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

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

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

### How can lead affect children?

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

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

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

### How can families reduce the risks of exposure to lead?

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

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

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

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

### Has the federal government made recommendations to protect human health?

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

EPA limits lead in drinking water to 15  $\mu\text{g}$  per liter.

### References

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

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



**This fact sheet answers the most frequently asked health questions (FAQs) about vinyl chloride. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It 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 vinyl chloride occurs mainly in the workplace. Breathing high levels of vinyl chloride for short periods of time can cause dizziness, sleepiness, unconsciousness, and at extremely high levels can cause death. Breathing vinyl chloride for long periods of time can result in permanent liver damage, immune reactions, nerve damage, and liver cancer. This substance has been found in at least 616 of the 1,662 National Priority List sites identified by the Environmental Protection Agency (EPA).**

### **What is vinyl chloride?**

Vinyl chloride is a colorless gas. It burns easily and it is not stable at high temperatures. It has a mild, sweet odor. It is a manufactured substance that does not occur naturally. It can be formed when other substances such as trichloroethane, trichloroethylene, and tetrachloroethylene are broken down. Vinyl chloride is used to make polyvinyl chloride (PVC). PVC is used to make a variety of plastic products, including pipes, wire and cable coatings, and packaging materials.

Vinyl chloride is also known as chloroethene, chloroethylene, and ethylene monochloride.

### **What happens to vinyl chloride when it enters the environment?**

- Liquid vinyl chloride evaporates easily. Vinyl chloride in water or soil evaporates rapidly if it is near the surface.
- Vinyl chloride in the air breaks down in a few days to other substances, some of which can be harmful.
- Small amounts of vinyl chloride can dissolve in water.
- Vinyl chloride is unlikely to build up in plants or animals that you might eat.

### **How might I be exposed to vinyl chloride?**

- Breathing vinyl chloride that has been released from plastics industries, hazardous waste sites, and landfills.
- Breathing vinyl chloride in air or during contact with your skin or eyes in the workplace.
- Drinking water from contaminated wells.

### **How can vinyl chloride affect my health?**

Breathing high levels of vinyl chloride can cause you to feel dizzy or sleepy. Breathing very high levels can cause you to pass out, and breathing extremely high levels can cause death.

Some people who have breathed vinyl chloride for several years have changes in the structure of their livers. People are more likely to develop these changes if they breathe high levels of vinyl chloride. Some people who work with vinyl chloride have nerve damage and develop immune reactions. The lowest levels that produce liver changes, nerve damage, and immune reaction in people are not known. Some workers exposed to very high levels of vinyl chloride have problems with the blood flow in their hands. Their fingers turn white and hurt when they go into the cold.

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The effects of drinking high levels of vinyl chloride are unknown. If you spill vinyl chloride on your skin, it will cause numbness, redness, and blisters.

Animal studies have shown that long-term exposure to vinyl chloride can damage the sperm and testes.

### How likely is vinyl chloride to cause cancer?

The U.S. Department of Health and Human Services has determined that vinyl chloride is a known carcinogen. Studies in workers who have breathed vinyl chloride over many years showed an increased risk of liver, brain, lung cancer, and some cancers of the blood have also been observed in workers.

### How can vinyl chloride affect children?

It has not been proven that vinyl chloride causes birth defects in humans, but studies in animals suggest that vinyl chloride might affect growth and development. Animal studies also suggest that infants and young children might be more susceptible than adults to vinyl chloride-induced cancer.

### How can families reduce the risk of exposure to vinyl chloride?

Tobacco smoke contains low levels of vinyl chloride, so limiting your family's exposure to cigarette or cigar smoke may help reduce their exposure to vinyl chloride.

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

The results of several tests can sometimes show if you have been exposed to vinyl chloride. Vinyl chloride can be measured in your breath, but the test must be done shortly after exposure. This is not helpful for measuring very low levels of vinyl chloride.

The amount of the major breakdown product of vinyl chloride, thiodiglycolic acid, in the urine may give some information about exposure. However, this test must be done shortly after exposure and does not reliably indicate the level of exposure.

### Has the federal government made recommendations to protect human health?

Vinyl chloride is regulated in drinking water, food, and air. The EPA requires that the amount of vinyl chloride in drinking water not exceed 0.002 milligrams per liter (mg/L) of water.

The Occupational Safety and Health Administration (OSHA) has set a limit of 1 part vinyl chloride per 1 million parts of air (1 ppm) in the workplace.

The Food and Drug Administration (FDA) regulates the vinyl chloride content of various plastics. These include plastics that carry liquids and plastics that contact food. The limits for vinyl chloride content vary depending on the nature of the plastic and its use.

### Reference

Agency for Toxic Substances and Disease Registry (ATSDR). 2006. Toxicological Profile for Vinyl Chloride (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 and Environmental Medicine, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaq.html>. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.



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

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

### What is trichloroethylene?

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

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

### What happens to trichloroethylene when it enters the environment?

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

plants and animals.

### How might I be exposed to trichloroethylene?

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

### How can trichloroethylene affect my health?

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

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

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

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

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

### How likely is trichloroethylene to cause cancer?

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

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

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

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

Exposure to larger amounts is assessed by blood

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

### Has the federal government made recommendations to protect human health?

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

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

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

### Glossary

Carcinogenicity: The ability of a substance to cause cancer.

CAS: Chemical Abstracts Service.

Evaporate: To change into a vapor or gas.

Milligram (mg): One thousandth of a gram.

Nonflammable: Will not burn.

ppm: Parts per million.

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

Solvent: A chemical that dissolves other substances.

### References

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

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

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

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

### What is tetrachloroethylene?

(Pronounced tět'rə-klôr' 0-ěth'ə-lēn')

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

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

### What happens to tetrachloroethylene when it enters the environment?

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

### How might I be exposed to tetrachloroethylene?

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

### How can tetrachloroethylene affect my health?

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

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

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

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

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

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

### How likely is tetrachloroethylene to cause cancer?

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

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

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

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

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

formed at special laboratories that have the right equipment.

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

### Has the federal government made recommendations to protect human health?

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

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

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

### Glossary

Carcinogen: A substance with the ability to cause cancer.

CAS: Chemical Abstracts Service.

Milligram (mg): One thousandth of a gram.

Nonflammable: Will not burn.

### References

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

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



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

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

### What is ethylbenzene?

(Pronounced ěth' əl bĕn' zĕn')

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

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

### What happens to ethylbenzene when it enters the environment?

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

### How might I be exposed to ethylbenzene?

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

### How can ethylbenzene affect my health?

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

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

### How likely is ethylbenzene to cause cancer?

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

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

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

### **How can ethylbenzene affect children?**

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

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

### **How can families reduce the risk of exposure to ethylbenzene?**

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

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

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

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

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

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

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

### **Has the federal government made recommendations to protect human health?**

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

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

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

### **References**

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

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



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

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

### What is toluene?

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

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

### What happens to toluene when it enters the environment?

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

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

Toluene does not usually stay in the environment long.

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

### How might I be exposed to toluene?

Breathing contaminated workplace air or automobile exhaust.

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

Drinking contaminated well-water.

Living near uncontrolled hazardous waste sites containing toluene products.

### How can toluene affect my health?

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

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

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

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

High levels of toluene may affect your kidneys.

### **How likely is toluene to cause cancer?**

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

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

### **How can toluene affect children?**

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

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

### **How can families reduce the risk of exposure to toluene?**

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

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

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

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

### **Has the federal government made recommendations to protect human health?**

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

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

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

### **References**

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

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



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

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

## What is xylene?

(Pronounced zī'lēn)

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

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

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

## What happens to xylene when it enters the environment?

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

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

## How might I be exposed to xylene?

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

## How can xylene affect my health?

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

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

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

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

### How likely is xylene to cause cancer?

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

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

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

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

### Has the federal government made recommendations to protect human health?

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

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

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

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

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

### Glossary

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

Carcinogenic: Having the ability to cause cancer.

CAS: Chemical Abstracts Service.

ppm: Parts per million.

Solvent: A liquid that can dissolve other substances.

### References

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

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



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

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

## What are fuel oils?

(Pronounced fyoo'el oilz)

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

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

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

## What happens to fuel oils when they enter the environment?

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

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

## How might I be exposed to fuel oils?

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

## How can fuel oils affect my health?

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

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

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

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

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

### How likely are fuel oils to cause cancer?

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

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

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

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

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

### Has the federal government made recommendations to protect human health?

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

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

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

### Glossary

Carcinogenic: Able to cause cancer.

CAS: Chemical Abstracts Service.

Evaporate: To change into a vapor or a gas.

Hydrocarbon: Any compound made up of hydrogen and carbon.

Milligram (mg): One thousandth of a gram.

ppm: Parts per million.

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

### References

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

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



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

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

## What is benzene?

(Pronounced bĕn'zĕn')

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

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

## What happens to benzene when it enters the environment?

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

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

## How might I be exposed to benzene?

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

## How can benzene affect my health?

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

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

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

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

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

### **How likely is benzene to cause cancer?**

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

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

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

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

### **Has the federal government made recommendations to protect human health?**

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

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

### **Glossary**

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

Carcinogen: A substance with the ability to cause cancer.

CAS: Chemical Abstracts Service.

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

Metabolites: Breakdown products of chemicals.

Milligram (mg): One thousandth of a gram.

Pesticide: A substance that kills pests.

### **References**

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

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



**ATTACHMENT C**  
**REPORT FORMS**

## WEEKLY SAFETY REPORT FORM

Week Ending: \_\_\_\_\_ Project Name/Number: Jamaica Works - 200278

Report Date: \_\_\_\_\_ Project Manager Name: Stephen Malinowski/Aдриanna Bosco

Summary of any violations of procedures occurring that week:

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

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

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Comments:

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Name: \_\_\_\_\_ Company: \_\_\_\_\_

Signature: \_\_\_\_\_ Title: \_\_\_\_\_



**INJURED - ILL:**

Name: \_\_\_\_\_ SSN: \_\_\_\_\_

Address: \_\_\_\_\_ Age: \_\_\_\_\_

Length of Service: \_\_\_\_\_ Time on Present Job: \_\_\_\_\_

Time/Classification: \_\_\_\_\_

**SEVERITY OF INJURY OR ILLNESS:**

\_\_\_ Disabling                      \_\_\_ Non-disabling                      \_\_\_ Fatality

\_\_\_ Medical Treatment                      \_\_\_ First Aid Only

**ESTIMATED NUMBER OF DAYS AWAY FROM JOB:** \_\_\_\_\_

**NATURE OF INJURY OR ILLNESS:** \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

**CLASSIFICATION OF INJURY:**

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

Part of Body Affected: \_\_\_\_\_

Degree of Disability: \_\_\_\_\_

Date Medical Care was Received: \_\_\_\_\_

Where Medical Care was Received: \_\_\_\_\_

Address (if off-site): \_\_\_\_\_

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

**PROPERTY DAMAGE:**

Description of Damage: \_\_\_\_\_

Cost of Damage:                   \$ \_\_\_\_\_

**ACCIDENT/INCIDENT LOCATION:** \_\_\_\_\_

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

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Was weather a factor?: \_\_\_\_\_

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

\_\_\_\_\_  
\_\_\_\_\_

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

\_\_\_\_\_  
\_\_\_\_\_

**ON-SITE ACCIDENTS/INCIDENTS:**

Level of personal protection equipment required in Site Safety Plan:

\_\_\_\_\_

Modifications:

Was injured using required equipment?:

\_\_\_\_\_

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

\_\_\_\_\_  
\_\_\_\_\_

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

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**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: \_\_\_\_\_

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Physician's recommendations: \_\_\_\_\_

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Date injured returned to work: \_\_\_\_\_

Follow-up performed by: \_\_\_\_\_

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Title

**ATTACH ANY ADDITIONAL INFORMATION TO THIS FORM**

**ATTACHMENT D**  
**EMERGENCY HAND SIGNALS**

## EMERGENCY SIGNALS

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

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

### EMERGENCY HAND SIGNALS

**OUT OF AIR, CAN'T BREATHE!**



**Hand gripping throat**

**LEAVE AREA IMMEDIATELY,  
NO DEBATE!**

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

**NEED ASSISTANCE!**



**Hands on top of head**

**OKAY! – I'M ALL RIGHT!  
- I UNDERSTAND!**



**Thumbs up**

**NO! - NEGATIVE!**



**Thumbs down**

**APPENDIX B**  
**QUALITY ASSURANCE PROJECT PLAN (QAPP)**

# **JAMAICA WORKS**

**95-25 149<sup>TH</sup> STREET  
QUEENS, NEW YORK**

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## **QUALITY ASSURANCE PROJECT PLAN**

**AKRF Project Number: 200278  
BCP Site Number: C241252**

### **Prepared for:**

NYSDEC Region 2  
1 Hunter's Point Plaza  
47-40 21<sup>st</sup> Street  
Long Island City, New York 11101

### **On Behalf Of:**

Radix 95-25 149<sup>th</sup> St LLC  
95-08 150<sup>th</sup> St LLC  
95-12 150<sup>th</sup> St 11435 LLC  
347 Fifth Avenue, 16<sup>th</sup> Floor  
New York, NY 10016

### **Prepared by:**



AKRF, Inc.  
440 Park Avenue South  
New York, New York 10016  
(212) 696-0670

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**AUGUST 2021**

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**ATTACHMENT**

- Attachment A – Project Team Resumes

## 1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) describes the protocols and procedures that will be followed during implementation of the Interim Remedial Measure (IRM) under the IRM Work Plan (IRMWP) at the Jamaica Works site, located at 95-25 149<sup>th</sup> Street and 95-08 and 95-12 150<sup>th</sup> Street in Queens, New York, hereafter referred to as the “Site”. The Site is identified on the New York City Tax Map as Queens Tax Block 10002, Lots 1, 10, and 13.

The objective of this QAPP is to provide for Quality Assurance (QA) and maintain Quality Control (QC) during the IRM under the New York State Department of Environmental Conservation (NYSDEC) oversight upon acceptance into the Brownfield Cleanup Program (BCP). Adherence to this QAPP will ensure that defensible data will be obtained during IRM implementation at the Site.

## 2.0 PROJECT TEAM

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

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

Marc Godick will serve as the QA/QC officer and will be responsible for adherence to this 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. Mr. Godick’s resume is included in Attachment A.

### 2.2 Remedial Engineer

Rebecca Kinal, P.E. will serve as the remedial engineer. As the remedial engineer, Ms. Kinal will oversee the design and installation of the sub-slab depressurization system (SSDS). Ms. Kinal’s resume is included in Attachment A.

### 2.3 Project Manager/Project Director

Stephen Malinowski, QEP will serve as the project manager. The project manager will be responsible for directing and coordinating all elements of the RAWP. The project manager will prepare reports and participate in meetings with the Site owner/Volunteer, and/or the NYSDEC. As project director, Mr. Malinowski will also be responsible for the general oversight of all aspects of the project, including scheduling, budgeting, data management, and field program decision-making. The project director will communicate regularly with all members of the AKRF and NYSDEC project teams to ensure a smooth flow of information between involved parties. Mr. Malinowski’s resume is included in Attachment A.

### 2.4 Deputy Project Manager

Adrianna Bosco will serve as the deputy project manager. The deputy project manager will be responsible for assisting the project manager. The deputy project manager will help prepare reports and will participate in meetings with the Site owner/Volunteer, and/or the NYSDEC. Ms. Bosco’s resume is included in Attachment A.

### 2.5 Field Team Leader, Field Technician, and Site Safety Officer (SSO)

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. The field team leader will also act as the field technician and 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. Tara Simmons will be the field team leader and the field team leader alternate will be Stephen Grens. Mr. Grens' and Ms. Simmons' resumes are included in Attachment A.

## 2.6 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 Christine Dusablou of Eurofins Test America (Eurofins). Eurofins, a New York State Department of Health (NYSDOH) Environmental Laboratory Accreditation Program (ELAP)-certified laboratory is being contracted to for all environmental sampling at the Site.

## 3.0 STANDARD OPERATING PROCEDURES (SOPS)

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

The temporary suction points will be installed according to the following procedure:

- Conduct a geophysical survey of each proposed vent and monitoring point location to identify any subsurface utilities in the work area. Mark locations on the ground with spray paint;
- Wet area down with a water mist to reduce dust from concrete;
- An electric core drill or hammer drill will be used to advance approximately 11 2.5-inch diameter temporary suction points through the concrete building slabs.
- After penetrating the slab, remove the underlying fill layer using a shop vacuum equipped with a granular activated carbon (GAC) filter and/or hand tools. Replace with a homogeneous gravel layer to optimize vacuum application.
- A diagnostic vacuum with a GAC filter will then be used to create a negative pressure beneath the concrete slab applied to the suction point.
- An electric hammer drill will be utilized to drill 5/16-inch holes on each side of the suction point to measure the negative pressure induced by the diagnostic vacuum. Subsequent monitoring points will be installed as needed to determine the radius of influence of each temporary suction point.
- Backfill each hole with Site soils when complete and restore the surface with concrete. Decontaminate the hammer drill bit prior to and following installation of each temporary suction point as described in Section 3.1 of this QAPP.
- Repeat the process at each proposed suction point location and add additional temporary suction points as necessary to establish design requirements to achieve a negative pressure under the each of the Site buildings.

- Document all work in the field logbook or on field data sheets.

### **3.1 Decontamination of Sampling Equipment**

All equipment will be either dedicated or decontaminated between sampling locations. Decontamination will be conducted to prevent discharge to the ground. The decontamination procedure will be as follows:

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

### **3.2 Management of Investigation-Derived Waste (IDW)**

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

## **4.0 FIELD TESTING PROCEDURES**

### **4.1 Communications Testing**

A geophysical contractor will be mobilized to the Site prior to the start of invasive activities to review the communications testing area, and will use a ground penetrating radar system to locate utilities. If utility lines or other anomalies are identified, any proposed suction or monitoring points will be relocated to avoid conflicts.

The communication testing will be conducted by a subcontractor by installing approximately 11 2.5-inch diameter suction points using an electric core drill to advance through the building slab, and removing the underlying fill layer using a shop vacuum and hand tools. This void space will be replaced with a homogeneous gravel layer to optimize vacuum application. A specialized sub-slab diagnostic vacuum blower equipped with a GAC filter will then be connected to the suction points, and will be capable of applying a vacuum of up to 100 inches of water column to the suction point, with flow rates up to 200 cubic feet per minute. The vacuum will then be used to create a negative pressure beneath the concrete slab applied to the suction point. Vacuum induced by this activity will then be measured at several smaller, 5/16-inch diameter monitoring points installed throughout the testing area at strategic locations relative to each suction point to determine the effective radius of influence (ROI) for each suction point. AKRF personnel will conduct air monitoring using a photoionization detector (PID) and particulate meter throughout the testing process. The PID will be used to monitor VOCs in the extracted vapors as well as ambient air concentrations in the buildings.

At each suction point, the applied vacuum and the airflow rate will be measured using a magnehelic differential pressure gauge, and a vane anemometer and/or pitot tube flow meter assembly, respectively. The induced vacuum will be measured at the smaller monitoring points using a micro manometer to assess induced vacuum at varying distances and directions from the applied vacuum point. A minimum target induced vacuum reading of 0.01 inches of water

column at the monitoring points will be used to establish the vacuum radius of influence (ROI) for the respective suction point. An additional suction point will be installed along the outer limits of this ROI, and a new test will be conducted to assess vacuum communication beneath the slab. This process will then be repeated, as necessary, throughout each building footprint.

All temporary suction and monitoring points will be patched using concrete grout and/or caulk after completion of the communication testing. During testing, urethane caulk will be used to seal any obvious cracks or other openings in the building slab that may cause short-circuiting of indoor air to the sub-slab.

This iterative testing approach will result in the identification of key locations for permanent suction points and induced vacuum monitoring points for a final SSDS design to ensure reliable SSDS coverage within each of the buildings and adequate system capacity for balancing and long-term coverage of the Site.

## **5.0 SAMPLING AND LABORATORY PROCEDURES**

### **5.1 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, staining,) using visual and olfactory methods and screen for volatile organic compounds (VOCs) using a photoionization detector (PID) equipped with an 11.7 electron Volt (eV) lamp.
- Collect a sample of the influent vapor at each suction point with a Tedlar<sup>®</sup> bag and screen for evidence of contamination with a PID. Collect a vapor sample for laboratory analysis of VOCs from one suction point displaying the highest reading on the PID for each of the four proposed SSDS.
- Collect sample in laboratory-supplied Summa<sup>™</sup> canister or Tedlar<sup>®</sup> bag, label the sample in accordance with Section 5.3.1 of this QAPP, and place in a container for shipment to the laboratory.
- Complete the proper chain of custody (COC) paperwork and seal the container.
- Record observations (evidence of contamination, PID readings, etc.) in field log book and boring log data sheet, if applicable.
- Decontaminate hand-held drill bit between sample locations as described in Section 3.1 of this QAPP.

### **5.2 Laboratory Methods**

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

**Table 1**  
**Laboratory Analytical Methods**

Matrix	Analysis	EPA Method	Bottle Type	Preservative	Hold Time
Soil Vapor	CVOCs	TO-15	Summa Canister or Tedlar <sup>®</sup> bag	None	14 days

### 5.3 Sample Handling

#### 5.3.1 Sample Identification

All samples will be consistently identified in all field documentation, COC documents, and laboratory reports. All samples will be amended with the collection date at the end of the sample name in a year, month, day (YYYYMMDD) format. Special characters, including primes/apostrophes ('), will not be used for sample nomenclature.

#### Sample Labeling and Shipping

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

- Project identification, including Site name, BCP Site number, Site address
- Sample identification
- Date and time of collection
- Analysis(es) to be performed
- Sampler's initials

Once the samples are collected and labeled, they will be placed in coolers and stored in an area away from direct sunlight to await shipment to the laboratory. All samples will be shipped to the laboratory at least twice per week.

The samples will be prepared for shipment by placing each sample in laboratory-supplied containers and into cartons for shipment to the laboratory. The COC 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 the COC. The COC 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.

### 5.4 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, a replacement instrument will be obtained as soon as possible. A calibration log will be maintained to record the date of each calibration, including any failure to calibrate and corrective actions taken. The PID will be equipped with an 11.7 electron volt (eV) lamp and will be calibrated each day using 100 parts per million (ppm) isobutylene standard gas in accordance with the manufacturer's standards.

**ATTACHMENT A**

**RESUMES OF QA/QC OFFICER, REMEDIAL ENGINEER, PROJECT DIRECTOR/PROJECT MANAGER,  
DEPUTY PROJECT MANAGER, AND FIELD TEAM LEADER**

## **MARC GODICK, LEP**

### **SENIOR VICE PRESIDENT**

Marc S. Godick, a Senior Vice President of the firm, has over 29 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.

### **BACKGROUND**

#### **Education**

ME, Pennsylvania State University, Engineering Science/Environmental Engineering, 1998  
BS, Carnegie Mellon University, Chemical Engineering, 1989

#### **Licenses/Certifications**

Licensed Environmental Professional (LEP), CT - 396

#### **Professional Memberships**

Chairman, Village of Larchmont/Town of Mamaroneck Coastal Zone Management Commission  
Member, Westchester County Stormwater Advisory Board  
Chairman/Member, Westchester County Soil and Water Conservation District  
Board of Directors, Sheldrake Environmental Center  
Member, NYSDEC Risk-Based Corrective Action (RBCA) Advisory Group for Petroleum-Impacted Sites  
Community Leadership Alliance, Pace University School of Law

#### **Years of Experience**

29 years in the industry  
17 years with AKRF

### **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



## **MARC GODICK, LEP**

**SENIOR VICE PRESIDENT**

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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.

### **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.

### **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.

### **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.



## **MARC GODICK, LEP**

**SENIOR VICE PRESIDENT**

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### **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.

### **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.



# **STEPHEN T. MALINOWSKI, QEP**

## **VICE PRESIDENT**

Stephen Malinowski is a Vice President with more than 20 years of professional experience in assessment, investigation, and remediation of environmental contamination-related issues. Steve has managed all aspects of environmental projects with multi-disciplinary teams, including public agencies, developers, property owners, architects, and construction managers to navigate regulatory programs efficiently and achieve project objectives. His projects fall under the regulatory oversight of the USEPA, NYSDEC, NYCDEP and NYCOER including the Federal and New York State Superfund, New York State Brownfield Cleanup Program (BCP) and petroleum spills, RCRA/IUC closures, New York City Voluntary Cleanup Program (VCP) and E-Designation program, and Nassau and Suffolk County regulatory programs. His proficiency in the development of custom scopes of work and accurate cost estimates coupled with his field-experience, knowledge of regulations, and excellent rapport with regulatory personnel allow him to provide turnkey environmental consulting for remediation, development, infrastructure improvement, and coastal resiliency projects.

Mr. Malinowski's experience includes the design, implementation, and management of environmental assessment, investigation and remediation projects in the New York Metropolitan Area including soil groundwater investigation, monitoring, and sampling programs, Brownfield and hazardous waste site investigations; underground storage tank studies, including soil contamination delineation, classification, waste removal and disposal. He has overseen and conducted hundreds of Phase I Environmental Site Assessments (ESAs) and Phase II investigations in a variety of environmental settings ranging from industrial sites to sites in challenging urban areas, many of them in conjunction with site redevelopment and property transaction related activities. In addition, Steve has designed and implemented indoor air and soil vapor intrusion surveys at industrial, commercial and residential properties in accordance with NYSDOH protocols, some requiring sub-slab depressurization or soil vapor extraction systems.

### **Education**

B.A., Environmental Science, State University of New York at Plattsburgh

### **Licenses/Certifications**

Qualified Environmental Professional from the Institute of Professional Environmental Practice (IPEP)

New York State Professional Geologist -000422

Certified Brownfield Professional by New York City Office of Environmental Remediation

Health and Safety Operations at Hazardous Materials Sites 29 CFR 1910.120

OSHA 10 Hour Occupational Construction Safety and Health

### **Professional Memberships**

Member, Long Island Association of Professional Geologists (LIAPG)

Member, Institute of Professional Environmental Practice (IPEP)

### **Awards**

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

Big Apple Brownfield Award recipient as part of the Flushing Commons redevelopment team 2017

Big Apple Brownfield Award recipient as part of the Jamaica 94<sup>th</sup> Avenue redevelopment team 2017

### **Years of Experience**

Year started in company: 2013

Year started in industry: 1992



# STEPHEN T. MALINOWSKI, QEP

VICE PRESIDENT

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## RELEVANT EXPERIENCE

### 85 Jay Street, Brooklyn, NY - NYS Brownfield Redevelopment

Mr. Malinowski was responsible for preparation and implementation of a NYSDEC-approved Remedial Action Work Plan for this approximately three-acre former industrial site that encompasses an entire city-block. The remediation is being conducted under the NYSDEC Brownfield Cleanup Program, primarily due to high levels of lead associated with former smelting operations. His responsibilities included overseeing an in-situ soil pre-characterization testing program to obtain pre-approval from the disposal of approximately 170,000 cubic yards of soil during the foundation excavation. Mr. Malinowski assisted with the review and procurement of bids for the off-site transport and disposal of multiple soil waste streams.

As part of the approval process, Mr. Malinowski oversaw extensive testing to delineate the extent of lead and other hot spot areas of contamination. The testing program included the development of a bench-scale study to condition the lead in-situ with a patented product to reduce its leachability from the soil and lower disposal costs. Based on the results of the bench tests, a Soil Stabilization Plan detailing an in-situ pilot study followed by wide-scale implementation was prepared and approved by NYSDEC. Upon receipt of the pilot test results, the soil conditioning program was approved for implementation for 40,000 tons of lead contaminated material. The project is in the midst of remediation, and Mr. Malinowski is managing the soil conditioning program, the excavation monitoring (CAMP and CHASP), and the daily and monthly reporting obligation to NYSDEC. **The project anticipates a 12-month construction period and is projected to achieve a Track 1 cleanup in 2019.**

### Elton Crossing (Melrose C - Family), Bronx, NY - NYS Brownfield Redevelopment

Mr. Malinowski was responsible for overseeing the implementation of the NYSDEC-approved Remedial Action Work Plan for this former industrial property. His responsibilities included the in-situ testing of all site soil to obtain pre-approval from facilities for 15,000 tons of soil disposal during the foundation excavation. Mr. Malinowski secured approval and procured bids for the off-site transport and disposal for six different classifications of soil. During excavation, Mr. Malinowski coordinated the transport and disposal of excavated material with the foundation contractor, while on-site personnel working under his direction managed the excavation and manifests for each truckload leaving the site. Mr. Malinowski was the regulatory and technical lead for the remediation, which involved providing guidance for the closure of two petroleum spills; the registration, removal, and closure of five petroleum storage tanks encountered during excavation; and the delineation of soil contaminants, including hazardous lead, petroleum, and pesticides. His efforts prior to construction and his strong communication skills allowed the foundation excavation to advance with minimal delays from environmental matters.

Additionally, Mr. Malinowski oversaw the implementation of the Community Air Monitoring Program (CAMP) during soil excavation activities and developed a soil-testing program that allowed the client to reuse certain material on-site, avoiding delays and soil import fees. The site was remediated to achieve Track 4 site-specific cleanup criteria and received a Certificate of Completion in 2016.

### 147-25 94th Avenue, Queens, NY - NYS Brownfield Redevelopment

**Mr. Malinowski is directing all Phases of this NYS Brownfield project located within the Jamaica BOA.** As project technical lead, Mr. Malinowski has been responsible for overseeing the implementation of a Phase I Environmental Site Assessment and asbestos survey of this former industrial property adjacent to the Long Island Rail Road tracks. Since the site had an E-Designation for hazardous materials, noise and air quality, Mr. Malinowski led a meeting with OER to coordinate all technical deliverables to satisfy the predevelopment requirements and obtain a Notice to Proceed. Additionally, he designed a scope of work for the Remedial Investigation that would satisfy both OER and the NYSDEC Brownfield Cleanup Program.



## STEPHEN T. MALINOWSKI, QEP

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Upon the receipt of results indicating the presence of contaminated soil and soil vapor beneath the site, the client decided to apply for the NYS BCP. Mr. Malinowski was responsible for preparing and submitting the BCP Application simultaneously with the Remedial Investigation Report and a Remedial Action Work Plan (RAWP) to expedite the approval process and enable implementation of the remediation concurrently with construction. Mr. Malinowski prepared a remedial estimate for the activities required by the RAWP, allowing the client to obtain financing for construction. **The project is scheduled to begin construction in September of 2018.**

### **New York City Department of Design and Construction (NYCDDC) Feasibility and Pre-Scoping Services for East Side Coastal Resiliency, New York, NY**

Mr. Malinowski lead the subsurface exploration program for a multidisciplinary design team selected by the New York City agency partnership of NYCDDC, New York City Department of Parks and Recreation (NYCDPR), New York City Department of Transportation, and the Mayor's Office of Recovery and Resiliency (ORR) or the Feasibility Study and Pre-Scoping Services for East Side Coastal Resiliency (ESCR) project. AKRF provided technical analysis and pre-scoping services, including complex conceptual 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 petroleum-related contamination along a 2.5 mile study area from Montgomery Street to East 23rd Street to develop a Subsurface Investigation Work Plan for approval by the NYCDEP. The program included both public and private utility mark-out services across vast areas of the project containing critical infrastructure to enable the installation of 81 deep borings, 515 shallow borings, and 10 temporary groundwater wells.

Mr. Malinowski was in charge of all aspects of the management and implementation of the field investigation including access coordination, permitting, and reporting. He was also responsible for interpretation of a wide-range of data, providing critical cost and health/safety advice to the design team, and preparation of technical reports for NYCDEP in order to satisfy City Environmental Quality Review (CEQR) requirements.

### **New York City Department of Design and Construction (NYCDDC) Preliminary and Final Design Services for East Side Coastal Resiliency, New York, NY.**

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

Mr. Malinowski worked with the design team to identify additional data needs based on advances in the design and developed a Supplemental Subsurface Investigation Work Plan for NYCDEP-approval. **Mr. Malinowski leads all aspects of the management and implementation of the supplemental field investigation including access coordination, utility locating, permitting and reporting. He is responsible for the interpretation of a wide-range of data, and to provide critical cost and health/safety direction to the design team. He is also responsible for preparation of all reports (EIS, cost reports, Soil and Groundwater Management Plan, and presentations to the NYC team.)**

**Mr. Malinowski has led extensive geology and hydrogeological studies to evaluate the impacts of the flood protection structure on the groundwater flow and transport of MGP-related wastes. He is currently supporting the City team with the coordination of remedial efforts pertains to MGP contaminants with NYSDEC, Con Ed and the various public and private entities that have a stake in the project. Once the preliminary design is released, Steve will prepare environmental specifications for the project to be used during the procurement of contractor bids.**



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### **Remedial Design, Gowanus Canal First Street Turning Basin, New York City Department of Design and Construction**

Mr. Malinowski is the Project Manager for the remedial design for restoration of the Filled-in Former First Street Turning Basin adjacent to the Gowanus Canal in Brooklyn, New York. The remediation is being conducted as part of an Order of Consent between the City of New York and USEPA for the Gowanus Canal Superfund Site. Steve is responsible for coordination of a multidisciplinary team to evaluate existing structure and environmental conditions associated with the site and the immediate surrounding area. Steve is overseeing the implementation of underwater bulkhead inspections and multi-beam sounding surveys in the Gowanus Canal, environmental and geotechnical investigations, surveys, structural and existing condition evaluations of nearby properties and is responsible for all reporting and communications for the project. He is working with nearby property owners to initiate access agreements for work on their properties. Steve is also assisting the DDC with presentations at the Gowanus Community Action Group and is working closely with the USEPA to implement an archaeology monitoring plan during subsurface disturbance activities

The remedial design will include removal of fill and sediment within the filled-in turning basin in an approximately 475-foot by 50-foot area and the creation of a wetland shelf. Design considerations include geotechnical concerns related to adjacent buildings and new and existing bulkheads; soil and water management; landscape design; and access/construction logistics. The project design is anticipated to be completed in early 2018.

### **13<sup>th</sup> and 14<sup>th</sup> Street Realty, NYS Brownfield Redevelopment, New York, NY**

Mr. Malinowski directed all Phases of this NYS Brownfield project including the initial investigation, submittal of a BCP Application simultaneously with a Remedial Investigation Work Plan and an Interim Remedial Measures Work Plan, which enabled the investigation and remediation to be implemented concurrently with planned site redevelopment activities. The site consisted of an approximately 20,000 square foot property in Manhattan comprised of 100 year old dilapidated buildings. The presence of perchloroethene (PCE) contamination associated with a former dry cleaner prevented the property owner from selling. The developer applied to the New York State Brownfield Cleanup Program (BCP) as a "Volunteer" to eliminate off-site liability. Prior to the client securing its construction loan all plans were approved by NYSDEC and a detailed remedial estimate was approved for financing by the client's lending institutions.

The investigation included soil and soil vapor testing as well as the installation and sampling of groundwater monitoring wells. The remediation activities included the removal of underground oil tanks, soil waste classification testing, and removal of approximately 15,000 tons of non-hazardous petroleum and lead contaminated soil as well as 200 tons of hazardous soil containing PCE. A water-proofing membrane was installed beneath the entire building to eliminate the exposure pathway for PCE into the new 8-story residential building. The investigation and remedial work was performed under a construction health and safety plan that included a community air monitoring program. The client received approximately \$6,000,000 in tax credits from NYS for the Track 2 cleanup of this underutilized contaminated property.

### **16 Bridgewater Street Brooklyn**

#### **Confidential Client – Litigation Support Services, Greenpoint, Brooklyn, NY – Waterfront Petroleum Spill**

AKRF was contracted by a private land owner of a 17-acre site along the Newtown Creek waterfront located above the 55-acre 20-million gallon underground petroleum plume. The site is located on property formerly utilized for petroleum refining and storage, and the property owner requested assistance understanding the impacts, negotiating investigation and cleanup activities with ExxonMobil and NYSDEC, to protect employees and limit disturbances to business operations. Mr. Malinowski's initial role in 1999 involved the review of work plans, investigation and remediation reports and acting as a liaison between the Site Owner, ExxonMobil, and NYSDEC to mitigate seepage of petroleum through the bulkhead into Newtown Creek. In 2005, ChevronTexaco's predecessor, Texaco, Inc. assumed responsibility for an approximate 11-acre portion of the



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property situated along the waterfront and initiated a site characterization which identified soil, groundwater and soil vapor concerns beneath the property. Mr. Malinowski was responsible for evaluating the impacts and assessing the alternative analysis evaluation to select a remedy that protected site personnel and cleaned up the property. Since ExxonMobil was remediating a portion of the property and the surrounding neighborhood and Texaco, Inc. was responsible for the waterfront parcel, Mr. Malinowski's role also involved discussions with ExxonMobil, Texaco, and NYSDEC to ensure the cleanup strategies were coordinated to address the potential of additional petroleum migrating onto the property.

In addition to reviewing, overseeing and advising on the investigation and cleanup activities, Mr. Malinowski has prepared Phase I Environmental Site Assessments for the property, reviewed historic maps and documents on the refining history of Newtown Creek, initiated indoor air monitoring programs, arranged for the removal of underground oil tanks, designed and installed sub-slab depressurization systems, and responded to ongoing work inquiries by the oil companies. He also managed the development of and implementation of a Stormwater Pollution Prevention Plan to comply with a NYSDEC Order on Consent and conducted waste classification and disposal for hazardous fill material encountered during construction of the stormwater treatment system. **Mr. Malinowski's work for this client remains ongoing.**

### **Empire State Varnish Corporation - RCRA Closure, Greenpoint, Brooklyn, NY**

Mr. Malinowski orchestrated the Closure of a varnish company with a host of RCRA problems situated over our Nation's largest underground oil spill by negotiating an investigation and cleanup with NYSDEC and the property purchaser ExxonMobil. The \$750,000 remedial cost estimate was utilized to create an escrow account to finance the investigation and remediation. The remediation included the disposal of more than 1,000 drums of hazardous/flammable waste, 17 underground storage tanks, and a vast inventory of small containers of hazardous material, off-site disposal of approximately 700 tons of non-hazardous soil, abatement of asbestos containing material and construction health and safety monitoring. The work was performed under the oversight of NYSDEC's RCRA unit as well as Albany's Bureau of Environmental Remediation overseeing the regional ExxonMobil Off-site Spill aka the Greenpoint Oil Spill. The completed project provided ExxonMobil with a strategically located property to greatly increase their remediation efforts of the regional petroleum spill and avoided the property being listed on the New York State's list of inactive hazardous waste sites.

### **Litigation Support Services, Long Island City, Queens, NY**

AKRF was contracted by two separate litigation groups to identify historic ownership, waterfront landfilling activities, and land use practices from the earliest period of development through the present for an approximately 300,000-squarefoot area along the Newtown Creek waterfront. The project site had a long history of industrial activity including coal and petroleum refining, chemical storage and manufacturing, and petroleum recycling. Mr. Malinowski worked with AKRF's historians to review data gathered from various resources, such as historic maps, historic photographs, historic conveyance records, newspaper articles, local histories, and readily available records such as historic aerial photographs, Sanborn fire insurance maps, historic topographical maps, historic city directories, and transcripts and exhibits from depositions conducted in litigation. The data collected was used to prepare a summary of the development and industrial history for the project area detailing ownership, property uses, and landfilling activities along the Newtown Creek waterfront.

### **Waterview at Greenpoint, LLC, NYC OER VCP, 77 Commercial Street Brooklyn, NY**

AKRF provided environmental consulting services in connection with the proposed affordable housing development at 77 Commercial Street as part of ongoing revitalization of the Greenpoint waterfront. The project comprises the redevelopment of an approximately 110,000-squarefoot former industrial parcel into a mixed-use commercial/residential development including public waterfront esplanade, affordable housing, and three interconnected buildings ranging from 2 to 40 stories. **The site is being remediated under the New York City Mayor's Office of Environmental Remediation (OER), and is listed with an E-Designation for Hazardous Materials, Air Quality, and Noise.**



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Mr. Malinowski oversaw the preparation of a Remedial Investigation Work Plan and implementation of a Remedial Investigation (RI) which included 38 soil samples, 6 groundwater samples, and 11 soil vapor samples. Based on the results of the RI, he oversaw the preparation of a Remedial Action Work Plan (RAWP) that included excavation of approximately 90,000 tons of soil, removal of underground oil tanks, installation of a vapor barrier beneath the entire building, and design drawings for a sub-slab depressurization system. Upon approval of the RAWP, Mr. Malinowski helped enroll the project into OER's Voluntary Cleanup Program (VCP) to enable an exemption from hazardous waste disposal taxes and to capitalize on additional community involvement provided by OER. AKRF, OER, and community leaders developed proactive measures to limit the potential disturbances from construction and to help keep concerned community members informed of planned activities. He also designed and conducted an extensive in-situ testing of soil to pre-classify the material for disposal.

Mr. Malinowski managed the associated E-Designation work for Air Quality and Noise (E-138) to render the site protective of Air Quality and Noise impacts. The work included a site-specific noise study and evaluation of proposed fuel types, mechanical equipment, and emission stack locations to prepare an Air Quality and Noise Remedial Action Plan (RAP). All documents were approved by OER and the project is awaiting groundbreaking and start of construction.

### **Flushing Commons Development, NYC OER VCP Site, 38-18 Union Street, Queens, NY**

AKRF prepared an Environmental Impact Statement (EIS) under New York City Environmental Quality Review (CEQR) for Flushing Commons, LLC, a 2-million-square-foot mixed-use, private-public development in Flushing, Queens. The project was sponsored by EDC and developed in partnership with Flushing-based TDC Development and Construction (TDC), and Rockefeller Group Development. As a result of the environmental review process a Restrictive Declaration was assigned to the property. Due to the scale of the project, the project development was divided into two Phases.

Flushing Commons Phase I included a 67,600-square-foot automotive parking area at 38-18 Union Street. Mr. Malinowski prepared a Remedial Investigation Work Plan and oversaw the implementation of a Remedial Investigation (RI), which included soil, groundwater, and soil vapor samples. Based on the results of the RI, AKRF prepared a Remedial Action Work Plan (RAWP) including excavation of approximately 178,000 tons of soil and a vapor barrier beneath the entire building. Upon approval of the RAWP, Mr. Malinowski helped enroll the project into OER's Voluntary Cleanup Program (VCP) to capitalize on additional community involvement provided by NYCOER. AKRF also conducted extensive waste characterization testing of the soil to pre-classify the material for disposal, provided construction oversight, and implemented a Community Air Monitoring Program (CAMP) during 11 months of excavation.

Mr. Malinowski received a Big Apple Brownfield award from the NYC Brownfield Partnership for employing sustainable remediation practices during the excavation. Mr. Malinowski coordinated participation in OER's Clean Soil Bank program, which led to the reuse of approximately 14,000 cubic yards of material to nearby local areas affected by Super Storm Sandy and 20,000 cubic yards of soil to a recycling plant for reuse as concrete mix. These efforts eliminated more than 1,500 truck trips to regional disposal locations outside of NYC, effectively reducing the carbon footprint of the redevelopment, and provided for the reuse of material on-site and elsewhere in NYC. To complete the project, AKRF prepared a Remedial Action Report documenting the Track 1 cleanup of the site, which was approved by OER.

### **Brickens Construction, 121<sup>st</sup> Precinct, 970 Richmond Avenue, Staten Island, NY**

Mr. Malinowski assisted Brickens Construction with the pre-characterization of approximately 15,000 tons of soil requiring excavation under a NYC DDC contract for the construction of the 121<sup>st</sup> Precinct on Staten Island. Mr. Malinowski designed a waste classification testing program, obtained approval from suitable disposal facilities and prepared an Excavated Materials Disposal Plan (EMDP) for review by NYC DDC. Upon approval of the EMDP,



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Mr. Malinowski coordinated the direct loading, transportation and disposal of the material while staff working under his direction initiated a community air monitoring program, and tracked each shipment for reporting purposes. As the excavation advanced, Mr. Malinowski arranged groundwater testing and worked with the project engineering team to design a dewatering scheme and obtain a permit from the NYCDEP to discharge dewatering fluids to the combined sewer system.

### **2264-2772 Morris Avenue, NYCDEP CEQR, Bronx, NY**

AKRF is providing environmental hazardous materials and consulting services in connection with the proposed affordable housing development at 2264-2772 Morris Avenue. The proposed 11-story building is expected to include 94 much-needed units of new affordable and supportive housing. Mr. Malinowski oversaw the preparation of hazardous materials reports for the project site including a Phase I ESA and Phase II site investigation for pre-purchase due diligence purposes. As part of the CEQR review, a Phase II Work Plan and Supplemental Phase II Investigation were performed under the regulatory oversight of the New York City Department of Environmental Protection (NYCDEP). Mr. Malinowski oversaw the preparation of a Remedial Action Plan (RAP) for NYCDEP approval which includes the removal of underground storage tanks (USTs), characterization and disposal of approximately 5,000 tons of soil, and the installation of a vapor barrier. AKRF is currently overseeing the implementation of the RAP and under Mr. Malinowski's direction has removed the USTs, cleaned up a petroleum spill to the satisfaction of the NYSDEC, and is conducting community air monitoring during the foundation excavation.

### **3363-3365 Third Avenue, NYC OER VCP site, Bronx, NY**

AKRF is providing environmental consulting services in connection with the proposed affordable housing development at 3363-3365 Third Avenue. The proposed project consists of a residential building with a basement and approximately 30 affordable housing units. Mr. Malinowski oversaw the preparation of Phase I ESA for due diligence purposes and to support an application to the New York City Acquisition Fund. The Phase I identified recognized environmental conditions as well as an E- Designation from the Morrisania Rezoning Action. Mr. Malinowski is assisting the client with satisfying the E –Designation and has prepared and implemented a Remedial Investigation Work Plan under the regulatory oversight of the New York City Mayor's Office of Environmental Remediation (NYCOER). The Remedial Investigation included soil, soil vapor, groundwater and ambient air sampling. AKRF also prepared a Remedial Action Work Plan (RAWP) and conducted which includes the design of a sub-slab depressurization system (SSDS) and vapor barrier system to prevent potential soil vapor intrusion. AKRF conducted waste disposal testing to characterization approximately 4,500 tons of soil for off-site disposal and is currently conducting environmental monitoring during excavation of the site soils and installation of the SSDS and vapor barrier. The site is enrolled in NYCOER's Voluntary Cleanup Program and the client is anticipating receiving the maximum allowable Brownfield Incentive Grant for this affordable housing project.

Entire City block W31st, W33rd, between 9th and 10th Ave

### **Manhattan West, Manhattan, NY - NYC OER and USEPA**

AKRF is providing environmental consulting services to Brookfield Office Properties in connection with the Manhattan West development site, which encompasses an entire city-block above the Amtrak approach to Penn Station. The four towers that comprise the Manhattan west development site are being remediated as four different sites under the New York City Mayor's Office of Environmental Remediation (OER), due to an E-Designation for hazardous materials, air quality, and noise attenuation. Mr. Malinowski managed all aspects of the work required for the OER E-Designation at the Southwest Tower site to achieve a Notice of Satisfaction (NOS), and is currently managing the OER-related work for the Northwest and Southeast Towers.

Mr. Malinowski oversaw the preparation of Remedial Investigation work plans and the initiation and reporting of the Remedial Investigations (RIs). Each RI included soil, groundwater, and soil vapor sampling to identify potential contamination. Based on the results of each RI, Mr. Malinowski oversaw the preparation of a site-specific



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Remedial Action Work Plan (RAWP) for building foundation elements located within a subterranean railroad and active Amtrak rail lines. The RAWP included site-wide soil excavation, the removal of underground oil tanks, and the installation of a vapor barrier beneath the entire building. Due to the presence of PCBs, the subterranean work was conducted under a Self-Implementing Cleanup Plan prepared by AKRF and approved by the USEPA. Upon approval of the remedial plans, Mr. Malinowski oversaw the remediation activities to ensure compliance with the OER RAPs. Mr. Malinowski also designed and conducted an extensive in-situ testing of soil to pre-classify the material for disposal. He continues to work with the USEPA as the foundation for the Southeast Tower is completed.

The noise and air quality E-Designation work for each site included window-noise attenuation assessments, evaluation of proposed fuel types, management of mechanical equipment, and evaluation of proposed fuel types and emission stack locations. Mr. Malinowski coordinated the preparation and timely completion of the air quality and noise Remedial Action Plans (RAPs) and air quality and noise installation reports to coincide with project milestone for NYCDOB approvals. Additionally, Mr. Malinowski worked with Brookfield to classify proposed excavation material for disposal to support the W. 31st Street viaduct replacement adjacent to the Manhattan West project.

### **Environmental Consulting Services for NYCOER E-designated and VCP Sites, Various Locations, NY**

Mr. Malinowski has provided environmental services required to satisfy hazardous materials-related E-designations on various locations in New York City, including 3363-3365 Third Avenue in the Bronx for Bronx Pro Real Estate Management, Flushing Commons in Queens, NY for the Rockefeller Group Development Corp., Manhattan West for Brookfield Properties, 432 East 14<sup>th</sup> Street in Manhattan for Urban Development Partners, 77 Commercial Street in Brooklyn, NY for Clipper Equities, and 260 West 26<sup>th</sup> Street in Manhattan and 94-02 148<sup>th</sup> Street in Queens, NY for Artimus Construction. These services included Phase I environmental site assessments, remedial investigations, preparation of Sampling Protocols, Remedial Action Plans and Health and Safety Plans based on identified hazardous materials issues, correspondence with the New York City Mayor's Office of Environmental Remediation (OER), remediation oversight as required by identified conditions, and preparation of Remedial Investigation and Remedial Closure Reports. He initiated pre-disposal soil classification programs and assisted with the disposal of large volumes of soil displaying characteristics from clean to hazardous containing to facilitate the installation of the new building foundations.

### **94-02 148th Street, Queens, NY - NYS Brownfield Redevelopment**

Mr. Malinowski was responsible for directing the assessment and preconstruction investigation activities for a former industrial property with an E-Designation for Hazardous Materials and Noise located within the Jamaica Brownfield Opportunity Area (BOA). Mr. Malinowski was responsible for designing the scope of the Remedial Investigation to satisfy the hazardous materials E-Designation, as well as for coordinating the pre-demolition asbestos survey and the noise survey to obtain the Notice to Proceed from the Mayor's Office of Environmental Remediation's (OER). The Remedial Investigation revealed the presence of contaminated soil and soil vapor beneath the site, and the developer entered the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP) through OER's JumpStart program. The remediation consisted of soil excavation and the removal of seven underground storage tanks. The site achieved an unrestricted use Track 2 cleanup and was the first project to receive a Certificate of Completion under the post-2015 amendment BCP.

### **Environmental Consulting Services for NYCDEP Sites, Various Locations, NY**

Mr. Malinowski has provided environmental services required to satisfy hazardous materials-related requirements on various locations in New York City, 23-25 Wooster Street and 325-329 West Broadway and 98 Franklin Street



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in Manhattan, NY for DDG Partners, 48-21 5<sup>th</sup> Avenue in Queens, NY for the Milestone Group, 2264-2272 Morris Avenue and 1070 Washington Avenue and 2264-2272 Morris Avenue in the Bronx, NY for the Bronx Pro Group, 1734 St. John's Place in Brooklyn, NY for MDG Design and Construction, LLC, and 20 West 40<sup>th</sup> Street in Manhattan for HFZ Capital. These services included Phase I environmental site assessments, remedial investigations, preparation of Sampling Protocols, Remedial Action Plans and Health and Safety Plans based on identified hazardous materials issues, correspondence with the New York City Department of Environmental Remediation oversight as required by identified conditions, and preparation of Site Investigation and Closure Reports. He has also initiated pre-disposal soil classification programs and assisted with the disposal of large volumes of soil to facilitate the installation of the new building foundations. Many of the projects with NYCDEP also involved the New York City Housing and Preservation Department (NYCHPD).

### **875 Tenant Corp., Oil Spill Investigation and Remediation, New York, NY**

Mr. Malinowski assisted one of the most prestigious real estate organizations in the northeast to investigate and remediate a petroleum spill in the basement of one of their high-rise residential properties along central park east in Manhattan. The source of the spill was a petroleum storage tank containing #6 fuel oil located in an exterior vault beneath the adjoining sidewalk. The contamination was located beneath the tank vault and adjacent to the foundation wall. The location of the oil and the viscous nature of the oil necessitated the need for innovative technology to remediate the spill with the least amount of disruption to this fully occupied and active residential building.

Mr. Malinowski performed a subsurface investigation to determine the extent of the impacts and assisted with the design and installation of a multi-phase extraction system in the building's sub-basement. The extraction system was fabricated on-site and consisted of eight extraction points to remove petroleum and groundwater pooled outside the foundation of the buildings' subbasement. The treatment system operated under a Stipulation Agreement with NYSDEC and required a NYCDEP sewer discharge permit. To mobilize the viscous oil steam was injected outside the foundation wall beneath the tank vault at nine locations. Formal spill closure was received by NYSDEC after a surfactant application was applied to the wells to eliminate the dissolved petroleum constituents and the subbasement walls were sealed with a chemical grout to prevent exposure to building occupants. Mr. Malinowski was responsible for all project activities, prepared all plans and reports and maintained communications with NYSDEC and the Tenant Board.

### **Site Investigation, Albanese Organization, Wyandanch, NY**

AKRF performed a Phase II subsurface investigation for the Albanese Organization to support the Wyandanch Rising project located on the Long Island Rail Road (LIRR) and Town of Babylon parking areas immediately located north of the Wyandanch train station. Prior to beginning the work, AKRF obtained a rail road protective liability insurance policy for the project and a Site Entry Permit from LIRR. The work consisted of the installation of soil and groundwater borings as well as the inspection and sampling of 13 stormwater drywells and five sanitary leaching structures under the oversight of the Suffolk County Department of Health Services (SCDHS). Based on these results, the SCDHS issued a "no further action" letter and the client was able to obtain financing for the project.

### **Gas Station Closure and Property Transfer, Hewlett, NY**

On behalf of a private property owner, AKRF provided third party oversight for closure of a filling station by a major national gasoline retailer and assisted with environmental matters which complicated the sale of the property to a commercial developer. The remedial work conducted by the gasoline retailer included the removal of three active and five improperly abandoned underground storage tanks and pump islands and the three hydraulic lifts. AKRF maintained direct communication with the New York State Department of Environmental Conservation (NYSDEC) to ensure that the on-site soil was excavated to the furthest extent possible and that a post-remedial groundwater monitoring plan was promptly initiated so the property could be promptly redeveloped. Additional investigation activities conducted by the purchaser revealed the presence of chlorinated solvents in the groundwater above NYSDEC groundwater standards which further complicated the pending transaction. AKRF



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conducted research of the surrounding area and contacted the United States Environmental Protection Agency (EPA) regarding a well-documented nearby solvent plume. AKRF's efforts expedited the closure of the fuel spill and our communications with NYSDEC and EPA provided a level of comfort to the Purchaser that allowed the property transaction to proceed.

### **Drywell Remediation, ABCO Refrigeration Company, Hauppauge, New York**

Mr. Malinowski assisted the ABCO Refrigeration Company with a real estate transaction complicated by stormwater drywells contaminated with semi-volatile organic compounds. AKRF notified the Suffolk County Department of Health Services (SCDHS) and performed further investigation activities to test the sanitary system for contamination and utilized a remote camera to locate additional drywells buried beneath the asphalt pavement. The remedial work included characterizing the sediments for disposal approval at a New York State-approved disposal facility and obtaining liquid waste disposal approval from the Suffolk County Department of Public Works (SCDPW). The remediation was conducted using a high-powered vacuum truck under the oversight of SCDHS and included the disposal of approximately 5,000 gallons of liquid and 42 tons of soil from four drywells servicing the property. Post-remedial sediment samples were collected from the base of the drainage structures to document the soil quality. Based on these results, the SCDHS issued a "no further action" letter and the property transaction proceeded on schedule.

### **Island Realty, Holbrook and Ronkonkoma, New York**

During the pre-purchase environmental due diligence process for the purchase of an eight multi-tenant industrial building in a four property portfolio, the Purchaser's consultant identified contamination in five separate sanitary systems and approximately 20 stormwater drywells. The property transaction was terminated, and Mr. Malinowski acted as turnkey for the requisite reporting of the contamination to Suffolk County Department of Health Services (SCDHS). Following notification, Mr. Malinowski participated in inspections of each property with SCDHS and the preparation of four separate work plans to remediate each property. The remedial work included characterizing the sediments for disposal approval at a New York State-approved disposal facility and obtaining liquid waste disposal approval from the Suffolk County Department of Public Works (SCDPW). The remediation activities utilized high-powered vacuum trucks to remove approximately 30,000 gallons of liquid and 300 tons of sludge and soil from the septic tanks, leaching pools and storm drains servicing the properties. The work was performed under the regulatory oversight of the SCDHS and a No Further Action letter was received for each property from the SCDHS.

### **Sanitary System Remediation, Smithtown, New York**

Mr. Malinowski performed inspection, testing, and remediation services for a commercial property owner in Smithtown, New York. As the property was undergoing pre-sale environmental assessment and investigation, perchloroethylene (PCE) was identified in the sanitary system above Suffolk County Department of Health Services (SCDHS) action levels. Mr. Malinowski developed a strategy to remediate the property under the oversight of the SCDHS. The remedial work included characterizing the sediments for disposal approval at a New York State-approved disposal facility and obtaining liquid waste disposal approval from the Suffolk County Department of Public Works (SCDPW). The remediation activities utilized high-powered vacuum trucks to remove approximately 8,000 gallons of liquid and 20 tons of sludge from the septic tank and two leaching pools servicing the property. All work was expedited by Mr. Malinowski to meet the 30-day deadline of the pending real estate transaction. The work was performed under the regulatory oversight of the SCDHS, and a No Further Action letter was received from the SCDHS with 30 days.



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### **Target Rock Corp., Farmingdale, New York**

The Target Rock Corp. was issued violations from the Suffolk County Department of Health Services (SCDHS) for an illegal industrial discharge of trichloroethylene (TCA) to an abandoned sanitary system and multiple bulk storage tank infractions. Under the supervision of SCDHS, Mr. Malinowski supervised dye tests of the suspect discharge as well as numerous additional floor drains to confirm their discharge outflow. Prior to beginning excavation activities, a subsurface investigation was performed to delineate soil and groundwater impacts and profile the soil for waste disposal purposes. Under his direction, approximately 300 tons of soil was excavated and transported as hazardous waste to the Stablex facility in Canada from the sanitary system and nearby area. In addition to the remediation, Mr. Malinowski worked closely with the project engineer to register and prepare plans to upgrade several chemical and petroleum bulk storage tanks to comply with SCDHS Article 12. His work also included a chemical inventory of the entire 250,000-square foot facility.

### **Air Testing Near Ground Zero Following 9/11, New York, NY**

The dust cloud generated during the catastrophic collapse of the former World Trade Center and the buried fires that continued to smolder caused many local area businesses and residents to become increasingly concerned about air quality. Mr. Malinowski led a sampling team to evaluate the quality of indoor air and the adequacy of interior cleaning inside several privately-owned buildings in close proximity to Ground Zero. Mr. Malinowski worked with a Certified Industrial Hygienist to develop and determine an appropriate testing program to evaluate the indoor air quality at five mixed-use commercial properties that were in various stages of tenant reoccupation. The specifically-designed sampling protocols included testing for asbestos, volatile & semi-volatile classes of organics, dust, mercury, PCBs, lead, and carbon monoxide. The air sampling teams collected interior and exterior air samples, both at street level and on the building rooftops for background purposes.

The initial review and design of the recommended sampling protocols, as well as implementation of the air tests, laboratory analyses, quality control, and reporting to the Client were all expedited and completed within six weeks after 9/11. The results were compared to the American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE) indoor air quality levels, the OSHA permissible exposure limits (PELs) divided by a safety factor of 10 and EPA's Asbestos Hazard Emergency Response Act (AHERA). The results showed that the cleaning of the building interior and ventilation ducts eliminated any health concerns within the buildings and the client could allow occupants to safely reoccupy the buildings.

### **Stanley Commons and Stanley Senior Housing, East New York, Brooklyn, NY**

AKRF, Inc. prepared a Part 58 Environmental Assessment (EA) and a NYC CEQR Technical Memorandum for the Stanley Commons project in East New York, Brooklyn. This project will result in the development of 240 affordable housing units on the site of an underutilized parking lot within the NYCHA Linden and Boulevard Houses. AKRF worked with both HPD and NYCHA on the environmental review documentation. Prior to joining AKRF, Mr. Malinowski conducted a Phase I ESA, remedial investigation and prepared a Remedial Action Plan for both the townhouse portion and adjacent senior housing parcel.

### **Tenant Environmental Inspection Program, Multiple Locations, NY**

Mr. Malinowski directed a Tenant Inspection Program for a landlord who owned 1.2 million square feet of multi-tenanted industrial and commercial properties located in Queens, Nassau, and Suffolk counties for nearly a decade. The Tenant Inspection Program was a compliance program established to address concerns that certain tenant's operations may have been negatively impacting the property. The program included an annual inspection of each tenant space to determine their processes, chemical usage, waste disposal habits, current permits, and fire safety procedures. In addition, each sanitary system was sampled for chemical constituents identified during the inspections and approximately 300 exterior storm drains were inspected for evidence of illegal discharges or dumping. Based on the results of the inspection and sampling, letter reports were sent to the tenants informing them of any issues and educating them on best practices. Each tenant was assisted with regulatory compliance,



## **STEPHEN T. MALINOWSKI, QEP**

**VICE PRESIDENT**

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permitting, and health and safety. The landlord received a report for each building detailing the findings of the inspection and sampling, and any follow-up actions. The landlord became educated on environmental issues and was able to incorporate the cost for this program and environmental compliance requirements into their leases as common area maintenance (CAM) charges. This resulted in a direct improvement in tenant housekeeping practices and enabled the landlord to obtain a comprehensive environmental insurance policy covering the entire property portfolio.

### **NYCDEP Dewatering Permits, Various Locations, NY**

Mr. Malinowski has provided environmental services to support dewatering design and obtain permits to discharge effluent to the NYC sewer system at various locations, including 1070 Washington Avenue in the Bronx for Bronx Pro Real Estate Management, 260 West 26th Street in Manhattan for Artimus Construction, 23-25 Wooster Street, 325-329 West Broadway, and 180 East 88th Street in Manhattan for DDG Partners, 100 Greenwich Street in Manhattan and 172 Montague in Brooklyn for Cava Construction, 970 Richmond Avenue in Staten Island for Brickens Construction, and 5-49 Borden Avenue in Queens for Pav-Lak Contracting. The work included designing sampling programs to obtain representative samples, assisting the construction teams with the design of treatment systems sediment and volatile organic compounds, and preparation of permit packages for NYCDEP review/approval. In addition, Mr. Malinowski has worked with NYCDEP to conduct dye testing of sewer system to confirm stormwater flow to the combined sewer system and rule-out the possibility of outflow to a water body of the New York State. Mr. Malinowski has also assisted with the discharge of effluent from a pressure test for a major utility transmission in Brooklyn to the water of New York State. Permission for the discharge was obtained after Mr. Malinowski and AKRF's engineers provided information to NYSDEC regarding the use of settling tanks and a dual polymer system of Storm Lear Liqui-Floc™ and HaloKlear LBP-210 to reduce discoloration before discharge.

## **ADRIANNA BOSCO**

### **TECHNICAL DIRECTOR**

Adrianna Bosco is a Technical Director in AKRF's Site Assessment and Remediation Department. She has experience in navigating redevelopment projects through regulatory requirements under local and state programs. Ms. Bosco has worked closely with projects enrolled in the NYSDEC Brownfield Cleanup Program, the New York City Voluntary Cleanup Program (VCP), and NYSDEC petroleum spills program, from initial stages of investigation and remediation, through site closure and post-remedial management. Ms. Bosco also has experience in preparing Phase I Environmental Site Assessments and Subsurface (Phase II) Investigations, in addition to conducting environmental/construction oversight and the associated reporting elements. Prior to joining AKRF, she worked as an Environmental Scientist for PS&S Engineering, Inc.

### **BACKGROUND**

#### **Education**

B.S., Environmental Engineering, Manhattan College, Bronx, New York, 2011

#### **Licenses/Certifications**

40 Hour OSHA HAZWOPER Certified, September 2011

10 Hour OSHA Construction Program Certified, October 2013

#### **Years of Experience**

Date started at AKRF: July 2014

Prior industry experience: PS&S Engineering, Inc. December 2011 – July 2014 (2 years, 7 months)

### **RELEVANT EXPERIENCE – AKRF**

#### **Garden City Union Free School District Environmental Consulting Services Garden City, New York**

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

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

#### **147-25 94<sup>th</sup> Avenue, Queens, NY**

This historical meat refrigeration facility is enrolled in the Brownfield Cleanup Program to remediate the property and construct a 23-story affordable residential building. Although the site has an E-Designation for hazardous



## **ADRIANNA BOSCO**

**TECHNICAL DIRECTOR**

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materials, noise, and air quality, AKRF assisted with applying for entry into the NYSDEC Brownfield Cleanup Program, due to the presence of contaminated soil and soil vapor beneath the site. AKRF is providing environmental consulting services throughout the project. As the Deputy Project Manager, Ms. Bosco prepared the Brownfield Cleanup Program application and Remedial Work Plan. Ms. Bosco also managed field activities associated with the Remedial Investigation, to determine the vertical and horizontal extent of on-site contamination. During construction, Ms. Bosco managed the on-site remediation and prepared NYSDEC-required submittals and reports.

### **1888 Bathgate Avenue Redevelopment Site, Bronx, NY**

AKRF is providing environmental consulting services in connection to the investigation and remediation of an approximately 36,000-square foot parcel enrolled in the Brownfield Cleanup Program. This former steel door manufacturing facility is contaminated with chlorinated solvents, including tetrachloroethene. The selected remedy included site-wide excavation of soil and bedrock, continuous air monitoring, collection of post-excavation endpoint samples, and implementation of an in-situ groundwater treatment program. As the Deputy Project Manager for this project, Ms. Bosco managed various field efforts, including a Remedial Design Investigation to develop the groundwater treatment program and implementation of the Remedial Action Work Plan. Upon completion of the remediation, Ms. Bosco prepared the Final Engineering Report and Site Management Plan for submission to the NYSDEC.

### **East Side Coastal Resiliency, Manhattan, NY**

Ms. Bosco served as an Environmental Scientist and conducted a portion of the 2016 subsurface investigation of the 2.5 mile study area from Montgomery Street to East 23<sup>rd</sup> Street. The ESCR subsurface exploration program involved a review of available utility plans and environmental reports involving manufactured gas plant (MGP) and petroleum-related contamination. Responsibilities included groundwater sampling, soil boring and temporary well installation, and compliance with the Supplemental Subsurface Investigation Work Plan.

### **Elton Crossing, Bronx, NY**

AKRF's work includes the implementation of the NYSDEC-approved Remedial Action Work Plan for this former industrial property, including: in-situ testing, off-site transport, the closure of two petroleum spills; the registration, removal, and closure of five petroleum storage tanks encountered during excavation; and the delineation of soil contaminants, including hazardous lead, petroleum, and pesticides. As the Environmental Scientist, Ms. Bosco provided remedial oversight during soil excavation, confirmatory endpoint sampling, SSDS piping installation and inspections, vapor barrier installation, and air monitoring for particulates and volatile organic compounds (VOCs).

### **145 West Street, Greenpoint, Brooklyn, NY**

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

### **Former Laundry/Dry Cleaning Plant, New York, NY**

Ms. Bosco served as the Environmental Scientist of the only New York State Department of Environmental Conservation's (NYSDEC) listed inactive hazardous waste (State Superfund) site in Manhattan, a former laundry/dry cleaning plant in Harlem. Remedial investigation included evaluation of soil, groundwater, soil vapor, indoor air, and building materials. Interim remediation included the removal of contaminated building materials and operation of an innovative sub-slab vapor extraction system retrofitted into the existing building. As the



## **ADRIANNA BOSCO**

**TECHNICAL DIRECTOR**

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Environmental Scientist, Ms. Bosco performed remedial action oversight, including SSDS piping installation inspections and Health and Safety Plan (HASP) air monitoring for volatiles and particulates. Remedial action work was completed in 2014 and documented in a Final Engineering Report. NYSDEC issued Certificate of Completion in January 2015 and the site has been reclassified to a “Class 4” site (site properly closed – requires continued management). Ongoing activities continue under the NYSDEC-approved Site Management Plan, including operations, maintenance and monitoring of the SSDS and SVE system.

### **RELEVANT EXPERIENCE – OTHER**

#### **PS&S Engineering, Inc. (PS&S), Yonkers, NY**

Before joining AKRF, Ms. Bosco was an Environmental Scientist in the Environmental Department at PS&S. She was responsible for conducting site investigations and providing construction oversight for remediation projects in New York and New Jersey. As a staff scientist, she was responsible for sampling and analysis of various media, preparing technical reports and work plans, and conducting Phase I Environmental Site Assessments.



## **STEPHEN R. GRENS, JR.**

### **SENIOR PROFESSIONAL**

Stephen Grens, Jr. is a Senior Environmental Professional with over 20 years of experience in project management, Phase I and II site assessments, remediation oversight, and comprehensive asbestos surveys. He has completed assessments in New York, New Jersey, Connecticut, Pennsylvania, North Carolina, South Carolina, and Georgia. Mr. Grens is also actively involved in data interpretation and report preparation.

### **BACKGROUND**

#### **Education**

B.S., Environmental Sciences, State University of New York (SUNY), Purchase, In Progress

#### **Licenses/Certifications**

New York State Certified Asbestos Inspector, Asbestos Project Monitor, and Air Sampling Technician, 1998

LIRR Roadway Worker, 2007

OSHA HAZWOPER Site Safety Supervisor , 2006

NYC Department of Buildings (DOB) Expediter, 2000

#### **Years of Experience**

Year started in company: 1996

Year started in industry: 1996

### **RELEVANT EXPERIENCE**

#### **Former Halstead Quinn/ATI Tank Farm Site, Yonkers, NY**

Mr. Grens was involved in with project management pertaining to the assessment and remediation of the Former Halstead Quinn/ATI Tank Farm Site located in Yonkers, New York. The project site has been developed with a residential apartment homes along the Hudson River. As the Project manager, Mr. Grens was responsible for directing AKRF Site Assessment and remediation field staff during site remedial activities, including tracking non-hazardous soil excavation and disposal and importation of approved backfill, the implementation of the site-specific health and safety plan (HASP) during excavation activities dewatering activities, work zone and community air monitoring, sub-slab depressurization system (SSDS) installation, vapor barrier installation, and reporting. The environmental clean-up activities at the Former Halstead Quinn/ATI Tank Farm Site were completed in accordance with the New York State Department of Environmental Conservation (NYSDEC) Site Management Plan (SMP) regulations under the Brownfields Clean-Up Program.

#### **Empire Merchants, Brooklyn, NY**

AKRF provides consulting services to Empire Merchants liquor distribution facility, located along Newtown Creek in Brooklyn, New York. Mr. Grens is involved managing the field activities, including semi-annual stormwater outfall inspections and sampling and annual dry weather inspections associated with the facility's NYSDEC State Pollutant Discharge Elimination System (SPDES) Multi-Sector General Permit. The facility maintains a fleet of trucks as part of their daily operations and maintains an on-site fuel dispensing island. As such, the facility maintains a Spill Prevention and Countermeasures Plan (SPCC) in accordance with NYSDEC regulations. As the AKRF Project Manager, Mr. Grens provides annual training for facility personnel to prevent spills and handle petroleum-products in accordance with the SPCC.



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### **2350 Fifth Avenue, Harlem, NY**

Mr. Grens was involved in the assessment and cleanup of this a former laundry/dry cleaning plant in Harlem, the only New York State Department of Environmental Conservation's (NYSDEC) listed hazardous waste site in Manhattan. Remedial investigation has included evaluation of soil, groundwater, soil vapor, indoor air, and building materials. Interim remediation included the removal of contaminated building materials and operation of an innovative sub-slab vapor extraction system retrofitted into the existing building. Phase 1 of the Remedial Action Work Plan consisted of further removal of contaminated building materials. Phase 2 of the remediation included a sub-slab depressurization system (SSDS) retrofitted into the existing building, soil vapor extraction (SVE) system, and chemical oxidation injection. As the Site Assessment & Remediation Task Leader, Mr. Grens performed field oversight for implementation of the remedial actions, including installation of the sub-slab depressurization system (SSDS), to document the work and ensure that it was completed in accordance with the remedial plan and construction specifications. Following the remedy, he continues to provide project management and reporting support, operations, maintenance and monitoring of the SSDS and SVE system under the NYSDEC-approved Site Management Plan.

### **Zerega Avenue - Phase I, Phase II and Wetland Survey, Bronx, NY**

AKRF was contracted by EDC to conduct perform environmental services at an approximately 255,000-square foot project area located at 530 to 590 Zerega Avenue, Bronx, New York. The work included a Phase I Environmental Site Assessment (ESA), and Phase II Environmental Site Investigation which included preparation of a site-specific health and safety plan, a geophysical survey and utility mark-outs, and the collection and analysis of soil, groundwater, soil vapor, indoor air and ambient air samples. As the Site Assessment & Remediation Task Leader, Mr. Grens performed a Phase II subsurface investigation including oversight of drilling activities and the collection of soil, groundwater, and soil vapor samples.

### **JFK Airport Off-Site Parking Lot, Jamaica, Queens, NY**

AKRF was contracted by EDC to conduct a subsurface investigation of an off-site parking lot for JFK Airport. The project area consisted of approximately 2.4 acres located on 146th Avenue in Queens, New York. The investigation included preparation of a site-specific health and safety plan, a geophysical survey and utility mark-outs, and the collection and analysis of soil, groundwater, soil vapor, and ambient air samples. As the Site Assessment & Remediation Task Leader, Mr. Grens performed a Phase II subsurface investigation including oversight of drilling and the collection of soil, groundwater, and soil vapor samples.

### **164 Kent Avenue, Brooklyn, NY (Northside Piers and 1 North 4th Place)**

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 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. AKRF provided assistance with construction oversight during soil handling activities and managing the Community Air Monitoring Plan (CAMP) activities. To date, closure reports have been prepared and occupancy achieved for three of the four buildings. As the Site Assessment & Remediation Task Leader, Mr. Grens performed a Phase II subsurface investigation including oversight of drilling and the collection of soil, groundwater, and soil vapor samples.

### **112 Atlantic Avenue, Brooklyn, NY**

The Site comprises an approximately 7,785-square foot parcel that was formerly occupied by a Shell gas station. As the Project Manager, Mr. Grens' responsibilities included project management overseeing UST removal, closure and reporting to the NYSDEC, Remedial Action Plan (RAP) and Construction Health and Safety Plan (CHASP) implementation oversight, and sub-slab depressurization system (SSDS) installation.



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### **Rego Park Home Depot, Queens, NY**

Solvent contamination was encountered during retail development of a former industrial property in Rego Park, Queens, New York. The site work included an extensive investigation and a multi-phase remediation performed under the NYSDEC Voluntary Cleanup Program (VCP). Remediation included removal of aboveground and underground storage tanks (ASTs and USTs) and hotspot soil removal. An Air Sparging/Soil Vapor Extraction (AS/SVE) groundwater remediation system designed by AKRF was installed as part of the building construction. Continued remediation work included upgrading and expanding the AS/SVE system after the store was opened. AKRF continues operations, maintenance, and monitoring under the NYSDEC-approved Site Management Plan. As the Site Assessment & Remediation Task Leader, Mr. Grens performed field oversight for the upgrades to the AS/SVE and system operation and maintenance (O&M). He also performed quarterly groundwater and indoor air quality sampling.

### **Bettina Equities Company, New York, NY**

Bettina Equities Company, an owner of over 40 residential apartment buildings in New York City, has retained AKRF as their on-call consultant for a wide variety of environmental issues for several of their locations. Work completed to date included storage tank compliance reviews, preparation of design specifications and permitting for storage tank closure and new tank installation, construction oversight for tank closure and installation, and preparation of Spill Prevention Control and Countermeasures (SPCC) Plans. AKRF has completed a series of subsurface and vapor intrusion investigations related to previous property uses for due diligence purposes and has also developed and implemented investigation and remedial work plans for existing and new NYSDEC spill cases primarily related to storage tanks. As the Site Assessment & Remediation Task Leader, Mr. Grens performed a Phase II subsurface investigation including oversight of drilling activities and the collection of soil, groundwater, and soil vapor samples.

### **250 North 10th Street, LLC, 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 Site Assessment & Remediation Task Leader, Mr. Grens performed construction health and safety plan (CHASP) oversight during excavation and construction activities at the site.

### **Domino Sugar, Brooklyn, NY**

The Refinery LLC proposed to redevelop the former Domino Sugar site located along the Williamsburg waterfront in Brooklyn with residential and mixed-use buildings. The EIS examined the full range of issues including land use, zoning and public policy and consistency with the Greenpoint-Williamsburg plan to the north, open space, coastal zone consistency, natural resources, traffic and parking, transit, air quality including any potential impacts from industrial sources and nearby major sources, noise and potential impacts from elevated locations (e.g., the Williamsburg Bridge), historic resources and industrial archeology, urban design and shadows. As the Site Assessment & Remediation Task Leader, Mr. Grens performed environmental oversight for the installation of numerous groundwater monitor wells, soil borings and soil and groundwater sampling. Soil and groundwater sampling and monitoring were performed in accordance with the NYCDEP-approved workplan.



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### **Gedney Way Landfill, White Plains, NY**

As the Site Assessment & Remediation Task Leader, Mr. Grens performed environmental oversight for the installation of numerous groundwater monitor wells, soil gas vapor extraction points, test pits, soil removal and soil and groundwater sampling. Remedial activities at the landfill are being performed for landfill closure in accordance with a NYSDEC-approved workplan.

### **Flushing Industrial Park, Flushing, NY**

As the Site Assessment & Remediation Task Leader, Mr. Grens performed environmental and remediation oversight including the implantation of the site-specific health and safety plan (HASP) during excavation activities at the Flushing Industrial Park site. Approximately 23,000 tons of PCB-contaminated soil and 55,600 tons of regulated but non-hazardous soil were remediated and disposed of at the appropriate receiving facilities. The environmental clean-up activities at the Flushing Industrial site were completed in accordance with U.S. Environmental Protection Agency (EPA) and New York State Department of Environmental Conservation (NYSDEC) regulations under the Brownfields Clean-Up Program.

### **Queens West Development Project, Long Island City, NY**

For over 20 years, AKRF has played a key role in advancing the Queens West development, which is transforming 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 has prepared an EIS that examines issues pertaining to air quality, land use and community character, economic impacts, historic and archaeological resources, and infrastructure. As part of the project, AKRF also undertook the largest remediation venture completed to date under the Brownfields Cleanup Program (BCP). As the Site Assessment & Remediation Task Leader, Mr. Grens performed environmental oversight including the implementation of the site specific health and safety plan (HASP) during excavation activities at the site. The environmental clean-up activities were conducted in accordance with U.S. Environmental Protection Agency (EPA) and New York State Department of Environmental Conservation (NYSDEC) regulations under the Brownfields Clean-Up Program.

### **Sutphin Boulevard Underpass, Jamaica, NY**

Mr. Grens performed the Phase I Environmental Site Assessment, Phase II Subsurface Investigation and asbestos and lead-based paint surveys at the LIRR-owned Sutphin Boulevard site. Portions of the Phase I report were used in the Hazardous Materials Chapter of the Environmental Impact Statement. As the Site Assessment & Remediation Task Leader, Mr. Grens reviewed previous environmental reports, performed oversight for the installation of soil gas points and soil borings, and performed the asbestos and lead paint surveys. The proposed redevelopment of the property included retail and commercial spaces.

### **Parkway Road Site, Bronxville, NY**

As the Site Assessment & Remediation Task Leader, Mr. Grens supervised and documented the removal of USTs, two hydraulic lifts, dry wells, and petroleum contaminated soil from a parcel that was formerly utilized as a gasoline service station. This site would eventually be redeveloped into multi-unit residential apartments.

### **Hanover Hall, Stamford, CT**

As the Site Assessment & Remediation Task Leader, Mr. Grens performed a remote camera observation of the sanitary sewer line to determine the presence of cracks associated with the contamination of surrounding soil. This procedure was implemented as a cost effective means to determine the precise location of possible soil and/or groundwater contamination.

### **East 135th Street Site, Bronx, NY**

As the Site Assessment & Remediation Task Leader, Mr. Grens supervised and documented the removal of approximately 8,000 tons of urban fill and metal-contaminated soil for the construction of a storage facility on the



## **STEPHEN R. GRENS, JR.**

**SENIOR PROFESSIONAL**

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Harlem River. He was responsible for the delineation of contaminated areas, and subsequent confirmation soil sampling.

### **Montagano Oil Blending Facility, Pleasantville, NY**

As the Site Assessment & Remediation Task Leader, Mr. Grens supervised and documented the removal of numerous aboveground storage tanks (ASTs) and oil mixing kettles. Approximately ten 550-gallon aboveground fuel oil storage tanks were rendered free of their contents, cleaned, cut, and removed off-site for disposal. All removal activities were performed in accordance with applicable state and federal regulations. Additional on-site activities included the removal of a 1,000-gallon underground gasoline storage tank, and the installation of site-wide groundwater monitoring wells.

### **Bridgeport Municipal Stadium (Former Jenkins Valve Property), Bridgeport, CT**

As part of the City of Bridgeport's revitalization program for the construction of a minor league baseball facility, As the Site Assessment & Remediation Task Leader, Mr. Grens supervised and documented the removal of approximately 14,000 tons of solvent, petroleum, and metal-contaminated soil. He was responsible for the delineation of contaminated areas as well as subsequent confirmation soil sampling for the local sponsoring municipality. Additional on-site activities included the installation of groundwater monitoring wells, removal of underground storage tanks, and management of the current groundwater monitoring program.

### **Catskill/Delaware Water Treatment Facility, Mount Pleasant and Greenburgh, NY**

As the Site Assessment & Remediation Task Leader, Mr. Grens was responsible for the contaminated materials analysis as part of the Environmental Impact Statement (EIS) for the New York City Department of Environmental Protection (DEP). The analysis included the Phase I site assessment, a description of the chemicals to be used in the direct filtration process, and their alternatives. Mr. Grens also worked on the Electromagnetic Fields (EMF) analysis for this EIS. It included the interpretation of electromagnetic data from existing on-site sources, including transformers, high-voltage lines, and electrical panels.

### **Former Sterns Department Store, Queens, NY**

As the Site Assessment & Remediation Task Leader, Mr. Grens conducted asbestos air monitoring and sampling at the former Sterns department store during asbestos abatement procedures conducted as part of demolition operations in preparation for a multiplex cinema and outlet store.

### **Former Jay Street Welfare Building and Adams Street Family Courthouse Building, Brooklyn, NY**

As the Site Assessment & Remediation Task Leader, Mr. Grens acted as the on-site asbestos project manager during asbestos abatement activities required prior to interior renovations. Tasks included project management and collecting asbestos air samples during abatement activities in accordance with applicable New York City and State regulations.

### **Memorial Sloan Kettering Cancer Center, New York, NY**

Mr. Grens has performed numerous noise impact studies on the east side of midtown Manhattan to assist in the determination of the various project scenarios within each site's respective EIS. Noise produced by mobile sources (automobiles, trucks, and trains), stationary sources (machinery, ventilation systems, and manufacturing operations), and construction activities can cause stress-related illness, disrupt sleep, and break concentration. The noise impact study for the Memorial Sloan Kettering Cancer Center was conducted to determine real time noise levels prior to renovations and construction activities. This provided a background level reference point for when construction activities started. As the Site Assessment & Remediation Task Leader, Mr. Grens' tasks included collecting relevant noise data at numerous locations during morning, afternoon, and evening rush hours to determine real time noise levels utilizing a Larsen Davis decibel level indicator.



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### **Con Edison East Side Development Sites, New York, NY**

Mr. Grens has performed numerous noise impact studies on the east side of midtown Manhattan to assist in the determination of the various project scenarios within each site's respective EIS. As the Site Assessment & Remediation Task Leader, Mr. Grens' tasks included collecting relevant noise data at numerous locations during morning, afternoon, and evening rush hours to determine real time noise levels utilizing a Larsen Davis decibel level indicator.

### **Supermarket Redevelopment, New Fairfield, CT**

AKRF provided consulting services to the developer and owner of a 9-acre site included conducting a remedial investigation and remediation of a site contaminated from former dry cleaning operations and off-site gasoline spills. The investigation included the installation of monitoring wells in three distinct aquifers, geophysical logging, pump tests, and associated data analysis. As the Site Assessment & Remediation Task Leader, Mr. Grens performed remediation oversight, including the excavation of solvent-contaminated soil and health and safety air monitoring for volatile organic compounds (VOCs). Additionally, Mr. Grens performed weekly inspections of the groundwater treatment system, including the collection of groundwater samples as part of the operation and maintenance of the system.

### **Columbia University Manhattanville Academic Mixed-Use Development, New York, NY**

Mr. Grens performed numerous Phase I Environmental Site Assessments for the Columbia Manhattanville rezoning project. As the Site Assessment & Remediation Task Leader, Mr. Grens also performed Phase II subsurface activities recommended in AKRF's Phase I reports. Phase II activities included the installation of soil borings and groundwater monitoring wells and the collection of soil and groundwater samples.

### **St. Agnes Hospital Redevelopment, White Plains, NY**

AKRF is currently working for North Street Community, LLC on the former St. Agnes Hospital campus in White Plains, New York. The project involves redeveloping the property into an assisted living and nursing home facility. Some of the existing buildings and uses will remain and several new buildings will be built for the new facility. AKRF's assignment includes preparing the site plan package to accompany the Draft Environmental Impact Statement (DEIS) for the project. As the Project Manager, Mr. Grens performed a Phase I Environmental Site Assessments of the numerous structures located on the property.

### **Roosevelt Union Free School District, Roosevelt, NY**

Mr. Grens performed numerous inspections for asbestos-containing materials (ACM) in the site buildings. Asbestos samples were collected as part of the ACM survey. As the Site Assessment & Remediation Task Leader, Mr. Grens performed remediation activities, including removal/closure of contaminated dry wells and underground petroleum storage tanks, and excavation and off-site disposal of petroleum- and pesticide-contaminated soil.

### **Field Training Coordinator**

With over 20 years of field experience, Mr. Grens is the Field Training Coordinator for the Site Assessment and Remediation Department. As the Field Training Coordinator, Mr. Grens is responsible for training all new employees who join the department, including all aspects of Phase I Environmental Site Assessments, Phase II Subsurface Investigations, Air Sparge/Soil Vapor Extraction System and SSDS installation oversight and continued monitoring, construction oversight, and health and safety plan (HASP) implementation.



## **TARA SIMMONS**

### **ENVIRONMENTAL ENGINEER**

Tara Simmons is an environmental engineer in AKRF's hazardous materials department with experience in soil, groundwater, and soil vapor sampling, and construction monitoring and oversight. Ms. Simmons' technical skills include Mathworks MATLAB, SolidWorks, R and C Programming, JMP Pro 12, and Microsoft Office.

### **BACKGROUND**

#### **Education**

B.E., Thayer School of Engineering, Hanover, NH, 2017

B.A., Engineering Sciences modified with Environmental Sciences, Dartmouth College, Hanover, NH, 2017

#### **Professional Memberships**

Society of Women Engineers

#### **Certifications**

OSHA 40-hour Health & Safety Training for Hazardous Waste Operations, September 2017

OSHA 10-hour Health & Safety Training for Hazardous Waste Operations, October 2017

North Respirator Training, September 2017

Amtrak Contractor Orientation, October 2017

Erosion and Sediment Control Certification, June 2018

#### **Years of Experience**

Year started in company: 2017

Year started in industry: 2017

### **RELEVANT EXPERIENCE – AKRF**

#### **Larkin Plaza, Yonkers, NY – Remedial Investigation, Construction Oversight**

AKRF was hired to perform a Remedial Investigation to support the Brownfield Cleanup Program application submitted for this property, and to prepare a Remedial Action Work Plan (RAWP). Ms. Simmons served as an on-site environmental monitor to ensure the appropriate execution of the RAWP, to conduct community and work zone air monitoring, to oversee excavation and export of soil, and to oversee the extraction and removal of an Underground Storage Tank (UST). Ms. Simmons collected endpoint soil samples as well as conducted monthly water samples from the dewatering system installed onsite during the duration of her work on the project.

#### **HSS Esplanade, Manhattan, NY – Subsurface Investigation**

Ms. Simmons collected soil samples in the course of a subsurface investigation in which AKRF was hired to determine whether subsurface conditions met required standards for the final installation of waterfront landscaping elements at this newly redeveloped hospital.



## **TARA SIMMONS**

**ENVIRONMENTAL ENGINEER** | p. 2

### **Home Depot Rego Park, Queens, NY – Environmental Monitoring**

Environmental monitoring of contaminated groundwater and remedial wells is being quarterly conducted. AKRF completed Phase 1 and Phase II Environmental Assessments, and installed remedial wells throughout the site. Ms. Simmons conducted groundwater sampling for quarterly reporting.

### **Lambert Houses Parcel 3A, Bronx, NY – Remedial Investigation, Construction Oversight**

Redevelopment of former residential properties was being conducted. AKRF completed Phase I and Phase II Environmental Assessments and a Remedial Action Work Plan (RAWP) to address subsurface contamination during redevelopment. After conducting waste characterization, Ms. Simmons collected soil and non-aqueous liquid samples for fingerprint analysis, oversaw excavation and export of soil, oversaw vacuuming of contaminated non-aqueous liquid from installed piles, and conducted community and work zone air monitoring. During the remedial excavation process, Ms. Simmons delineated the extent of the spill onsite and collected endpoint samples for verification.

### **1043 Fulton Street, Brooklyn, NY – Construction Oversight**

Redevelopment of former residential properties was being conducted. AKRF completed Phase 1 and Phase II Environmental Assessments. Ms. Simmons conducted community and work zone air monitoring, and oversaw excavation and export of soil.

### **11 Greene Street, Manhattan, NY – Construction Oversight**

Redevelopment of former residential properties was being conducted. AKRF completed Phase 1 and Phase II Environmental Assessments. Ms. Simmons conducted community and work zone air monitoring, and oversaw excavation and export of soil. She also oversaw the installation of building waterproofing, utilized due to the proximity to groundwater.

### **St. John Villa, Staten Island, NY – Phase II Environmental Site Investigation**

AKRF conducted a Phase II Environmental Site Investigation to determine whether subsurface conditions within a St John Villa campus required remediation before an acquisition by the NYC School Construction Authority. Ms. Simmons helped collect onsite sub-slab soil vapor samples at locations throughout the St John Villa campus.

### **NYU Kimmel, Manhattan, NY – Construction Oversight**

Ms. Simmons served as an on-site environmental monitor who oversaw excavation and the installation of municipal separate stormwater system elements.

### **Manhattan West Southeast Tower, Manhattan, NY – Construction Oversight**

Reconstruction of Amtrak and NJ Transit properties was being conducted. AKRF completed Phase 1 and Phase II Environmental Assessments. Ms. Simmons conducted work zone air monitoring, and oversaw excavation and export of bedrock.

### **Holmes Towers, Manhattan, NY – Phase II Environmental Site Investigation**

Ms. Simmons assisted in a phase II subsurface investigation collecting soil, soil vapor, and groundwater samples.

### **145 West St., Brooklyn, NY – Construction Oversight**

Ms. Simmons conducted soil samples to characterize waste and determine appropriate methods of disposal.



## **TARA SIMMONS**

**ENVIRONMENTAL ENGINEER** | p. 3

### **66 Sands St., Brooklyn, NY – Phase II Environmental Site Investigation**

Ms. Simmons conducted a phase II subsurface investigation collecting soil, soil vapor, and groundwater samples.

### **Dance Theater of Harlem, Manhattan, NY – Remedial Investigation**

Ms. Simmons collected effluent samples of an unknown source during construction to determine appropriate remedial measures.

### **NYCDEP OGI-RAD, New York, NY – Bioswale Data Collection**

Ms. Simmons recorded observations and collected data from various test project bioswales located throughout NYC.

### **MTA Paratransit Relocation Facility, Bronx, NY – Remedial Investigation, Construction Oversight**

Ms. Simmons conducted construction oversight during the construction of the MTA Paratransit Facility, monitoring installation of a sub-slab depressurization system and vapor barrier. She also assisted in the remedial excavation and export work associated with an oil spill closure and removal of a lead plume affecting groundwater of the Westchester Creek.

**APPENDIX C**  
**PROPOSED SUB SLAB DEPRESSURIZATION (SSDS) SYSTEM BLOWER AND**  
**CARBON CUT SHEETS**

# THE OBAR GBR89

## COMPACT RADIAL BLOWER



Based on 25 years of experience and 2 years of research and development, the patent pending GBR series of compact radial blowers provide the perfect combination of performance and design.

### PERFORMANCE

- GBR89 HA 14" WC at 100CFM max flow 500 CFM.
- Built in speed control to customize performance.
- Condensate bypass built in.
- 18 month warranty 40,000 hr sealed bearings.



*GBR89 WITH ROOF MOUNT*

### DESIGN

- Our modular design means the blower and manifold assembly can be removed and replaced as a unit. This makes repairs cost effective and easy and allows contractors to upgrade systems simply by swapping assemblies.
- The GBR series is based on a bypass blower designed to handle combustible materials.
- The housing is not required to be air tight so you can add gauges and alarms without compromising the system.
- Built in condensate bypass.
- Built in speed control.
- Quick disconnect electrical harness.
- All UL listed components including UL listed enclosure for outside use.
- Wall fastening lugs included.
- GBR series roof and wall mounts available to quickly configure the blowers for your installation while providing a custom built look.
- Compact design 18"x 16"x 10" weighing only 18 lbs.
- 4" schedule 40 inlet and 6" schedule 40 exhaust.

# Enclosure Specifications

## Rating:

Ingress Protection (EN 60529): 66/67

Electrical insulation: Totally insulated

Halogen free (DIN/VDE 0472, Part 815): yes

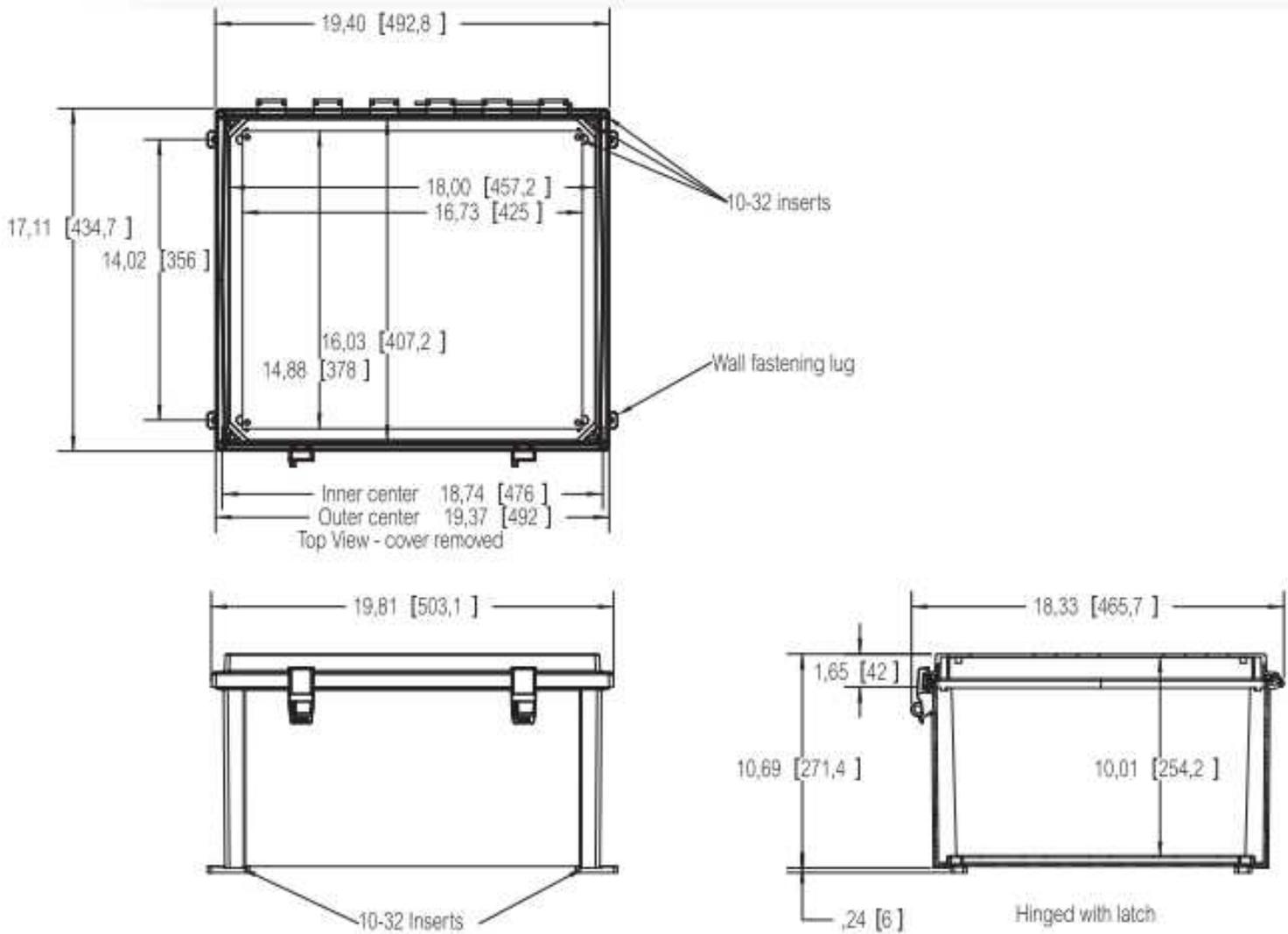
UV resistance: UL 508

Flammability Rating (UL 746 C 5): complies with UL 508

Glow Wire Test (IEC 695-2-1) °C: 960

NEMA Class: UL Type 4, 4X, 6, 6P, 12 and 13

Certificates: Underwriters Laboratories



## Catalog

### Liquid Filters

### Vapor Filters

#### VFD Series

- VFD-30
- VFD-55
- VFD-85
- VFD-110

#### VFV Series

- VFV-250
- VFV-500
- VFV-1000
- VFV-2000
- VFV-3000
- VFV-5000
- VFV-10000

#### VF Series

- VF-500
- VF-1000
- VF-2000
- VF-3000
- VF-5000
- VF-10000

#### VR Series

- VR-140
- VR-170
- VR-225
- **VR-400**
- VR-700
- VR-1600
- VR-2600

### Filtration Media

### Special Products

## MODEL VR-400

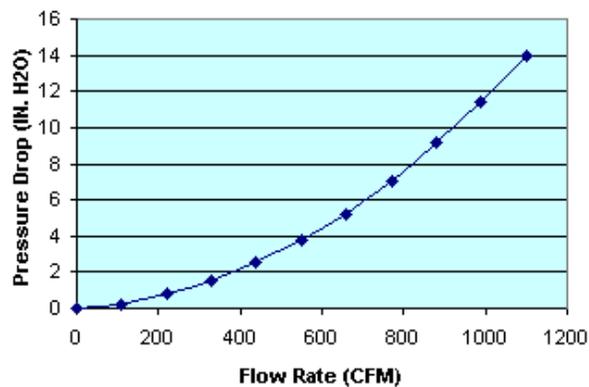
The VR-400 filter is a radial flow filter vessel designed to treat vapor streams where pressure drop is a strong concern. With the radial design in certain applications the user can obtain higher flow rates than could be obtained in similar upflow filters. Some applications include:

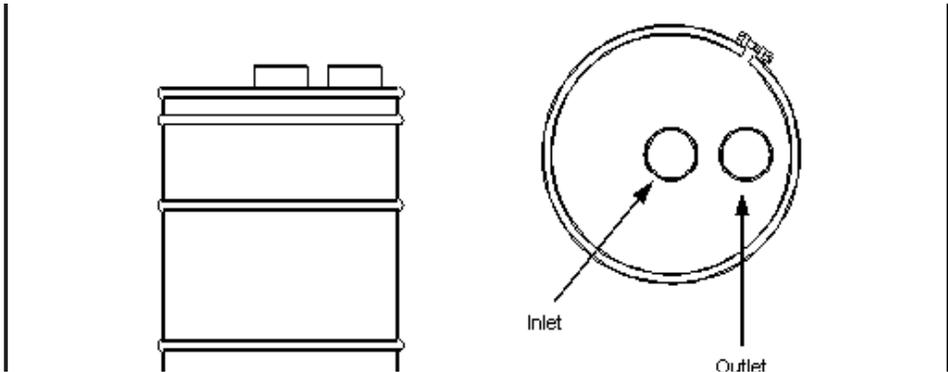
- Soil Vapor Extraction Treatment
- Air Stripper Off Gas Treatment
- Odor Removal System
- Storage Tank Purge Vapor Treatment
- Industrial Process Treatment

Picture  
Not  
Available

**PRESSURE DROP GRAPH**

*(As Filled 4'x10 GAC)*





http://tetrasolv.com/catalog/vr-400.htm

Go

INTERNET ARCHIVE  
Wayback Machine

11 captures  
20 Mar 06 - 10 Sep 15

MAR  
2006

VR-400 SPECIFICATIONS			
Overall Height	3'11"	Vessel/Internal Piping Materials	CS/ SCH 40 PVC
Diameter	30"	Internal Coating	Polyamide Epoxy Resin
Inlet / Outlet (FNPT)	6"	External Coating	Urethane Enamel
Drain / Vent (FNPT)	OPT	Maximum Pressure / Temp	2 PSIG / 150° F
GAC Fill (lbs)	400	Cross Sectional Bed Area	8.8 FT <sup>2</sup>
Shipping / Operational Weight (lbs)	500/575	Bed Depth/Volume	11.7 IN / 14.25 FT <sup>3</sup>

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