146 BAYARD

146-150 BAYARD STREET
BROOKLYN, NEW YORK 11222
Block 2724, Lot 18

REMEDIAL ACTION WORK PLAN

NYSDEC BCP Site Number: C224294

JUNE 2020

Prepared for:

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CERTIFICATIONS

I Ariel Czemerinski certify that I am currently a NYS registered professional engineer and that this Remedial Action Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

076508	6/25/2020	
NYS Professional Engineer #	Date	Signature

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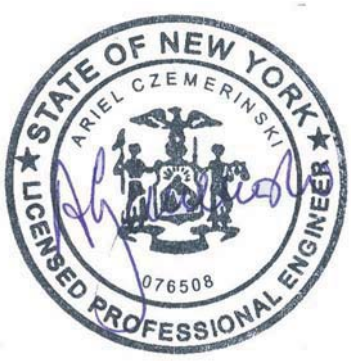

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LIST OF ACRONYMS

Acronym	Definition
AMC	AMC Engineering
AWQS	Ambient Water Quality Standards
BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
CQMP	Construction Quality Management Plan
DUSR	Data Usability Statement Report
EBC	Environmental Business Consultants
FER	Final Engineering Report
HDPE	High Density Polyethylene
IRM	Interim Remedial Measure
NYC	New York City
NYCDEP	New York City Department of Environmental Protection
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PS	Public School
PVC	Polyvinyl Chloride
RAO	Remedial Action Objectives
RAWP	Remedial Action Work Plan
RI	Remedial Investigation
RSCOs	Recommended Site Cleanup Objectives
SCG	Standards, Criteria, and Guidelines
SMMP	Soil/Materials Management Plan
SMP	Site Management Plan
SSDS	Sub-slab Depressurization System
SWPPP	Stormwater Pollution Prevention Plan
SVOCs	Semi-Volatile Organic Compounds
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
VOCs	Volatile Organic Compounds

EXECUTIVE SUMMARY

Site Description/Physical Setting/Site History

This Remedial Action Work Plan (RAWP) was prepared on behalf of Bayard Holdings, LLC and for the property known as the 146 Bayard Street Site located at 146-150 Bayard Street in Brooklyn, New York (hereafter referred to as the Site). Bayard Holdings, LLC has applied has applied to the New York State Brownfield Cleanup Program (BCP) as a Volunteer. An unrestricted use is proposed for the property. When completed, the Site will be redeveloped with a new 6-story commercial/residential building. The proposed development is compatible with the existing M1-2/R6A zoning. Refer to the Brownfield Cleanup Program (BCP) application for additional details.

The street addresses for the Site are 146 Bayard Street and 481 Graham Avenue, Brooklyn, New York 11222 (Figure 1). The Site is located in the City of New York in the Greenpoint neighborhood of the Borough of Brooklyn, and is identified as Block 2724 and Lot 18 on the New York City Tax Map. The Site is located on the southern corner of the intersection of Bayard Street and Graham Avenue. The Site consists of 96.12 feet of street frontage on Bayard Street and 101.33 feet of street frontage on Graham Avenue for a total area of approximately 8,800 ft^2.

A Phase I Environmental Site Assessment (ESA) Reports prepared by EBC in May 2017 provided a history of the Site. The Site was originally developed with multiple dwellings fronting Bayard Street and multiple mixed-use storefronts along Graham Avenue sometime prior to 1887. The Site was redeveloped in 1972 with a one-story manufacturing building that was demolished in 2018. The Site was identified with a manufacturing use on Sanborn maps from 1965 through 2007. Residential tenants were listed for the Site for the intermittent years from 1928 through 1960. Several commercial uses were identified, including a Venetian Blind Supply Company (1949), a beauty salon (1949), “House of Chan Enterprise Inc (1973), Meyers Herring Importing Corporation (1985), Le Classic Group, Inc. (1997-2000), and NCL (2005).

Lot 18 is currently owned by Bayard Holdings, LLC.

Summary of the Remedial Investigation

A Remedial Investigation was completed at the Site from in October 2017, and documented in a Remedial Investigation Report dated November 2017. The goals of the Remedial Investigation were to define the nature and extent of contamination in soil, groundwater and any other impacted media; to identify the source(s) of the contamination; to assess the impact of the contamination on public health and/or the environment; and to provide information to support the development of a Remedial Work Plan to address the contamination.

Activities completed under the RI:

- October 19, 2017 - Installed six soil borings (SB1-SB6), and collected twelve soil samples for laboratory analysis of volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), herbicides, pesticides, organophosphate pesticides, PCBs, and metals;
- October 19, 2017 - Installed three groundwater monitoring wells and collected three groundwater samples (GW1, GW2 and GW3) for laboratory analysis of VOCs, SVOCs, pesticides, PCBs, and total and dissolved metals;
- October 19, 2017 - Installed five soil gas implants and collected five soil gas samples on October 23, 2017 (SV1-SV5) for laboratory analysis of VOCs.
- January 29, 2018 - Installed three additional soil borings (SB7-SB9), and collected six soil samples for laboratory analysis of volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), herbicides, pesticides, organophosphate pesticides, PCBs, and metals;
- March 9, 2018 - Installed one additional groundwater monitoring well collected one groundwater sample (GW4) for laboratory analysis of VOCs, SVOCs, pesticides, PCBs, and total and dissolved metals.
- January 27, 2020 - Installed five additional soil borings (EC-SB1-ECSB5) and collected ten soil samples for laboratory analysis of emerging contaminants (PFOS, 1,4-dioxane).

The results of sampling performed during this RI identified historic fill material across the Site to depths as great as 6 feet below grade. Depending on location, the historic fill material contains one or more metals including arsenic, barium, cadmium, chromium, copper, lead, mercury,

nickel and zinc, pesticides, and polycyclic aromatic hydrocarbons (PAHs) above Unrestricted Use and / or Restricted Residential SCOs.

The VOC xylene was detected at low concentrations in both soil samples retained from soil boring SB3. MTBE was detected in groundwater at a concentration above GQS at several locations. Petroleum related VOCs were also detected at low concentrations in each of the soil gas samples collected at the Site. CVOCs were reported at generally low concentrations in all of the soil gas samples collected at the Site.

Qualitative Human Health Exposure Assessment

The qualitative exposure assessment identified potential completed routes of exposure to construction workers and remediation workers through inhalation, ingestion and dermal contact of VOCs, pesticides, SVOCs and heavy metals during excavation activities. The Health and Safety Plan prepared for the Site identifies such exposures and provides instructions for on-Site workers to minimize potential exposure.

The exposure assessment indicated a limited potential exposure to residents and commercial workers in adjacent buildings which would be reduced further following the removal of the identified source areas.

Potential environmental impacts through the groundwater to surface water discharge were considered unlikely based on the concentrations of VOCs in groundwater.

Summary of the Remedy

The remedy recommended for the Site is a Track 1 alternative (Alternative 1) which consists of the removal of all on-Site soil which exceeds Unrestricted Use SCOs and the removal of impacted groundwater. It is expected that a Track 1 alternative will require excavation to a minimum depth of 10 feet across the Site with additional excavation as needed to remove soil/fill with contaminants above Unrestricted Use SCOs. Excavation for the new building's cellar level will be performed across the Site to a depth of at approximately 12 feet below grade with some deeper excavation to accommodate structural elements, elevator shaft, etc. The remedy will include the following items:

1. Excavation of soil/fill exceeding Track 1 Unrestricted Use SCOs as listed in **Table 1** to a minimum depth of 10 feet across the Site with additional excavation as needed to meet Track 1 Unrestricted Use SCOs;
2. Screening for indications of contamination (by visual means, odor, and monitoring with PID) of all excavated soil during any intrusive Site work;
3. Collection and analysis of end-point samples to evaluate the performance of the remedy with respect to attainment of Track 1 Unrestricted Use SCOs;
4. Appropriate off-Site disposal of all material removed from the Site in accordance with all Federal, State and local rules and regulations for handling, transport, and disposal;
5. Dewatering and treatment of VOC impacted groundwater before discharging to the NYC sewer system under a NYCDEP sewer discharge permit;
6. Import of materials to be used for backfill and cover in compliance with: (1) chemical limits and other specifications included in **Table 1**, (2) all Federal, State and local rules and regulations for handling and transport of material;
7. If Track 1 cleanup is not achieved, implementation of a Site Management Plan (SMP) for long term maintenance of the Engineering Controls (Track 2, Track 4).
8. If Track 1 cleanup is not achieved, an Environmental Easement will be filed against the Site to ensure implementation of the SMP (Track 2, Track 4).

Although the goal of the remedy will be to remove all soil exceeding the Track 1 Unrestricted Use SCOs, if Track 1 Unrestricted Use SCOs cannot be achieved, then a Track 2 or a Track 4 remedy may result.

REMEDIAL ACTION WORK PLAN

1.0 INTRODUCTION

This Remedial Action Work Plan (RAWP) was prepared on behalf of Bayard Holdings, LLC for the property known as the 146 Bayard Street Site located at 146-150 Bayard Street in Brooklyn, New York (hereafter referred to as the Site). Bayard Holdings, LLC has applied to the New York State Brownfield Cleanup Program (BCP) as a Volunteer. An unrestricted use is proposed for the property. When completed, the Site will be redeveloped with a new 6-story commercial/ residential building. The proposed development is compatible with the existing M1-2/R6A zoning. Refer to the Brownfield Cleanup Program (BCP) application for additional details.

This RAWP summarizes the nature and extent of contamination as determined from data gathered during the Remedial Investigation (RI), performed in October 2017. It provides an evaluation of a Track 1 cleanup and other applicable Remedial Action alternatives, their associated costs, and the recommended and preferred remedy. The remedy described in this document is consistent with the procedures defined in DER-10 and complies with all applicable standards, criteria and guidance. The remedy described in this document also complies with all applicable Federal, State and local laws, regulations and requirements. The NYSDEC and New York State Department of Health (NYSDOH) have not yet determined that this Site does or does not pose a significant threat to human health and the environment. The RI for this Site did not identify fish and wildlife resources.

A formal Remedial Design document will not be prepared.

1.1 SITE LOCATION AND DESCRIPTION

The street addresses for the Site are 146 Bayard Street and 481 Graham Avenue, Brooklyn, New York 11222 (**Figure 1**). The Site is located in the City of New York in the Greenpoint neighborhood of the Borough of Brooklyn, and is identified as Block 2724 and Lot 18 on the New York City Tax Map. The Site is located on the southern corner of the intersection of Bayard Street and Graham Avenue. The Site consists of 96.12 feet of street frontage on Bayard Street and 101.33 feet of street frontage on Graham Avenue for a total area of approximately 8,800 ft^2 (**Figure 2**).

A Phase I Environmental Site Assessment (ESA) Reports prepared by EBC in May 2017 provided a history of the Site. The Site was originally developed with multiple dwellings fronting Bayard Street and multiple mixed-use storefronts along Graham Avenue sometime prior to 1887. The Site was redeveloped in 1972 with a one-story manufacturing building that was demolished in 2018. The Site was identified with a manufacturing use on Sanborn maps from 1965 through 2007. Residential tenants were listed for the Site for the intermittent years from 1928 through 1960. Several commercial uses were identified, including a Venetian Blind Supply Company (1949), a beauty salon (1949), "House of Chan Enterprise Inc (1973), Meyers Herring Importing Corporation (1985), Le Classic Group, Inc. (1997-2000), and NCL (2005).

Lot 18 is currently owned by Bayard Holdings, LLC.

The elevation of the Site is approximately 17 feet above the National Geodetic Vertical Datum (NGVD). The topography within the immediate area slopes gradually from east to west. Groundwater occurs beneath the Site at a depth of approximately 6.12 to 9.24 feet below grade under water table conditions. The groundwater flow direction calculated for the Site was to the southeast.

1.2 CONTEMPLATED REDEVELOPMENT PLAN

The redevelopment project consists of the construction of a new 6-story mixed-use (commercial/residential) building with a cellar that will cover the entirety of the Site. The cellar level will consist of a 3,928 ft^2 retail space, a bicycle storage room, a recreational space for building occupants, and the building's utility meter rooms. The first floor / ground level will consist of the commercial lobby for the cellar level retail space, residential apartments, and a 4,670 ft^2 parking garage. The proposed development is compatible with the existing M1-2/R6A zoning. The cellar level of the new building will require excavation of the entire Site to a depth of 12 feet below grade with deeper excavation in some areas for structural elements, elevator shaft, etc. It is estimated that a total of 3,300 cubic yards (5,000 tons) of soil/fill will require excavation and off-Site disposal. Groundwater was found at the Site at depths ranging between 7.50 to 9.5 feet below grade. Therefore, dewatering will be required during construction of the building's foundation.

1.3 DESCRIPTION OF SURROUNDING PROPERTY

The property is currently zoned M1-2 / R6A. M1 districts are often buffers between M2 or M3 districts and adjacent residential or commercial districts. M1 districts typically include light industrial uses, such as woodworking shops, repair shops, and wholesale service and storage facilities. Nearly all industrial uses are allowed in M1 districts if they meet the stringent M1 performance standards. Offices, hotels and most retail uses are also permitted. Certain community facilities, such as hospitals, are allowed in M1 districts only by special permit, but houses of worship are allowed as-of-right.

R6A is a higher-density residence district generally found close to central and regional business districts and are usually mapped in proximity to mass transit. These areas are characterized by bulkier buildings, a greater range of building heights and less automobile ownership than lower-density areas.

Surrounding land use to the west north along Bayard Street is a 2-story residential 1 & 2 family building. The adjacent properties to the south east along Graham Avenue consist of two 3-story residential multi-family walk-up buildings and a 3-story mixed residential and commercial building. To the north of the Site, across Bayard Street, there are multiple residential 1 & 2 family buildings and two 3-story mixed residential and commercial buildings. To the east of the property, across Graham Avenue, there are multiple residential multi-family walk-up buildings and a single-story garage structure.

There are two public schools; John Ericsson Middle School 126 located approximately 340 feet west of the Site at 424 Leonard Street, Brooklyn and Williamsburg Charter High School located approximately 600 feet west of the Site at 198 Varet Street, Brooklyn (see **Figure 3**). There were no nursing homes or hospitals identified within 1,200 feet of the Site.

2.0 DESCRIPTION OF REMEDIAL INVESTIGATION FINDINGS

The field work portion of the Remedial Investigation was conducted by EBC in October 2017. The investigation is summarized in the sections below. Further details are provided in the Remedial Investigation Report (EBC, March 2018).

2.1 SUMMARY OF REMEDIAL INVESTIGATIONS PERFORMED

2.1.1 Soil Sampling

Soil sampling was performed at a total of 9 locations between October 18, 2017, and October 23, 2017, and on January 29, 2018, to identify source areas and to obtain general soil quality information present at the Site (**Figure 4**).

On October 20, 2017, three test pits (identified as soil sampling locations SB2, SB3 and SB4) were excavated using a skidsteer with a backhoe attachment. Soil excavated from the test pits was field screened by an environmental professional for the presence of VOCs with a photo-ionization detector (PID) and visually inspected for evidence of contamination. No significant PID readings were encountered, and no olfactory evidence of contamination was observed. From each test pit location, EBC collected one soil sample for laboratory analysis representing the interval 0 to 2ft below grade, and a second soil sample for laboratory analysis representing from the interval 2 to 4 feet below grade. The geologist's field observations and PID readings were recorded for each boring in a soil boring log.

From October 18, 2017, to October 23, 2017, soil borings SB1, SB5, and SB6 were performed utilizing a truck mounted auger with a 2ft split-spoon sampler. Soil samples were collected continuously from grade to final depths of 5 feet below grade (SB1 and SB6) and 9 feet below grade (SB5). Soil recovered from the three soil borings was field screened by an environmental professional for the presence of VOCs with a PID and visually inspected for evidence of contamination. No significant PID readings were encountered, and no olfactory evidence of contamination was observed. From soil boring locations SB1 and SB6, EBC collected one soil sample for laboratory analysis representing the interval 0 to 2ft below grade, and a second soil sample for laboratory analysis representing from the interval 2 to 4ft below grade. Soil samples were retained for laboratory analysis from soil boring location SB5 from the intervals 0 to 2ft

below grade and 7 to 9ft below grade. The geologist's field observations and PID readings were recorded for each boring in a soil boring log.

On January 29, 2018, three soil borings (SB7, SB8, and SB9) were performed. From each soil boring location, soil samples were collected continuously in 5-foot intervals to 15 feet below grade using a track-mounted Geoprobe™ model 66DT sampling system. The Geoprobe™ uses a direct push hydraulic percussion system to drive and retrieve core samplers. Soil samples were retrieved using a 2-inch diameter, 5-foot long macro-core sampler with disposable acetate liners. Each soil sample recovered from the soil borings was characterized by an experienced geologist and field screened for the presence of VOCs using a PID. The geologist's field observations and PID readings were recorded for each boring in a soil boring log.

From each of the three soil boring locations, one soil sample was retained for laboratory analysis representing the interval 0 to 2ft below grade, and a second soil sample was retained for laboratory analysis representing from the interval 10 to 12ft below grade.

A total of 18 soil samples (and one duplicate) were retained for laboratory analysis from the 9 soil sampling locations. Each of the 19 soil samples were analyzed for VOCs (EPA Method 8260), SVOCs (EPA Method 8270), TAL metals, and pesticides and PCBs (EPA Method 8081/8082).

Five additional soil borings (ECB1-ECB5) were advanced across the Site on January 27, 2020. Soil samples were collected continuously in 5-foot intervals using a Geoprobe™ dual-tube sampling system. Soil samples were retrieved using a 1.25-inch diameter, 5-foot long core sampler with disposable acetate liners to preserve sample integrity.

Soil recovered from each of the soil borings was field screened for the presence of VOCs with a photo-ionization detector (PID) and visually inspected for evidence of contamination. No PID readings above background concentrations were obtained from any of the soil borings. Two samples from each boring were retained and submitted for analysis of emerging contaminants (PFOS compounds and 1,4-dioxane). Soil boring locations are identified in **Figure 4**.

2.1.2 Monitoring Wells

Three monitoring wells (GW1, GW2, and GW3) were installed at the Site in October 2017. An additional monitoring well (GW4) was installed at the Site in March 2018. Three additional monitoring wells (MW1901-MW1903) were installed at the Site in January 2019. GW1-GW4 were installed to a depth of approximately 40 feet below grade with 10 feet of 0.010 PVC well screen and 15 feet of PVC riser. Three additional wells MW1901-MW1903 were installed to a depth of approximately 15 feet below grade with 10 feet of 0.010 PVC well screen and 5 feet of PVC riser. The wells were constructed of 1-inch diameter PVC casing and PVC well screen.

A No.00 morie filter-pack sand filled the annulus surrounding the screen within two feet above the top of the screen. A one-foot hydrated bentonite seal was then placed on top of the filter sand and the remainder of the borehole was backfilled to grade. Following installation, each of the wells were surveyed to determine relative casing elevation to the nearest 0.01 ft and horizontal position to the nearest 0.1 ft. Monitoring well locations are identified in **Figure 5**.

Prior to sampling, a synoptic round of depth-to-groundwater (DTW) measurements were obtained from the monitoring wells to determine the water table elevation and to calculate the volume of standing water in the well. The depth to groundwater ranged from 6.12 to 9.24 feet below grade.

2.1.3 Samples Collected

A summary of the sampling performed during the RI is provided in **Table 2**.

2.1.3.1 Soil Samples

A total of 28 soil samples were retained for laboratory analysis from the 14 soil borings advanced at the site in October 2017 and January 2020. The soil samples were collected in pre-cleaned, laboratory supplied glassware, stored in a cooler with ice and submitted for analysis to Phoenix Environmental Laboratories. The 22 samples collected between October 2017 and January 2018 were analyzed for VOCs EPA Method 8260B, SVOCs EPA Method 8270, pesticide / PCBs EPA Method 8081/8082, TAL metals EPA 6010. Soil sample analytical results are compared with NYSDEC Part 375.6 Unrestricted Use SCOs and Residential Restricted SCOs.

The 10 soil samples collected in January 2020 were analyzed for PFOS Compounds EPA Method 537 and SVOCs plus 1,4 dioxane EPA Method 8270.

2.1.3.2 Groundwater Samples

All groundwater samples collected from monitoring wells GW1- GW4 were analyzed for VOCs EPA Method 8260B, SVOCs EPA Method 8270, pesticide / PCBs EPA Method 8081/8082, metals EPA 6010 dissolved and total. Groundwater results are compared to NYSDEC Division of Water, Technical & Operational Guidance Series 1.1.1, Ambient Water Quality Standards and Guidance Values (AWQS), June 1998.

Groundwater samples collected from wells MW1901-MW1903 were analyzed for PFOS Compounds EPA Method 537 and 1,4-dioxane EPA Method 8270 SIM.

2.1.3.3 Soil Gas Samples

To assess the presence of VOCs in soil gas beneath the Site, 5 soil vapor implants were installed at the Site from October 19, 2017. The soil vapor implants (Geoprobe™ Model AT86 series), were constructed of a 6-inch length of double woven stainless steel wire and installed to a depth of 7 ft below grade using Geoprobe™ equipment. All soil vapor samples were collected over a 2 hr sampling period. Soil vapor samples were collected in accordance with the procedures as described in section 2.4 of the approved RIR and the *Guidance for Evaluating Soil Vapor Intrusion in the State of New York (NYSDOH 10/06).*

2.1.4 Chemical Analytical Work Performed

Each soil and groundwater sample was placed in pre-cleaned laboratory supplied glassware, and placed in a cooler packed with ice for transport to the laboratory. Laboratory services for soil and groundwater sample analysis were provided by Phoenix Environmental Laboratories, Inc. of Manchester, Connecticut, a New York State ELAP certified environmental laboratory (ELAP Certification No. 11301).

The 22 samples collected between October 2017 and January 2018 were analyzed for VOCs EPA Method 8260B, SVOCs EPA Method 8270, pesticide / PCBs EPA Method 8081/8082,

TAL metals EPA 6010. Soil sample analytical results are compared with NYSDEC Part 375.6 Unrestricted Use SCOs and Residential Restricted SCOs.

The 10 soil samples collected in January 2020 were analyzed for PFOS Compounds EPA Method 537 and SVOCs plus 1,4 dioxane EPA Method 8270.

All groundwater samples collected from monitoring wells GW1- GW4 were analyzed for VOCs EPA Method 8260B, SVOCs EPA Method 8270, pesticide / PCBs EPA Method 8081/8082, metals EPA 6010 dissolved and total. Groundwater results are compared to NYSDEC Division of Water, Technical & Operational Guidance Series 1.1.1, Ambient Water Quality Standards and Guidance Values (AWQS), June 1998. Groundwater samples collected from wells MW1901-MW1903 were analyzed for PFOS Compounds EPA Method 537 and 1,4-dioxane EPA Method 8270 SIM.

Soil gas samples were analyzed for VOCs by USEPA Method TO-15.

2.1.5 Documentation

A map showing the locations of the soil borings is provided in **Figure 4**. The locations of the monitoring wells and soil gas sample collection points are provided in **Figure 5**. The results of soil, groundwater and soil gas samples collected during the RI are summarized in **Tables 3 through 16**. Below is a summary of the RI findings.

The results of soil sampling performed during this RI identified several contamination sources as follows:

- Historic fill material has been identified across the Site to a depth of approximately 6 feet below grade. Deeper contamination was reported in several locations at 7-9 feet and 10-12 feet below grade.
- Pesticides, metals and polycyclic aromatic hydrocarbons (PAHs) reported above Unrestricted Use and / or Restricted Residential SCOs. SVOCs detected above Restricted Residential SCOs include benz(a)anthracene (max. of 40,000 µg/Kg), benzo(a)pyrene (max. of 29,000 µg/Kg), benzo(b)fluoranthene (max. of 30,000 µg/Kg),

benzo(k)fluoranthene (max of 29,000 µg/Kg), chrysene (max. of 42,000 µg/Kg), dibenz(a,h)anthracene (max. of 5,100 µg/Kg), and indeno(1,23-,3-cd)pyrene (max. of 19,000 µg/Kg) above Restricted Residential Use SCOs within ten of the soil samples collected. Several pesticides including, 4,4'-DDD (max. of 34 µg/Kg), 4,4'-DDE (max. of 60 µg/Kg), 4,4'-DDT (max. of 150 µg/Kg), and chlordane (110 µg/Kg) were detected above Unrestricted Use SCOs within ten of the soil samples collected. Several metals including barium (max. of 1,770 milligrams per kilogram [mg/Kg]), lead (max. of 1,340 mg/Kg), and mercury (max. of 2.54 mg/Kg) exceeded Restricted Residential SCOs within samples collected from the historic fill material layer. In addition, the metals arsenic (max. of 14.7 mg/Kg), chromium (max. of 36.8 mg/Kg), copper (max. of 183 mg/kg), nickel (max. of 57.2 mg/Kg), and zinc (max. of 941 mg/Kg) were detected above Unrestricted Use SCOs. Overall, soil chemistry is similar to sites with historic urban fill material in New York City.4,4'-DDE (max. of 60 µg/Kg), 4,4'-DDT (max. of 150 µg/Kg), and chlordane (110 µg/Kg).

- One VOC, acetone (maximum of 380 µg/Kg), was detected above Unrestricted Use SCOs within all the samples collected. M&p-Xylenes were detected at 470 µg/Kg in the SB3 shallow sample and o-Xylenes (max. of 140 µg/Kg) were identified in the SB3 shallow (0-2ft) and deeper (2-4ft) soil samples. No other VOCs were detected above Unrestricted Use SCOs.

The results of the groundwater sampling performed during this RI identified the following:

- One VOC, methyl t-butyl ether (MTBE) (max. of 230 micrograms per liter [µg/L]), was detected within three of the groundwater samples (GW2, GW3 and GW4) exceeding its respective GQS.
- SVOCs were detected above AWQS within most of the groundwater samples collected at the Site. The SVOC detections were limited to PAH compounds with standards in the parts per trillion range. The exceedences are likely attributed to a suspended solids in the sample or background conditions and are not due to an on-Site source.
- No pesticides or PCBs were detected in any of the five groundwater samples collected at the Site.
- Dissolved metals detected above GQS included aluminum (max. of 0.16 mg/L), arsenic (0.029 mg/L), magnesium (65.2 mg/L), manganese (max. of 5.36) and sodium (265

mg/L). The exceedences are likely attributed to slightly brackish conditions related to historic salt water intrusion.

The results of the soil gas sampling performed during this RI identified the following:

- All five sub-slab soil gas samples collected showed elevated levels of petroleum-related VOCs. The total concentration of petroleum-related VOCs (BTEX) ranged from 215.54 µg/m^3 to 308.80 µg/m^3.
- Tetrachloroethene (PCE) was detected in all five of the sub-slab soil gas sampled collected at a max. of 11 µg/m^3. The chlorinated VOC trichloroethylene (TCE) was detected in four of the five soil vapor samples (max. of 2.43 µg/m^3). Carbon tetrachloride was detected in the five soil vapor samples at a max. of 0.62 µg/m^3. 1,1,1-trichloroethane was detected in two of the five soil vapor samples at a max. of 3.17 µg/m^3. The chlorinated VOC cis-1,2-dichloroethene was detected in two of the five soil vapor samples at a max. of 1.79 µg/m^3. Vinyl chloride was detected in one of the five soil vapor samples at 0.22 µg/m^3. The chlorinated VOC 1,1-dicloroethene was not detected in any of the sub-slab soil gas or soil vapor samples.

2.2 SIGNIFICANT THREAT

The NYSDEC and NYSDOH will review the RI Report and will determine whether the Site does or does not pose a significant threat to human health and the environment. Notice of that determination will be provided during the public comment period, through Fact Sheet No. 2 and the Proposed Decision D^{o}cument.

2.3 SITE HISTORY

2.3.1 Past Uses and Ownership

The Site is currently owned by Bayard Holdings, LLC. The former 1-story manufacturing building that occupied the entire footprint of the lot was demolished in 2018. The Site is currently undeveloped and surrounded with an 8-ft high construction fence.

The Site was originally developed with multiple dwellings fronting Bayard Street and multiple mixe**d**-use storefronts along Graham Avenue sometime prior to 1887. The Site was redeveloped in 1972 with a one-story manufacturing building that was demolished in 2018. The Site was

identified with a manufacturing use on Sanborn maps from 1965 through 2007. Residential tenants were listed for the Site for the intermittent years from 1928 through 1960. Several commercial uses were identified, including a Venetian Blind Supply Company (1949), a beauty salon (1949), "House of Chan Enterprise Inc (1973), Meyers Herring Importing Corporation (1985), Le Classic Group, Inc. (1997-2000), and NCL (2005).

A listing of previous owners and operators for the property is as follows:

Previous Owners

Dates	Name	Comments	Contact Info
From sometime prior to 10/30/1967	M. Speigel & Sons Oil Corp. & Tally Petroleum Corp.	Deed	46 Atlantic Avenue, Lynbrook, NY 104 South Central Avenue, Valley Stream, NY
From 10/30/1967 to 7/27/1969	Ruth Torborg	Deed	140 Barbey Street, Brooklyn, NY
From 7/27/1969 to 7/3/2012	Frank Clark Winifred Clark	Deed	17 Eakins Road, Manhasset, NY
From 7/3/2012 to 10/17/2017	481 Graham LLC	Deed	C/O Bedford Management Cp. 196 Bedford Avenue, Brooklyn, NY 11249
From 10/17/2017 to Present	Bayard Holdings LLC	Deed	670 Myrtle Avenue Suite 370, Brooklyn, NY, 11211

Note: Bayard Holdings LLC is in no way affiliated with any of the prior owners of the property.

Previous Tenants

Dates	Name	Comments	Contact Info
1887-1951	Residential w/ commercial storefronts along Bayard Street	Sanborn Maps	Unknown
1965 - 2007	Manufacturing	Sanborn Maps	Unknown
2017	Flooring Manufacturing	Phase I Inspection	Unknown
2018 to Present	Vacant	Owner	670 Myrtle Avenue Suite 370, Brooklyn, NY, 11211

Note: Bayard Holdings LLC is in no way affiliated with any of the prior tenants of the property.

2.3.2 Summary of Previous Reports

Environmental investigations performed at the Site include the following:

- Phase I Environmental Site Assessment Report - EBC (May 31, 2017)

May 2017 – Phase I Environmental Site Assessment (EBC)

A Phase I Environmental Site Assessment Report was prepared for the Site by EBC in May 2017. The Phase I indicated the Site was originally developed with multiple dwellings fronting Bayard Street and multiple mixed-use storefronts along Graham Avenue sometime prior to 1887.

The Site was redeveloped in 1972 with a one-story manufacturing building that was demolished in 2018. The Site was identified with a manufacturing use on Sanborn maps from 1965 through 2007. Residential tenants were listed for the Site for the intermittent years from 1928 through 1960. Several commercial uses were identified, including a Venetian Blind Supply Company (1949), a beauty salon (1949), "House of Chan Enterprise Inc (1973), Meyers Herring Importing Corporation (1985), Le Classic Group, Inc. (1997-2000), and NCL (2005).

The Phase I Report revealed the following recognized environmental condition (REC) in connection with the Site:

- Based on a review of historical records, the Site has been utilized as manufacturing activities since 1965 to present day. Most recently the building has been occupied by a floor manufacturing company. The presence and storage of wood stains, varnishes, paint, paint thinners, floor sealants, and floor oil on Site is considered to be a recognized environmental condition.

2.4 GEOLOGICAL CONDITIONS

The geologic setting of Long Island is well documented and consists of crystalline bedrock overlain by layers of unconsolidated deposits. According to geologic maps of the area created by the United States Geologic Survey (USGS), the bedrock in this area of Brooklyn is an igneous intrusive classified as the Ravenswood grano-diorite of middle Ordovician to middle Cambrian age. Unconsolidated sediments overlie the bedrock and consist of Pleistocene aged sand, gravel and silty clays, deposited by glacial-fluvial activity. Non-native fill materials consisting of dredge spoils, rubble and / or other materials have historically been used to reinforce and extend shoreline areas and to raise and improve the drainage of low lying areas.

The Site is not located within a designated flood zone area. The nearest 0.2% flood zone is located approximately 300 feet to the west.

Subsurface soils at the Site consist of historic fill materials to depths as great as 9 feet below grade. A native silty sand is present immediately below this layer.

Groundwater at the Site is present under water table conditions at a depth of 6.12 to 9.24 feet below grade. Based upon on-site measurements, groundwater flow is to the southeast (**Figure 6**).

Considering the poor quality of groundwater in the area, including high levels of iron, sodium and magnesium associated with saltwater intrusion and impacts from petroleum and industrial solvents related to the former commercial / industrial use of the area, there is no anticipated future groundwater use.

2.5 CONTAMINATION CONDITIONS

2.5.1 Conceptual Model of Site Contamination

Contamination at the Site consists of historic fill material that contains petroleum related VOCs, pesticides, metals, and SVOCs above Unrestricted Use, Restricted Residential Use, and/or Commercial Use SCOs to depths as great as 9 feet below grade. The metals and SVOCs reported in soil are likely related to fill materials documented at the Site. The historic fill material was likely imported to the Site to raise the grade and backfill a former building's cellar prior to construction of the building constructed in 1972. The xylene detections in boring SB3 may be associated with incidental spillage of wood finishing products. Chromium was also reported above its UUSCO at two locations in the 10-12 ft interval.

2.5.2 Description of Areas of Concern

Historic fill material has been identified across the Site to depths as great as 9 feet below grade. Depending on location, the historic fill material contains one or more VOCs, metals, pesticides and polycyclic aromatic hydrocarbons (PAHs) above Unrestricted Use and / or Restricted Residential SCOs. Chromium was also reported above its UUSCO at two locations in the 10-12 ft interval.

2.5.3 Soil/Fill Contamination

2.5.3.1 Summary of Soil/Fill Data

Soil sample results from the RI are summarized in **Tables 3-7**. Further information on soil sample collection, handling and analysis can be found in the RI Report (EBC, March 2018).

2.5.3.2 Comparison of Soil/Fill with SCGs

Table 15 shows sample results above Track 1 Unrestricted SCOs for all overburden soil at the Site. **Figure 7** is a spider map which shows soil sampling locations and summarizes shallow and deep sample results above Track 1 Unrestricted SCOs for all overburden soil.

2.5.4 On-Site and Off-Site Groundwater Contamination

Groundwater samples showed no PCBs or pesticides at detectable concentrations. One VOC, methyl t-butyl ether (MTBE) (max. of 230 micrograms per liter [µg/L]), was detected within three of the groundwater samples (GW2, GW3 and GW4) exceeding its respective GQS. SVOCs detected above GQS included benz(a)anthracene (max. of 0.34 µg/L), benzo(b)fluoranthene (max. of 0.24 µg/L), benzo(k)fluoranthene (max. of 0.24 µg/L), chrysene (max. of 0.30 µg/L), and indeno(1,2,3-cd)pyrene (max. of 0.16 µg/L). Several dissolved metals were identified including aluminum (max. of 0.16 milligrams per Liter [m*3
g/L]), arsenic (0.029 mg/L), magnesium (65.2 mg/), manganese (max. of 5.36 mg/L and sodium (max. 265 mg/L).

2.5.4.1 Summary of Groundwater Data

The results of groundwater samples collected during the RI are summarized in **Tables 8-13**. Further information on groundwater sample collection, handling and analysis can be found in the RI Report (EBC, March 2018).

2.5.4.2 Comparison of Groundwater with SCGs

Sample results above groundwater standards in monitoring wells prior to the remedy are shown in **Table 16**. Spider maps which show groundwater sampling locations and summarize results above GA groundwater standards prior to the remedy are shown in **Figure 8**.

2.5.5 On-Site and Off-Site Soil Vapor Contamination

Total BTEX VOCs were low in soil vapor samples. Total BTEX compounds ranged from 215.54 µg/m^3 to 308.80 µg/m^3. Chlorinated VOCs (CVOCs) were reported in all of the soil vapor samples at relatively low concentrations tetrachloroethene (PCE) reported in all 5 samples at a maximum concentration of 11 µg/m^3, trichloroethene (TCE) reported in all 5 samples at a maximum concentration of 2.43 µg/m^3, carbon tetrachloride was detected in the 5 soil vapor

samples at a maximum of 0.62 µg/m^3, 1,1,1-trichloroethane was detected in 2 of the soil vapor samples at a maximum of 3.17 µg/m^3, cis-1,2-dichloroethene was detected in 2 of the samples at a maximum of 1.79 µg/m^3, vinyl chloride was detected in a single sample at 0.22 µg/m^3.

2.5.5.1 Summary of Soil Vapor Data

A table of soil vapor data collected prior to the remedy is shown in **Table 14**. Further information on soil gas sample collection, handling and analysis can be found in the RI Report (EBC, March 2018). Soil vapor results are posted on **Figure 9**.

2.5.6 Environmental and Public Health Assessments

Qualitative Human Health Exposure Assessment

The objective of the qualitative exposure assessment under the Brownfields Cleanup Program (BCP) is to identify potential receptors to the contaminants of concern (COC) that are present at, or migrating from, the Site. The identification of exposure pathways describes the route that the COC takes to travel from the source to the receptor. An identified pathway indicates that the potential for exposure exists; it does not imply that exposures actually occur. An exposure pathway has five elements; a contaminant source, release and transport mechanisms, point of exposure, route of exposure and a receptor population.

The potential exposure pathways identified below, represent both current and future exposure scenarios.

Contaminant Source

Historic fill material has been identified across the Site to depths as great as 9 feet below grade across the Site. Depending on location, the historic fill material contains one or more metals pesticides and polycyclic aromatic hydrocarbons (PAHs) above Unrestricted Use and / or Restricted Residential SCOs.

The xylene detections in soil boring SB3 are likely associated with incidental surface spills related to former manufacturing operations (wood finishing) performed at the Site.

Contaminant Release and Transport Mechanism

Historic fill material with elevated concentrations of SVOCs, pesticides and metals is present across the Site to depths as great as 9 feet below grade. Chromium was also reported at elevated levels at two locations at a depth of 10-12 feet below grade. The metals, SVOCs and pesticides detected within the historic fill material are not believed to be associated with a spill/release, but are likely associated with the source of material originally brought in to backfill/raise the property.

The xylene detected in subsurface soil at a single location may be associated with incidental surface spills associated with wood finishing products. No MTBE was detected within any of the soil samples collected at the Site, but MTBE was detected above GQS within each of the four groundwater samples. Petroleum related VOCs were detected in soil vapor at moderate concentrations, and comparable to those often found in Brooklyn. There does not appear to be any transfer of site contaminants to dissolved or vapor phases and therefore no transport.

Point of Exposure, Route of Exposure and Potentially Exposed Populations

Potential On-Site Exposures: Remediation workers and construction workers engaged in the excavation of impacted and non-impacted soil at the site may be exposed to VOCs, SVOCs, pesticides and heavy metals through several routes. Workers excavating impacted soil may be exposed through inhalation, ingestion and dermal contact. A site-specific Health and Safety Plan has been developed to identify and minimize the potential hazards to on-site workers. Site trespassers could also be exposed to impacted soil during excavation, however, security measures including an 8 ft high construction fence and 24 hr security will minimize potential exposure through this route. Potential vapor intrusion does not appear to be a significant concern for residents of the planned construction which includes a cellar level below the static water table. However, if Site conditions are found to be different or if the planned construction changes additional evaluation of the potential for soil vapor intrusion may be necessary. Remediation of the source areas is also expected to further reduce or eliminate this potential.

Potential Off-Site Exposures: Off-Site residents could also be exposed to dust or vapors during the excavation of impacted soil. A Site-specific Community Air Monitoring Plan has been developed to identify and minimize the potential for off-site exposure to residents through continuous air monitoring during excavation activity.

The entire area is serviced by the New York City Water System which distributes water from the Croton Reservoir system. Since there are no public or private potable supply wells in the area, exposure from contact with tap water is not a concern.

The entire area is serviced by the New York City Water System which distributes water from the Croton Reservoir system. Since there are no public or private potable supply wells in the area, exposure from contact with tap water is not a concern.

Fish & Wildlife Remedial Impact Analysis

Since the VOC MTBE may be migrating beneath the Site in groundwater at low concentrations in a easterly direction, the groundwater to surface water discharge pathway was evaluated. The nearest surface water to the Site is the Bushwick Inlet located approximately 3,700 feet to the northwest. Based upon the concentrations of contaminants currently in groundwater beneath the Site, there are no expected impacts to surface water environments from contaminants migrating from the Site.

2.6 REMEDIAL ACTION OBJECTIVES

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

2.6.1 Groundwater

RAOs for Public Health Protection

- Prevent ingestion of groundwater containing contaminant levels exceeding drinking water standards.
- Prevent contact with, or inhalation of, volatiles emanating from contaminated groundwater.

RAOs for Environmental Protection

- Restore ground water aquifer, to the extent practicable, to pre-disposal/pre-release conditions.
- Prevent the discharge of contaminants to surface water.
- Remove the source of ground or surface water contamination.

2.6.2 Soil

RAOs for Public Health Protection

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

RAOs for Environmental Protection

- Prevent migration of contaminants that would result in groundwater or surface water contamination.
- Prevent impacts to biota due to ingestion/direct contact with contaminated soil that would cause toxicity or bioaccumulation through the terrestrial food chain.

2.6.3 Soil Vapor

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

3.0 DESCRIPTION OF REMEDIAL ACTION PLAN

3.1 EVALUATION OF REMEDIAL ALTERNATIVES

The goal of the remedy selection process under the BCP is to select a remedy that is protective of human health and the environment taking into consideration the current, intended and reasonably anticipated future use of the property. The remedy selection process begins by establishing RAOs for media in which chemical constituents were found in exceedance of NYSDEC standards, criteria and guidance values (SCGs). A remedy is then developed based on the following nine criteria:

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

The first two criteria are threshold criteria and must be satisfied in order for an alternative to be considered for selection. The remaining seven criteria are balancing criteria which are used to compare the positive and negative aspects of each of the remedial alternatives, provided the alternative satisfies the threshold criteria.

3.2 STANDARDS, CRITERIA AND GUIDANCE (SCG)

A criterion for remedy selection is evaluation for conformance with SCGs that are applicable, relevant and appropriate. Principal SCGs that are applicable, relevant and appropriate for evaluating the alternatives for remediation of this BCP site include the following:

- 29 CFR Part 1910.120 - Hazardous Waste Operations and Emergency Response
- 10 NYCRR Part 67 – Lead
- 6 NYCRR Part 371 - Identification and Listing of Hazardous Wastes (November 1998)

- 6 NYCRR Part 372 - Hazardous Waste Manifest System and Related Standards for Generators, Transporters and Facilities (November 1998)
- 6 NYCRR Subpart 374-1 - Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities (November 1998)
- 6 NYCRR Part 375 - 6 NYCRR Part 375 Environmental Remediation Programs Subparts 375-1, 375-3 and 375-6 (December 2006)
- 6 NYCRR Part 376 - Land Disposal Restrictions
- 6 NYCRR Part 608 - Use and Protection of Waters
- 6 NYCRR Parts 700-706 - Water Quality Standards (June 1998)
- 6 NYCRR Part 750 through 758 - Implementation of NPDES Program in NYS ("SPDES Regulations")
- 6 NYCRR Part 375-6 Soil Cleanup Objectives
- New York State Groundwater Quality Standards – 6 NYCRR Part 703;
- NYSDEC Ambient Water Quality Standards and Guidance Values – TOGS 1.1.1;
- NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation - May 2010;
- NYSDEC Draft Brownfield Cleanup Program Guide – May 2004;
- New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan
- NYS Waste Transporter Permits – 6 NYCRR Part 364;
- NYS Solid Waste Management Requirements – 6 NYCRR Part 360 and Part 364.
- TAGM 4059 - Making Changes To Selected Remedies (May 1998)
- STARS #1 - Petroleum-Contaminated Soil Guidance Policy
- TAGM 3028 - "Contained In" Criteria for Environmental Media: Soil Action Levels (August 1997)
- DER-10, Technical Guidance for Site Investigation and Remediation, May 2010
- DER-23 / Citizen Participation Handbook for Remedial Programs, January 2010
- OSWER Directive 9200.4-17 - Use of Monitored Natural Attenuation at Superfund,
- RCRA Corrective Action, and Underground Storage Tank Sites (November 1997)
- New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan with Special Requirements

- Guidance for Evaluating Soil Vapor Intrusion in the State of New York, with updates

Additional regulations and guidance are applicable, relevant, and appropriate to the remedial alternatives and will be complied in connection with implementation of the remedial program; however, the list above is intended to represent the principal SCGs which should be considered in evaluating the remedial alternatives for the BCP site.

Conformance with the appropriate standards for remediation of contaminated soil is an important criterion in evaluating the remedial alternatives for the BCP site. Presently, in New York State 6 NYCRR Part 375 establishes the primary SCGs associated with remediation of contaminated soil at sites which are in the BCP. If proposing remediation pursuant to a Track other than Track 1 (Unrestricted Use), 6 NYCRR Part 375 requires evaluation of at least one remedial alternative pursuant to Track I (Unrestricted Use) and one other alternative developed by the applicant for the proposed use of the BCP site. The remedial alternatives presented in Section 3.3 of this work plan have been prepared in conformance with this requirement.

3.3 ALTERNATIVES ANALYSIS

The goal of the remedy selection process under the BCP is to select a remedy that is protective of human health and the environment taking into consideration the current, intended and reasonably anticipated future use of the property. The remedy selection process begins by establishing RAOs for media in which chemical constituents were found in exceedance of NYSDEC standards, criteria and guidance values (SCGs). A remedy is then developed based on the following nine criteria:

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

The following is a detailed description of the alternatives analysis and remedy selection to address impacted media at the Site. This analysis was prepared in accordance with 6 NYCRR Part 375-1.8(f) and Part 375-3.8(f) and Section 4.3(c) of NYSDEC DER-10. As required, a minimum of two remedial alternatives (including a Track 1 scenario) are evaluated, as follows:

- Alternative 1 - Track 1 requires the remediation of all soils above bedrock to Unrestricted Use criteria. To meet this requirement excavation would be completed to a minimum depth of 10 feet across the Site to meet Unrestricted Use SCOs. The Alternative includes removal of contaminated groundwater at the Site by dewatering / treatment. This alternative does not allow the use of long-term Institutional/Engineering Controls to address impacted media or prevent exposures which may be required beneath the new building. A SSDS will not be needed for this alternative since the building foundation will be constructed approximately 2 ft or more below the water table.

- Alternative 2 - Track 2 requires the remediation of all soils to Restricted Residential criteria to a depth of 15 feet below grade. To meet this alternative, excavation would be required to a minimum depth of 6 feet across the Site with additional excavation to 10 feet in some areas to meet RRSCOs. This alternative does not allow the use of long-term Institutional/Engineering Controls to meet SCOs. Long-term Institutional/ Engineering Controls are allowed to address or prevent exposures from other impacted media however, such as soil gas. This alternative is provided as a contingency in the event that Track 1 restricted Use SCOs cannot be met. This alternative will require an environmental easement and may also require a Site Management Plan.

- Alternative 3 - Track 4, requires the remediation / replacement of all soils in the upper two feet to meet Restricted Residential SCOs or covering with the building slab or other impervious cover. This alternative would require capping of the entire site with the building slab. Since this alternative allows the use of long-term Institutional/Engineering Controls (>5yrs) to meet soil cleanup objectives and to address or prevent exposures from other impacted media such as soil gas, it is presented as a contingency to Alternative 2 in the event that on-going engineering controls are required to meet soil SCOs. This alternative will also require an environmental easement and a Site Management Plan.

3.4 REMEDIAL ALTERNATIVE 1

The following sections provide an evaluation of Alternative 1 based on the nine evaluation criteria as previously discussed.

3.4.1 Overall Protection of Human Health and the Environment

Alternative 1 will be protective of human health and the environment by removing all historic fill material at the Site and by remediating groundwater. The potential for human and environmental exposure to these constituents on-Site will be eliminated by excavation of all soils with parameters in excess of Unrestricted Use criteria, disposing of excavated materials off-Site, dewatering and treatment of groundwater beneath the Site, and backfilling as needed with certified clean fill or virgin mined materials.

Potential post-remediation exposures to on-Site residents from soil vapors are not expected since vapors during the RI were low and since the building slab will be installed below the water table. However, if Site conditions are found to be different or if the planned construction changes additional evaluation of the potential for soil vapor intrusion may be necessary. Groundwater use may be restricted at the Site until groundwater quality recovers.

During remedial and construction activity workers and area residents may be exposed to impacted soil and vapors. Worker exposure to soil and vapors will be minimized through implementation of a Health and Safety Plan. Exposures to area residents from dust and/or vapors will be minimized through the use of engineering controls and through implementation of a Community Air Monitoring Plan (CAMP).

3.4.2 Compliance with Remedial Goals, SCGs and RAOs

Alternative 1 will achieve compliance with the remedial goals, SCGs and RAOs for soil through source removal to Track 1 Unrestricted Use cleanup levels. SCGs for groundwater will also be achieved as impacted groundwater will be extracted and treated prior to discharge into the NYC sewer system (see Section 5.5.10).

3.4.3 Long-Term Effectiveness and Permanence

Alternative 1 achieves long term effectiveness and permanence by permanently removing and/or remediating all soils affected by Site contaminants or historic fill materials. Under this

Alternative, risk from soil impacts and groundwater will be eliminated. Alternative 1 will continue to meet RAOs for soil, groundwater and soil vapor in the future, providing a permanent long-term solution for the Site.

3.4.4 Reduction in Toxicity, Mobility or Volume through Treatment

Alternative 1 will permanently eliminate the toxicity, mobility, and volume of contaminants from on-Site soil by meeting Unrestricted Use SCOs through excavation and from on-Site groundwater by extraction, treatment and off-Site discharge (sewer system) of groundwater beneath the Site during construction. The removal/remediation of on-Site soil and groundwater will also reduce the toxicity, mobility, and volume of contaminants in soil vapor.

3.4.5 Short-Term Effectiveness

There is the potential for short-term adverse impacts and risks to workers, the community, and the environment during the implementation of Alternative 1. Short-term exposure to on-site workers during excavation and loading activities will be addressed with a HASP and mitigated through the use of personal protective equipment, monitoring and engineering controls. Potential short-term exposure to the surrounding community will be addressed through the use of odor and dust-suppression techniques and through the implementation of a CAMP which will require air monitoring activities during all excavation and soil disturbance activities.

Other potential impacts to the community such as construction-related noise, vibrations and traffic, will be controlled and regulated under the terms of the NYS Department of Buildings issued building permit which can place a Stop Work Order on the property for unsafe conditions, community impacts or violation of the terms and conditions of the permit. Decontamination procedures of equipment, including trucks transporting soil to off-site disposal facilities, will minimize the potential for impacted soil to be dispersed beyond the Site boundary. A truck traffic plan has also been prepared to minimize disturbance to the local roads and community.

3.4.6 Implementability

The techniques, materials and equipment to implement Alternative 1 are readily available and have been proven effective in remediating the contaminants associated with the Site. Excavation and construction dewatering for the remediation of soils and groundwater are both a "low tech"

and reliable method which has a long and proven track record on the remediation of hazardous waste and petroleum spill sites.

3.4.7 Cost

Costs associated with Alternative 1 are estimated at approximately $ 1,073,219,447. This cost estimate includes the following elements and assumptions:

- Excavate historic fill material to 10 ft across the Site with additional excavation as needed to achieve Track 1 Unrestricted Use SCOs;
- Shoring to accommodate excavation to a depth of 10 ft;
- Disposal of approximately 3,911 cy of historic fill material and soil;
- Dewatering, treatment and discharge of groundwater to the NYC sewer system;
- Waste characterization and endpoint verification sampling and analysis;
- HASP and CAMP monitoring for the duration of the remedial activities; and
- Preparation of a Final Engineering Report.

3.4.8 Compatibility with Land Use

The proposed redevelopment of the Site is compatible with its current zoning. Following remediation, the Site will meet the objectives for Unrestricted Use which is appropriate for its planned community use. A groundwater use restriction will be required to prevent future exposure to affected groundwater.

3.4.9 Community Acceptance

This RAWP will be subject to a 45-day public comment period to determine if the community had comments on the presented remedial alternatives and selected remedy. If no comments are received regarding Alternative 1, it will be considered to be acceptable to the community.

3.5 REMEDIAL ALTERNATIVE 2

The following sections provide an evaluation of Alternative 2 based on the nine evaluation criteria as previously discussed.

3.5.1 Overall Protection of Human Health and the Environment

Alternative 2 will be protective of human health and the environment by eliminating constituents in soil above Restricted Residential SCOs to a depth of 15 feet below grade. The potential for

human and environmental exposure to these constituents on-site will be eliminated by excavation of all soil with parameters in excess of Restricted Residential criteria to a minimum depth of 15 feet, off-site disposal of excavated materials, dewatering, treatment and discharge of impacted groundwater, and backfilling as needed with certified clean fill or virgin mined materials.

Potential post-remediation exposures to on-Site residents from soil vapors are not expected since vapors during the RI were low and since the building slab will be installed below the water table. However, if Site conditions are found to be different or if the planned construction changes additional evaluation of the potential for soil vapor intrusion may be necessary. Groundwater use may be restricted at the Site until groundwater quality recovers.

During remedial and construction activity, workers and area residents may be exposed to impacted soil and vapors. Worker exposure to soil and vapors will be minimized through implementation of a HASP. Exposures to area residents from dust and or vapors will be minimized through the use of engineering controls and through implementation of a CAMP.

3.5.2 Compliance with Remedial Goals, SCGs and RAOs

Alternative 2 will achieve compliance with the remedial goals, SCGs and RAOs for soil through source removal to Restricted Residential cleanup levels for the top 15 feet. SCGs for groundwater will also be achieved as impacted groundwater below the Site will be extracted and treated prior to discharge into the NYC sewer system (see Section 5.5.10).

3.5.3 Long-term Effectiveness and Permanence

Alternative 2 achieves long term effectiveness and permanence by permanently removing and/or remediating all soils affected by Site contaminants above Restricted Residential SCOs to a depth of 15 feet and by remediating groundwater. Under this Alternative risk from soil impacts and groundwater will be eliminated. Alternative 2 will continue to meet RAOs for soil groundwater and soil vapor in the future, providing a permanent long-term solution for the Site.

3.5.4 Reduction in Toxicity, Mobility or Volume through Treatment

Alternative 2 will permanently eliminate the toxicity, mobility, and volume of contaminants from on-Site soil by meeting Restricted Residential SCOs in the upper 15 feet and from on-Site

groundwater by extraction, treatment and off-site discharge (sewer system) of groundwater beneath the Site during construction.

3.5.5 Short-term Effectiveness

The potential for short-term adverse impacts and risks to the workers, the community, and the environment during the implementation of Alternative 2 is minimal. Short-term exposure to on-site workers during excavation and loading activities will be addressed with a HASP and mitigated through the use of personal protective equipment, monitoring and engineering controls. Potential short-term exposure to the surrounding community will be addressed through the use of odor and dust-suppression techniques and through the implementation of a CAMP which will require air monitoring activities during all excavation and soil disturbance activities.

Other potential impacts to the community such as construction-related noise, vibrations and traffic will be controlled and regulated under the terms of the NYS Department of Buildings issued building permit which can place a Stop Work Order on the property for unsafe conditions, community impacts or violation of the terms and conditions of the permit. Decontamination procedures of equipment, including trucks transporting soil to off-site disposal facilities will minimize the potential for impacted soil to be dispersed beyond the Site boundary. A truck traffic plan will also be prepared to minimize disturbance to the local roads and community.

3.5.6 Implementability

The techniques, materials and equipment to implement Alternative 2 are readily available and have been proven effective in remediating the contaminants associated with the Site. Excavation and construction dewatering for the remediation of soils and groundwater are both a "low tech" and reliable method which has a long and proven track record on the remediation of hazardous waste and petroleum spill sites. Excavation to remove source materials and meet Restricted Residential SCOs will not require any additional shoring / dewatering beyond that needed for construction purposes.

3.5.7 Cost

Costs associated with Alternative 2 are almost identical to Alternative 1 adding only those costs associated with preparation of a Site Management Plan and Environmental Easement package

and are estimated at approximately $599,849. This cost estimate includes the following elements and assumptions:

- Excavate historic fill material to 6 ft across the Site with additional over-excavation as needed to achieve Restricted Residential SCOs within the top 15 ft of the Site;
- Shoring to accommodate excavation to a depth of 6 ft;
- Disposal of approximately 2,346 cy of historic fill material and soil;
- Waste characterization and endpoint verification sampling and analysis;
- HASP and CAMP monitoring for the duration of the remedial activities;
- Preparation of a Site Management Plan;
- Preparation of a Final Engineering Report; and
- Recording of an Environmental Easement to restrict groundwater use.

3.5.8 Compatibility with Land Use

The proposed redevelopment of the Site is compatible with its current zoning. Following remediation, the Site will meet the objectives for Restricted Residential use which is appropriate for its planned community use. A groundwater use restriction will be required to prevent future exposure to affected groundwater.

3.5.9 Community Acceptance

This RAWP will be subject to a 45-day public comment period to determine if the community has any comments on the presented remedial alternatives and selected remedy. If no comments are received, it will be considered to be acceptable to the community.

3.6 REMEDIAL ALTERNATIVE 3

The following sections provide an evaluation of Alternative 3 based on the nine evaluation criteria as previously discussed.

3.6.1 Overall Protection of Human Health and the Environment

Alternative 3 will be protective of human health and the environment by removing the upper two feet of the soil column and by covering the Site with the building foundation. The potential for human and environmental exposure to these constituents on-Site will be eliminated by the excavation and/or covering of all soil with parameters above Restricted Residential criteria.

Residual fill with parameters above Restricted Residential criteria which remain following construction excavation, will be effectively covered with the concrete foundation slab of the new building.

Potential post-remediation exposures to on-Site residents from soil vapors are not expected since vapors during the RI were low and since the building slab will be installed below the water table. However, if Site conditions are found to be different or if the planned construction changes additional evaluation of the potential for soil vapor intrusion may be necessary. Groundwater use may be restricted at the Site until groundwater quality recovers.

During remedial and construction activity, workers and area residents may be exposed to impacted soil and vapors. Worker exposure to soil and vapors will be minimized through implementation of a HASP. Exposures to area residents from dust and or vapors will be minimized through the use of engineering controls and through implementation of a CAMP.

3.6.2 Compliance with Remedial Goals, SCGs and RAOs

Alternative 3 will achieve some compliance with the remedial goals, SCGs and RAOs for soil through removal to a depth of 2 feet followed by covering with the building slab. Groundwater quality will continue to improve over time with respect to SCGs.

3.6.3 Long-term Effectiveness and Permanence

Alternative 3 achieves long term effectiveness and permanence by permanently covering all soils affected by Site contaminants above Restricted Residential SCOs. Under this Alternative risk from soil impacts is eliminated for on-site residents. Alternative 2 will continue to meet RAOs for soil in the future, providing a permanent long-term solution for the Site.

3.6.4 Reduction in Toxicity, Mobility or Volume through Treatment

Alternative 3 will not reduce the toxicity or volume of contaminants in on-Site soil through removal of the upper 2 ft and will reduce the potential for mobility by covering the soil with the building slab. The covering of on-Site soil will also reduce the toxicity, mobility, and volume of contaminants within on-Site groundwater.

3.6.5 Short-term Effectiveness

The potential for short-term adverse impacts and risks to the workers, the community, and the environment during the implementation of Alternative 3 is minimal. Short-term exposure to on-site workers during soil disturbance activities will be addressed with a HASP and mitigated through the use of personal protective equipment, monitoring and engineering controls. Potential short-term exposure to the surrounding community will be addressed through the use of odor and dust-suppression techniques and through the implementation of a CAMP which will require air monitoring activities during all excavation and soil disturbance activities.

Other potential impacts to the community such as construction-related noise, vibrations and traffic will be controlled and regulated under the terms of the NYS Department of Buildings permit which can place a Stop Work Order on the property for unsafe conditions, community impacts or violation of the terms and conditions of the permit. Decontamination procedures of equipment, including trucks transporting soil to off-site disposal facilities will minimize the potential for impacted soil to be dispersed beyond the Site boundary. A truck traffic plan will also be prepared to minimize disturbance to the local roads and community.

3.6.6 Implementability

The techniques, materials and equipment to implement Alternative 3 are readily available and have been proven effective in remediating the contaminants associated with the Site. Covering of soils for managing them in place is both a "low tech" and reliable method which has a long and proven track record on hazardous waste and petroleum spill sites.

3.6.7 Cost

Costs associated with Alternative 3 are estimated at approximately $264,442. This cost estimate includes the following elements and assumptions:

- Covering the entire Site with the building foundation;
- HASP and CAMP monitoring for the duration of the remedial activities; and
- Preparation of a Final Engineering Report.
- Preparation of a Site Management Plan; and,
- Recording of an Environmental Easement.

3.6.8 Compatibility with Land Use

The proposed redevelopment of the Site is compatible with its current zoning. Following remediation the Site will meet restricted residential use objectives which is appropriate for its planned mixed residential and commercial use. A groundwater use restriction will be required to prevent future exposure to affected groundwater.

3.6.9 Community Acceptance

This RAWP will be subject to a 45-day public comment period to determine if the community has any comments on the presented remedial alternatives and selected remedy. If no comments are received, it will be considered to be acceptable to the community.

3.7 SELECTION OF THE PREFERRED REMEDY

The remedy recommended for the site is a Track 1 alternative which consists of the removal and proper off-Site disposal of all historic fill material with parameters above Unrestricted Use SCOs. The Track 1 alternative also includes the removal of contaminated groundwater through dewatering activities during excavation. Any over-excavated areas will be backfilled with either virgin mined materials or certified fill which meet Unrestricted Use SCOs.

3.7.1 Preferred Remedy Land Use Factor Evaluation

As required by Article 27, Title 14 of the Environmental Conservation Law 27-1415, the following land use factor evaluation examines whether the preferred alternative is acceptable based on the 14 criteria presented in the following subsections.

Zoning

The property is currently zoned M1-2 / R6A. M1 districts are often buffers between M2 or M3 districts and adjacent residential or commercial districts. M1 districts typically include light industrial uses, such as woodworking shops, repair shops, and wholesale service and storage facilities. Nearly all industrial uses are allowed in M1 districts if they meet the stringent M1 performance standards. Offices, hotels and most retail uses are also permitted. Certain community facilities, such as hospitals, are allowed in M1 districts only by special permit, but houses of worship are allowed as-of-right.

R6A is a higher-density residence district generally found close to central and regional business districts and are usually mapped in proximity to mass transit. These areas are characterized by bulkier buildings, a greater range of building heights and less automobile ownership than lower-density areas.

The proposed project which includes residential apartments and retail space is compatible with the surrounding land use and will be in compliance with the current zoning.

Applicable Comprehensive Community Master Plans or Land Use Plans

In May 2005, the City Council adopted the Greenpoint - Williamsburg Rezoning Action (CEQR No. 04DCP003K). The purpose of the action was intended to provide opportunities for new residential and commercial development and enhancement and upgrade of the waterfront areas, including new parkland on the waterfront to provide waterfront access and recreational opportunities.

Over the last two decades, the Greenpoint and Williamsburg areas have experienced substantial growth in their residential population, resulting in a housing shortfall and increasing demands for new dwelling units. While the residential population dramatically increased, the industrial sector has declined, leaving many large properties vacant or underutilized. In addition, as a result of the 1961 rezoning efforts, existing residential buildings in manufacturing districts became non-conforming uses, banned from continued residential occupancy when vacant for two years, and not allowed to expand or rebuild when substantially damaged by fire.

The decline of industrial activity, particularly water-dependent industry, during recent decades has been pronounced in Greenpoint and Williamsburg. Industrial sectors such as garment and textile manufacturing, which once dominated Williamsburg, have nearly disappeared from the area as companies have closed or moved their operations abroad. At the same time, residential activity has spread beyond its traditional boundaries in Greenpoint-Williamsburg.

The action would create opportunities for new housing development on underutilized and vacant land formerly used for manufacturing, where there is no longer a concentration of industrial activity and where strong demand for housing exists. It would bring existing non-conforming residential uses into conformance. In addition, the mixed-use districts proposed in certain areas

would permit the continuation of light industrial uses as well as the residential re-use of underutilized and vacant land.

The proposed project will be in compliance with the current land use plans as identified in the Greenpoint - Williamsburg Rezoning action (CEQR No. 04DCP003K) adopted by the City on May 11, 2005.

Surrounding Property Uses

Surrounding land use to the west north along Bayard Street is a 2-story residential 1 & 2 family building. The adjacent properties to the south east along Graham Avenue consist of two 3-story residential multi-family walk-up buildings and a 3-story mixed residential and commercial building. To the north of the Site, across Bayard Street, there are multiple residential 1 & 2 family buildings and two 3-story mixed residential and commercial buildings. To the east of the property, across Graham Avenue, there are multiple residential multi-family walk-up buildings and a single-story garage structure.

There are two public schools; John Ericsson Middle School 126 located approximately 340 feet west of the Site at 424 Leonard Street, Brooklyn and Williamsburg Charter High School located approximately 600 feet west of the Site at 198 Varet Street, Brooklyn. There were no nursing homes or hospitals identified within 1,200 feet of the Site.

Citizen Participation

Citizen participation for implementation of the preferred alternative will be performed in accordance with DER 23 and NYCRR Part 375-1.10 and Part 375-3.10. A Citizen Participation Plan has been prepared and is available for public review at the identified document repositories (NYSDEC Region 2 Office, Greenpoint Branch of the Brooklyn Public Library, Brooklyn Community Board 1).

Environmental Justice Concerns

The Site is not located within a potential environmental justice area. The NYSDEC defines a potential environmental justice area as a "minority or low-income community that may bear a disproportionate share of the negative environmental consequences resulting from industrial,

municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies.

Environmental justice means the fair treatment and meaningful involvement of all people regardless of race, color, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including a racial, ethnic, or socioeconomic group, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies.

Since the goal of the remedy will achieve the highest level of cleanup and will remove contaminated materials from the community, the remedy poses no environmental justice concerns.

Land use designations

The proposed remedy is consistent with land-use designations.

Population growth patterns

Population growth patterns support the proposed use for the Site. The preferred remedy will not negatively affect on population growth patterns.

Accessibility to existing infrastructure

The Site is accessible to existing infrastructure. The close proximity of the Site to the Brooklyn - Queens Expressway (I-287) will assist soil transportation and contractor access to the Site. The Site is also accessible to mass transit and is within walking distance to the G line with a subway stop on Nassau Avenue (5 blocks to the northwest) and the L line which has a subway stop on Bedford Avenue (8 blocks to the east). The preferred remedy will not alter accessibility to existing infrastructure.

Proximity to cultural resources

The proposed remedy will not negatively impact cultural resources.

Proximity to natural resources

The proposed remedy will improve the local environment and will not negatively impact affect natural resources.

Off-Site groundwater impacts

The proposed remedy will improve off-site groundwater impacts by removing contaminated groundwater from the Site by dewatering. The proposed remedy will not affect natural resources other than to potentially improve the quality of groundwater on a local basis.

Proximity to floodplains

Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs) were reviewed to determine if the Site is located within the 100-year or 500-year flood zones. The FIRM showing the property (No. 3604970202F) indicates that the entire property is located outside the 100-year and 500-year flood zones. This indicates that there is a minimal risk of flooding at the Site.

Geography and geology of the Site

The selected remedy will excavate soil/fill from the Site to a depth of at least 10 feet below sidewalk grade. The selected alternative and development of the Site have considered the geography and geology of the Site.

Current Institutional Controls

There are no Institutional Controls presently assigned to the Site.

3.8 SUMMARY OF SELECTED REMEDIAL ACTIONS

The remedy recommended for the Site is a Track 1 alternative (Alternative 1) which consists of the removal of all on-Site soil which exceeds Unrestricted Use SCOs and the removal of impacted groundwater. It is expected that a Track 1 alternative will require excavation to a minimum depth of 10 feet across the Site with additional excavation as needed to remove soil/fill with contaminants above Unrestricted Use SCOs. Excavation for the new building's cellar level will be performed across the Site to a depth of at least 12 feet below grade. The remedy will include the following items:

1. Excavation of soil/fill exceeding Track 1 Unrestricted Use SCOs as listed in **Table 1** to a minimum depth of 10 feet across the Site with additional excavation as needed to meet Track 1 Unrestricted Use SCOs;
2. Screening for indications of contamination (by visual means, odor, and monitoring with PID) of all excavated soil during any intrusive Site work;
3. Collection and analysis of end-point samples to evaluate the performance of the remedy with respect to attainment of Track 1 Unrestricted Use SCOs;
4. Appropriate off-Site disposal of all material removed from the Site in accordance with all Federal, State and local rules and regulations for handling, transport, and disposal;
5. Dewatering and treatment of VOC impacted groundwater before discharging to the NYC sewer system under a NYCDEP sewer discharge permit;
6. Import of materials to be used for backfill and cover in compliance with: (1) chemical limits and other specifications included in **Table 1**, (2) all Federal, State and local rules and regulations for handling and transport of material;
7. If Track 1 cleanup is not achieved, implementation of a Site Management Plan (SMP) for long term maintenance of the Engineering Controls (Track 2, Track 4).
8. If Track 1 cleanup is not achieved, an Environmental Easement will be filed against the Site to ensure implementation of the SMP (Track 2, Track 4).

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

Remedial activities will be performed at the Site in accordance with this NYSDEC-approved RAWP. Any anticipated deviations to the RAWP shall be submitted to the NYSDEC for review.

4.0 REMEDIAL ACTION PROGRAM

The objective of this section of the Remedial Action Work Plan, is to present a scope of work which will be approved by NYSDEC and when completely implemented will ready the BCP site for development under the Contemplated Use consistent with the requirements of the Brownfield Cleanup Program.

4.1 GOVERNING DOCUMENTS

Governing documents and procedures included in the Remedial Work Plan include a Site-specific Health and Safety Plan (HASP), a Community Air Monitoring Plan (CAMP), a Citizen Participation Plan, a Soil Management Plan (SoMP), a Quality Assurance Project Plan (QAPP), fluid management procedures, and contractors' site operations and quality control procedures. Highlights of these documents and procedures are provided in the following sections.

4.1.1 Health & Safety Plan (HASP)

Contractors and subcontractors will have the option of adopting this HASP or developing their own Site-specific document. If a contractor or subcontractor chooses to prepare their own HASP, the Remedial Engineer will insure that it meets the minimum requirements as detailed in the Site-specific HASP prepared for the Site.

Activities performed under the HASP will comply with applicable parts of OSHA Regulations, primarily 29 CFR Parts 1910 and 1926. Modifications to the HASP may be made with the approval of the Remedial Engineer (RE), Site Safety Manager (SSM) and/or Project Manager (PM).

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

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

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

The Site Safety Coordinator will be Mr. Thomas Gallo. His resume is provided in **Attachment F**. Confined space entry will comply with all OSHA requirements to address the potential risk posed by combustible and toxic gasses. A copy of the Site-Specific Health and Safety Plan is provided in **Attachment B**.

4.1.2 Quality Assurance Project Plan (QAPP)

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

Collected samples will be appropriately packaged, placed in coolers and shipped via overnight courier or delivered directly to the analytical laboratory by field personnel. Samples will be containerized in appropriate laboratory provided glassware and shipped in plastic coolers. Samples will be preserved through the use of ice or a cold-pak(s) to maintain a temperature of $4^{o}C$.

Dedicated disposable sampling materials will be used for both soil and groundwater samples (if collected), eliminating the need to prepare field equipment (rinsate) blanks. However, if non-disposable equipment is used, (stainless steel scoop, etc.) field rinsate blanks will be prepared at the rate of 1 for every eight samples collected.

Decontamination of non-dedicated sampling equipment will consist of the following:

- Gently tap or scrape to remove adhered soil
- Rinse with tap water
- Wash with alconox® detergent solution and scrub
- Rinse with tap water
- Rinse with distilled or deionized water

Prepare field blanks by pouring distilled or de-ionized water over decontaminated equipment and collecting the water in laboratory provided containers. Trip blanks will accompany samples each time they are transported to the laboratory. Matrix spike and matrix spike duplicates (MS/MSD) will be collected at the rate of one per 20 samples submitted to the laboratory. Laboratory reports will be upgradeable to ASP category B deliverables for use in the preparation of a data usability report (DUSR). The QAPP for the Site is provided in **Attachment C**.

4.1.3 Construction Quality Assurance Plan (CQAP)

All construction work related to the remedy (i.e. soil excavation) will be monitored by EBC / AMC field personnel under the direct supervision of the Remedial Engineer. Monitoring during soil excavation will be performed to protect the health of site workers and the surrounding community. A Health and Safety Plan (HASP) and Community Air Monitoring Plan (CAMP) have been specifically developed for this project. These plans specify the monitoring procedures, action levels, and contingency measures that are required to protect public health.

All intrusive and soil disturbance activities will be monitored by an environmental professional (EP) under the direct supervision of the Remedial Engineer who will record observations in the site field book and complete a photographic log of the daily activities. The EP will provide daily updates to the Project Manager and Remedial Engineer who will both make periodic visits to the site as needed to assure construction quality. Daily updates will also be submitted to the NYSDEC. See section 4.4.1 Daily Reports.

4.1.4 Soil/Materials Management Plan (SoMP)

A SoMP has been prepared for excavation, handling, storage, transport and disposal of all soils/materials that are disturbed / excavated at the Site. The SoMP includes all of the controls that will be applied to these efforts to assure effective, nuisance-free performance in compliance with all applicable Federal, State and local laws and regulations. The SoMP is presented in Section 5.4.

4.1.5 Erosion and Sediment Control Plan (ESCP)

Erosion and sediment controls will be performed in conformance with requirements presented in the New York State Guidelines for Urban Erosion and Sediment Control. Typical measures that

will be utilized at various stages of the project to limit the potential for erosion and migration of soil include the use of hay bales, temporary stabilized construction entrances/exits, placement of silt fencing and/or hay bales around soil stockpiles, and dust control measures.

4.1.6 Community Air Monitoring Plan (CAMP)

The CAMP provides measures for protection for on-site workers and the downwind community (i.e., off-site receptors including residences, businesses, and on-site workers not directly involved in the remedial work) from potential airborne contaminant releases resulting from remedial activities.

The action levels specified require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that the remedial work did not spread contamination off-site through the air. The primary concerns for this site are vapors, nuisance odors and dust particulates.

The primary concerns for this site are vapors, nuisance odors and dust particulates. The CAMP prepared for implementation of the RAWP is provided in **Attachment D**.

4.1.7 Contractors Site Operations Plan (SOP)

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

4.1.8 Citizen Participation Plan (CPP)

The Citizen Participation Plan prepared for this project is provided in **Attachment E**. The public will be informed of key project documents and events through the distribution of fact sheets through the Department's List Serv. The public was initially informed of the Site and the opportunity to join the List Serv through an ad placed in the local newspaper and mailed fact sheets.

No changes will be made to approved Fact Sheets authorized for release by NYSDEC without written consent of the NYSDEC. No other information, such as brochures and flyers, will be included with the Fact Sheet mailing.

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

Brooklyn Public Library – Greenpoint Branch

107 Norman Avenue, Brooklyn, NY 11222 - (718) 349-8504

Hours

Mon	10:00 AM - 6:00 PM	Thu	10:00 AM - 8:00 PM	Sun - Closed
Tue	10:00 AM - 8:00 PM	Fri	10:00 AM - 6:00 PM	
Wed	10:00 AM - 8:00 PM	Sat	10:00 AM - 5:00 PM	

Brooklyn Community Board 1
435 Graham Avenue
Brooklyn, NY, 11211
Phone: 718-389-0009
Email: bk01@cb.nyc.gov

4.2 GENERAL REMEDIAL ACTION INFORMATION

4.2.1 Project Organization

The Project Manager for the Remedial Activity will be Mr. Keith Butler. Overall responsibility for the BCP project will be Mr. Charles B. Sosik, P.G., P.HG. The Remedial Engineer for this project is Mr. Ariel Czemerinski, P.E. Chawinie Reilly will serve as the Quality Assurance Officer. Thomas Gallo will serve as the Field Manager. Ms. Sherri Pullar will provide 3rd party data validation. Data. Resumes of key personnel involved in the Remedial Action are included in **Attachment F**.

4.2.2 Remedial Engineer

The Remedial Engineer for this project will be Mr. Ariel Czemerinski, P.E. The Remedial Engineer is a registered professional engineer licensed by the State of New York. The Remedial Engineer will have primary direct responsibility for implementation of the remedial program for the Site. The Remedial Engineer will certify in the Final Engineering Report that the remedial activities were observed by qualified environmental professionals under his supervision and that the remediation requirements set forth in the Remedial Action Work Plan and any other relevant provisions of ECL 27-1419 have been achieved in full conformance with that Plan. Other Remedial Engineer certification requirements are listed later in this RAWP.

The Remedial Engineer will review all pre-remedial plans submitted by contractors and subcontractors involved in all aspects of remedial construction, including soil excavation, stockpiling, characterization, removal and disposal, air monitoring, emergency spill response services, import of back fill material, and management of waste transport and disposal, and will certify compliance in the Final Remediation Report. The Remedial Engineer will provide the certifications listed in Section 10.1 in the Final Engineering Report.

4.2.3 Remedial Action Schedule

The remedial action will begin with mobilization of equipment and material to the Site, which will begin approximately 1 week following RAWP approval and 10 days after the distribution of the remedial construction Fact Sheet. A pre-construction meeting will be held among NYSDEC, the Remedial Engineer, and the selected remedial contractor prior to site mobilization. Mobilization will be followed by soil removal and disposal and confirmation sampling. The work is expected to take 4 months as part of the construction excavation and foundation installation.

4.2.4 Work Hours

The hours for operation of remedial construction will conform to the New York City Department of Buildings construction code requirements or according to specific variances issued by that agency. DEC will be notified by the Applicant of any variances issued by the Department of Buildings. NYSDEC reserves the right to deny alternate remedial construction hours.

4.2.5 Site Security

A construction fence will be erected around the entire property as required by the NYC Department of Buildings. The fence will be maintained as required and secured at the end of each work day.

4.2.6 Traffic Control

The Volunteer's construction management personnel will direct the arrival or departure of construction vehicles, and provide flag services as needed to maintain safe travel exiting and entering the Site from Bayard Street. Traffic related to on-going remedial activity will require the staging of 10-wheel dump trucks on Bayard Street on a daily basis during soil excavation activity. The soil disposal transport route will be as follows:

- ENTERING SITE - from the Brooklyn-Queens Expressway heading east; take the Exit 33 McGuinness Boulevard/Humboldt Street and turn left, heading northwest on McGuinness Boulevard. Turn left on Broome Street, then make a left onto Graham Avenue. Continue south on Graham Avenue Bayard Street. Make a right onto Bayard Street and the entrance to the Site is on the left.
- EXITING SITE – Continue west on Bayard Street to Manhattan Avenue. Turn right onto Manhattan Avenue and make the first right onto Newtown Street. Continue east on Newtown Street to McGuinness Boulevard. Turn right onto McGuniness and bear right on to the on-ramp to the Brooklyn-Queens Expressway.

A map showing the truck routes is included as **Figure 10**.

4.2.7 Worker Training and Monitoring

An excavation contractor with appropriate experience, personnel and training (minimum 24 hr OSHA) is required to perform the removal of the petroleum impacted soil, non-hazardous CVOC impacted soil, historic fill and uncontaminated native soil. The excavation contractor's on-site personnel engaged in this work will all have a minimum of 24 hour Hazardous Waste Operations and Emergency Response Operations training.

All field personnel involved in remedial activities will participate in training, if required under 29 CFR 1910.120, including 24 and 40-hour hazardous waste operator training and annual 8-

hour refresher training. The Site Safety Officer will be responsible for maintaining workers training records.

Personnel entering any exclusion zone will be trained in the provisions of the HASP and be required to sign a HASP acknowledgment.

All on-site personnel engaged in remedial or sampling activities must receive adequate Site-specific training in the form of an on-site Health and Safety briefing prior to participating in field work with emphasis on the following:

- Protection of the adjacent community from hazardous vapors and / or dust which may be released during intrusive activities.
- Identification of chemicals known or suspected to be present on-site and the health effects and hazards of those substances.
- The need for vigilance in personnel protection, and the importance of attention to proper use, fit and care of personnel protective equipment.
- Decontamination procedures.
- Site control including work zones, access and security.
- Hazards and protection against heat or cold.
- The proper observance of daily health and safety practices, such as entry and exit of work zones and site. Proper hygiene during lunch, break, etc.
- Emergency procedures to be followed in case of fire, explosion and sudden release of hazardous gases.

4.2.8 Agency Approvals

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

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

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

4.2.9 Pre-Construction Meeting with NYSDEC

A pre-construction meeting or teleconference call with the Project Manager, Remedial Engineer, Construction Manager, Owner's Representative and the NYSDEC will take place prior to the start of major construction activities.

4.2.10 Emergency Contact Information

An emergency contact sheet with names and phone numbers is included in **Table 18**. That document will define the specific project contacts for use by NYSDEC and NYSDOH in the case of a day or night emergency.

4.2.11 Remedial Action Costs

The total estimated cost of the Remedial Action is $ 454,940. An itemized and detailed summary of estimated costs for all remedial activity is attached as **Attachment G**. This will be revised based on actual costs and submitted as an Appendix to the Final Remediation Report.

4.3 SITE PREPARATION

4.3.1 Mobilization

Mobilization will include the delivery of construction equipment and materials to the Site. All construction personnel will receive site orientation and training in accordance with the Site-specific HASP, CAMP and established policies and procedures to be followed during the implementation of the RAWP. The remediation contractor, construction manager and all associated subcontractors will each receive a copy of the RAWP and the Site-specific HASP and will be briefed on their contents.

4.3.2 Erosion and Sedimentation Controls

Soil erosion and sediment control measures for management of storm water will be installed in accordance with the New York Guidelines for Urban Erosion and Sediment Control. Haybales and/or silt fence will be placed by the remedial contractor at locations surrounding excavation areas and within the perimeter fencing as needed, to control stormwater runoff and surface water from exiting the excavation. These control measures will be installed prior to initiating the soil excavation.

4.3.3 Stabilized Construction Entrance(s)

Stabilized construction entrances will be installed at all points of vehicle ingress and egress to the Site. The stabilized entrances will be constructed of a 4 to 6-inch bed of crushed stone or crushed concrete which will be sloped back toward the interior of the Site. The stabilized entrances will be inspected on a daily basis during soil loading activities and reinforced as needed with additional stone/concrete material to prevent the accumulation of ruts, mud or soil.

4.3.4 Utility Marker and Easements Layout

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

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

4.3.5 Sheeting and Shoring

Appropriate management of structural stability of on-Site or off-Site structures during on-Site activities including excavation is the sole responsibility of the Applicant and its contractors. The Applicant and its contractors are solely responsible for safe execution of all invasive and other

work performed under this Plan. The Applicant and its contractors must obtain any local, State or Federal permits or approvals that may be required to perform work under this Plan. Further, the Applicant and its contractors are solely responsible for the implementation of all required, appropriate, or necessary health and safety measures during performance of work under the approved Plan.

The exact means and methods for the support of excavation (SOE) have not been determined yet and will be forwarded to DEC upon receipt.

4.3.6 Equipment and Material Staging

All equipment and work materials will be staged on-Site in areas as designated by the General Contractor, and / or Construction Site Superintendant.

4.3.7 Decontamination Area

A temporary truck decontamination pad will be constructed to decontaminate trucks and other vehicles/equipment leaving the Site. The pad will be constructed by placing a 4 to 6-inch bed of stone aggregate such as crushed rock or RCA. The pad will be bermed at the sides and sloped back to the interior of the Site. The truck pad will be sized to accommodate the largest construction vehicle used and located in line with the stabilized construction entrance. The pad will be inspected on a daily basis during soil loading activities and reinforced as needed with additional stone/concrete material to prevent the accumulation of ruts, mud or soil.

4.3.8 Site Fencing

An 8-foot high construction fence is present around the portions of the Site which are not bordered by adjacent buildings (west) with an entrance / exit gate located on Bayard Street. This fence will be properly secured at the end of the day and supplemented, as needed, by installing orange safety fencing around open excavations to ensure on-site worker safety.

4.3.9 Demobilization

Demobilization will consist of the restoration of material staging areas and the disposal of materials and/or general refuse in accordance with acceptable rules and regulations. Materials

used in remedial activities will be removed and disposed properly. All equipment will be decontaminated prior to leaving the Site.

4.4 REPORTING

All daily and monthly Reports will be included in the Final Engineering Report.

4.4.1 Daily Reports

Daily reports will be submitted to NYSDEC and NYSDOH Project Managers by the end of each day in which remedial activity takes place. Daily reports will include:

- An update of progress made during the reporting day;
- A summary of any and all complaints with relevant details (names, phone numbers);
- A summary of CAMP finding, including excursions;
- An explanation of notable Site conditions.

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

These reports will include a summary of air sampling results, odor and dust problems and corrective actions, and all complaints received from the public.

4.4.2 Monthly Reports

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

- Activities relative to the Site during the previous reporting period and those anticipated for the next reporting period, including a quantitative presentation of work performed (i.e. tons of material exported and imported, etc.);
- Description of approved activity modifications, including changes of work scope and/or schedule;

- Sampling results received following internal data review and validation, as applicable; and,
- An update of the remedial schedule including the percentage of project completion, unresolved delays encountered or anticipated that may affect the future schedule, and efforts made to mitigate such delays.

4.4.3 Other Reporting

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

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

4.4.4 Complaint Management Plan

Complaints from the public regarding nuisance or other Site conditions including noise, odor, truck traffic etc., will be recorded in the Site field book and reported to the NYSDEC via email on the same day as the complaint is received.

4.4.5 Deviations from the Remedial Action Work Plan

Minor deviations from the RAWP will be identified in the daily update report and will be noted in the Final Engineering Report. When deviations are reported, a brief discussion will be provided which will state the following:

- Reasons for deviating from the approved RAWP;
- Effect of the deviations on overall remedy.

Major changes to the scope of work must be discussed with the NYSDEC and the NYSDOH prior to implementation. If the changes are considered to be significant enough, an addendum to the RAWP Work Plan will be prepared and submitted to NYSDEC / NYSDOH for review.

5.0 REMEDIAL ACTION: MATERIAL REMOVAL FROM SITE

Excavation work includes the following; the removal and off-Site disposal of the top 10 feet of soil/fill material across the Site with additional excavation as needed to meet Unrestricted Use SCOs. Soil excavation will be performed using conventional equipment such as track-mounted excavators, backhoes and loaders.

All excavation work will be performed in accordance with the Site-specific HASP and CAMP. If an underground storage tank (UST) is discovered during excavation the NYSDEC Project Manager will be immediately notified and the UST removed and closed in accordance with DER-10, NYSDEC PBS regulations and NYC Fire Department regulations. It is anticipated that the excavation of non-hazardous petroleum impacted soil, historic fill material and native soil will be performed by an excavation contractor using appropriately trained personnel (24 hr HAZWOPER).

Excavation for the cellar level of the new building will continue Site wide to a depth of approximately 12 feet with additional excavation as needed to accommodate structural features, elevator pit, etc. Over excavated areas will be backfilled using clean native soil excavated from other areas of the Site or imported material meeting Unrestricted Use SCOs. An excavation plan showing the excavation depths to achieve the Track 1 remedy is provided in **Figure 11**.

Dewatering will be required for excavation to 10 feet (See section 5.10).

5.1 CONTINGENCY

5.1.1 UST Removal Methods

Any USTs encountered during excavation activities at the Site will be removed in accordance with the procedures described under the NYSDEC Memorandum for the Permanent Abandonment of Petroleum Storage Tanks and Section 5.5 of Draft DER-10 as follows:

- Remove all product to its lowest draw-off point
- Drain and flush piping into the tank
- Vacuum out the tank bottom consisting of water product and sludge
- Dig down to the top of the tank and expose the upper half of the tank

- Remove the fill tube and disconnect the fill, gauge, product and vent lines and pumps. Cap and plug open ends of lines
- Temporarily plug all tank openings, complete the excavation, remove the tank and place it in a secure location
- Render the tank safe and check the tank atmosphere to ensure that petroleum vapors have been satisfactorily purged from the tank
- Clean tank or remove to a storage yard for cleaning
- If the tank is to be moved it must be transported by licensed waste transported. Plug and cap all holes prior to transport leaving a 1/8 inch vent hole located at the top of the tank during transport
- After cleaning the tank must be made acceptable for disposal at a scrap yard cleaning the tank interior with a high pressure rinse and cutting the tank in several pieces.

During the tank and pipe line removal the following field observations should be made and recorded:

- A description and photographic documentation of the tank and pipe line condition (pitting, holes, staining, leak points, evidence of repairs, etc.)
- Examination of the excavation floor and sidewalls for physical evidence of contamination (odor, staining, sheen, etc.)
- Periodic field screening (through bucket return) of the floor and sidewalls of the excavation with a calibrated photoionization detector (PID).

5.1.2 Supplemental Groundwater Treatment

The remedy includes full Site dewatering and excavation below the impacted soil zone. Extracted groundwater will be treated and discharged under permit to the NYC combined sewer system. Dewatering operations will continue post-excavation until the building foundation is installed and enough of the building super structure is complete to counter balance the hydrostatic pressure when dewatering operations cease. Dewatering is therefore expected to continue for a minimum of four months. Full removal of all impacted groundwater from the Site followed by continued pumping of multiple additional Site volumes is expected to fully remediate groundwater.

5.2 SOIL CLEANUP OBJECTIVES

The Soil Cleanup Objectives for this Site are listed in **Table 1**. **Table 15** summarizes all soil samples that exceed the SCOs proposed for this Remedial Action. Spider maps showing all soil samples that exceed the SCOs proposed for this Remedial Action are shown in **Figure 7**.

5.3 REMEDIAL PERFORMANCE EVALUATION (POST EXCAVATION END-POINT SAMPLING)

Post excavation (endpoint) soil samples will be collected from across the Site to verify that remedial goals have been achieved. Endpoint soil samples will be collected from the Site as follows:

(1) Site-wide bottom of excavation endpoint soil samples will be collected following the excavation of soil all soil exceeding Unrestricted Use SCOs (10 feet) to verify that remedial goals have been achieved (**Figure 12**). The Site-wide endpoint soil samples will be analyzed for VOCs, SVOCs, pesticides, PCBs, and metals. Twenty percent of the site-wide endpoint samples will be analyzed for emerging contaminants (PFAS by EPA Method 537 modified and 1,4-dioxane by EPA method 8270).

5.3.1 End-Point Sampling Frequency

Endpoint sampling frequency will be in accordance with DER-10 section 5.4 which recommends the collection of one bottom sample per 900 sf of bottom area and one sidewall sample per 30 liner feet. Sidewall samples will not be collected where sheeting or shoring is present and will not be collected when the excavation extends to the Site boundaries. Sidewall samples only be collected if the excavation extends beyond the site-wide construction excavation depth of 12 ft to address a hot-spot area.

5.3.2 Methodology

Collected samples be placed in glass jars supplied by the analytical laboratory and stored in a cooler with ice to maintain a temperature of 4 degrees C. Samples will either be picked up at the Site by a laboratory dispatched courier at the end of the day or transported back to the EBC /AMC office where they will be picked up the following day by the laboratory courier. All samples will be analyzed by a NYSDOH ELAP certified environmental laboratory

All site-wide post-excavation (endpoint) soil samples will be analyzed for VOCs by EPA Method 8260B, SVOCs by EPA method 8270, pesticides/PCBs by EPA method 8081/8082 and TAL metals. Twenty percent of the site-wide endpoint samples will be analyzed for emerging contaminants (PFAS by EPA Method 537 modified and 1,4-dioxane by EPA method 8270). Post-excavation soil samples from any petroleum hotspot areas will be analyzed for VOCs by EPA Method 8260B, SVOCs by EPA method 8270. Post-excavation soil samples from any CVOC hotspot areas will be analyzed for VOCs by EPA Method 8260B.

5.3.3 Reporting of Results

Sample analysis will be provided by a New York State certified environmental laboratory. Laboratory reports will include ASP category B deliverables for use in the preparation of a data usability summary report (DUSR). All results will be provided in accordance with the NYSDEC Environmental Information Management System (EIMS) electronic data deliverable (EDD) format.

5.3.4 QA/QC

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

Collected samples will be appropriately packaged, placed in coolers and shipped via overnight courier or delivered directly to the analytical laboratory by field personnel. Samples will be containerized in appropriate laboratory provided glassware and shipped in plastic coolers. Samples will be preserved through the use of ice or cold-pak(s) to maintain a temperature of 4^{o}C.

Dedicated disposable sampling materials will be used for soil samples, eliminating the need to prepare field equipment (rinsate) blanks. However, if non-disposable equipment is used, (stainless steel scoop, etc.) field rinsate blanks will be prepared at the rate of 1 for every eight samples collected. Field blanks will be prepared by pouring distilled or deionized water over decontaminated equipment and collecting the water in laboratory provided containers.

Trip blanks will accompany samples each time they are transported to the laboratory. Matrix spike and matrix spike duplicates (MS/MSD) will be collected at the rate of one per 20 samples submitted to the laboratory.

5.3.5 DUSR

The DUSR provides a thorough evaluation of analytical data without third party data validation. The primary objective of a DUSR is to determine whether or not the data, as presented, meets the site/project specific criteria for data quality and data use. Verification and/or performance monitoring samples collected under this RAWP will be reviewed and evaluated in accordance with the Guidance for the Development of Data Usability Summary Reports as presented in Appendix 2B of DER-10. The completed DUSR for verification/performance samples collected during implementation of this RAWP will be included in the final Engineering Report.

5.3.6 Reporting of End-Point Data in FER

All endpoint data collected as part of this remedial action will be summarized and presented in the Final Engineering Report. The summary tables will include comparison of results to Unrestricted Use SCOs to verify attainment of Track 1. Laboratory reports and the DUSR will be included as an appendix in the FER.

5.4 ESTIMATED MATERIAL REMOVAL QUANTITIES

It is expected that 3,911 cubic yards (6,257 tons) of non-hazardous historic fill material will be generated by excavating the entire Site to a depth of at least 10 feet to meet Unrestricted Use SCOs. Excavation will continue for the new buildings foundation to a depth of approximately 12 feet below grade generating 782 cubic yards of clean native soil, which may be reused, if found to be suitable, to backfill behind shoring installed around the perimeter of Site, or in over-excavated areas. The remainder of clean soil will be transported off-Site for disposal at a beneficial reuse facility or other approved destination.

5.5 SOIL/MATERIALS MANAGEMENT PLAN

Excavated soil will be secured and temporarily stored on-site until arrangements can be made for off-site disposal. As an alternative, waste characterization soil samples may be collected prior to commencement of excavation activities to allow the soil/fill to be loaded directly on to trucks for

transport to the disposal facility. Based on the results of the Remedial Investigation, all soil/fill is expected to be classified as non-hazardous. The final determination on classification will be based on the results of waste characterization analysis and the NYSDEC.

Soil excavation will be performed in accordance with the procedures described under Section 5.5 of DER-10 as follows:

- A description and photographic documentation of the excavation.
- Examination of the excavation floor and sidewalls for physical evidence of contamination (odor, staining, sheen, etc.).
- Periodic field screening (through bucket return) of the floor and sidewalls of the excavation with a calibrated photoionization detector (PID).

Final excavation depth, length, and width will be determined by the Remedial Engineer or his designee and will depend on the horizontal and vertical extent of contaminated soils as identified through physical examination (PID response, odor, staining, etc.).

The following procedure will be used for the excavation of impacted soil (as necessary and appropriate):

- Wear appropriate health and safety equipment as outlined in the HASP;
- Prior to excavation, ensure that the area is clear of utility lines or other obstructions. Lay plastic sheeting on the ground next to the area to be excavated;
- Using a rubber-tired backhoe or track mounted excavator, remove overburden soils and stockpile or dispose of separate from the impacted soil;
- If USTs are discovered, the NYSDEC will be notified and the best course of action to remove the structure should be determined in the field. This may involve the continued removal of overburden to access the top of the structure or continued trenching around the perimeter to minimize its disturbance;
- If physically contaminated soil is present (e.g., staining, odors, sheen, PID response, etc), an attempt will be made to remove it to the extent not limited by the site boundaries. If possible, physically impacted soil will be removed using the backhoe or excavator, segregated from clean soils and overburden, and staged on separate dedicated plastic

sheeting or live loaded into trucks from the disposal facility. Removal of the impacted soils will continue until visibly clean material is encountered and monitoring instruments indicate that no contaminants are present;

- Excavated soils which are temporarily stockpiled on-site will be covered with 6-mil polyethylene sheeting while disposal options are determined. Sheeting will be checked on a daily basis and replaced, repaired or adjusted as needed to provide full coverage. The sheeting will be shaped and secured in such a manner as to drain runoff and direct it toward the interior of the property;
- Once the Remedial Engineer is satisfied with the removal effort, verification or confirmatory samples will be collected from the excavation as described in **Section 6.2** of this document.

5.5.1 Excavation of Historic Fill Soil

Historic fill material is present beneath the Site to depths which extend to approximately 9 feet across the Site. The historic fill material contains petroleum related VOCs, SVOCs, metals and pesticides above Unrestricted Use and/or Restricted Residential SCOs. Historic fill material will be segregated from non-contaminated native soils and disposed of off-Site at a permitted disposal facility. Elevated chromium was also present in two locations to a depth of 10-12 feet.

If fill/soil with lead levels above 1,500 mg/kg is encountered during waste characterization soil sampling, the soil/fill may require further segregation for disposal at alternate facilities. Excavated historic fill materials will be secured and temporarily stored on-Site until arrangements can be made for off-Site disposal. It is anticipated that the historic fill material will be classified as non-hazardous material. If this material is classified as non-hazardous, then the excavation of historic fill material will be performed by the excavation contractor for the construction project using trained personnel (24 hr HAZWOPER). If this material is classified as hazardous, then 40 hr HAZWOPER trained personnel will be needed to perform the excavation of this material.

5.5.2 Excavation of Native Soils

Native soils present below the fill material will require excavation for the new building's cellar which will extend approximately 2 feet beyond the remedial excavation depth of 10 feet across

the Site. Some areas will require deeper construction excavation for structural elements, elevator shaft, etc. Excavation of native soil for the cellar will begin following removal of historic fill. If evidence of contamination is discovered while excavating the native soil, for the cellar level, the contaminated soil will be removed to the extent possible and segregated from clean native soil for proper disposal. Clean native soil will be stockpiled on-Site and characterized for reuse on-Site in over excavated areas or behind shoring constructed around the perimeter of the Site. Any excess soil will be disposed of off-Site as a beneficial re-use material or reused on-Site if found to meet SCOs through testing and if acceptable to the structural engineer.

It is anticipated that the excavation of native soil will be performed by the excavation contractor for the construction project.

5.5.3 Soil Screening Methods

Visual, olfactory and PID soil screening and assessment will be performed by an environmental professional during all remedial and development excavations into known or potentially contaminated material (Residual Contamination Zone). Soil screening will be performed regardless of when the invasive work is done and will include all excavation and invasive work performed during the remedy and during development phase, such as excavations for foundations and utility work, prior to issuance of the COC.

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

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

5.5.4 Stockpile Methods

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

Stockpiles will be kept covered at all times with appropriately anchored tarps. Stockpiles will be routinely inspected, and damaged tarp covers will be promptly replaced. Soils which exhibit strong odors will be completely sealed with heavy tarps or vapor suppressant foam.

5.5.5 Materials Excavation and Load Out

The Remedial Engineer or an EP under his/her supervision will oversee all invasive work and the excavation and load-out of all excavated material. The Volunteer and its contractors are solely responsible for safe execution of all invasive and other work performed under this Plan.

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

Where effective, the equipment will be "dry" decontaminated using a broom and/or brushes. If significant amounts of soil or other contaminants remain after the dry decontamination, the equipment will also be pressure washed before leaving the Site. The EP will be responsible for ensuring that all outbound trucks are dry-brushed or washed on the truck wash/equipment pad before leaving the Site until the remedial construction is complete. Locations where vehicles enter or exit the Site shall be inspected daily for evidence of off-Site sediment tracking. The EP will be responsible for ensuring that all egress points for truck and equipment transport from the Site will be clean of dirt and other materials derived from the Site during Site remediation and development. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to Site derived materials.

The Volunteer and associated parties preparing the remedial documents submitted to the State, and parties performing this work, are completely responsible for the safe performance of all

invasive work, the structural integrity of excavations, and for structures that may be affected by excavations (such as building foundations and bridge footings).

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

Development-related grading cuts and fills will not interfere with, or otherwise impair or compromise, the performance of remediation required by this plan.

Mechanical processing of historical fill material and contaminated soil on-Site is prohibited. All primary contaminant sources (including but not limited to tanks and hotspots) identified during Site Characterization, Remedial Investigation, and Remedial Action will be located and shown on maps to be reported in the Final Engineering Report.

5.5.6 Materials Transport Off-Site

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

- ENTERING SITE - from the Brooklyn-Queens Expressway heading east; take the Exit 33 McGuinness Boulevard/Humboldt Street and turn left, heading northwest on McGuinness Boulevard. Turn left on Broome Street, then make a left onto Graham Avenue. Continue south on Graham Avenue Bayard Street. Make a right onto Bayard Street and the entrance to the Site is on the left.
- EXITING SITE – Continue west on Bayard Street to Manhattan Avenue. Turn right onto Manhattan Avenue and make the first right onto Newtown Street. Continue east on Newtown Street to McGuinness Boulevard. Turn right onto McGuinness and bear right on to the on-ramp to the Brooklyn-Queens Expressway.

These routes are shown in **Figure 10**.

These are the most appropriate routes to and from the Site and take into account: (a) limiting transport through residential areas and past sensitive sites; (b) use of city mapped truck routes;

(c) prohibiting off- Site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport.

Trucks will be prohibited from stopping and idling in residential neighborhoods around the project Site. Egress points for truck and equipment transport from the Site will be kept clean of dirt and other materials during Site remediation and development. Material transported by trucks exiting the Site will be secured with covers. Wet loads are not anticipated since the entire site will be dewatered prior to excavating soils. However, if wet soils are excavated they will be stockpiled within the excavation to dry or blended with dry soils. No loads of material capable of generating free liquid will be allowed to leave the Site. All trucks will be inspected, dry-brushed and / or washed, as needed, before leaving the Site.

5.5.7 Materials Disposal Off-Site

Multiple disposal facility designations may be employed for the materials removed from the Site. Once final arrangements have been made, the disposal facility acceptance letters will be provided to the NYSDEC Project Manager before the start of excavation activities. It is anticipated that the soil will be disposed of at up to 3 different facilities, based on the following classification:

- Non Hazardous - Contaminated (historic fill / petroleum) Low Lead < 1,100 mg/kg
- Non Hazardous - Contaminated (historic fill / petroleum) High Lead > 1,100 mg/kg
- Uncontaminated Native Soil - meets NJDSC Criteria for beneficial Reuse

The total quantity of material expected to be disposed off-Site is 4,693 cubic yards, including 3,911 cubic yards of historic fill material and 782 cubic yards of clean native soil.

Hazardous Soil Disposal and Transport

It is not expected that any soil will be classified as hazardous, however if any soil is classified as hazardous it will be shipped under a hazardous waste manifest system. All hazardous waste transported and disposed of must have a USEPA ID Number and waste code and must be distributed in accordance with the regulatory requirements.

The multi-part manifest will be filled out for each load of soil shipped off of the Site. At a minimum, the following information will be recorded on each manifest:

1) Generator's Name, Address, and Phone Number
2) Destination Facility Name, Address and Phone Number
3) EPA ID Number
4) Waste classification code
5) Transporter Name, Address, Phone Number, License Plate Number, Driver Name, and SW Haulers Permit #
6) Signatures – Generator or an authorized agent for the generator shall print, sign, and date each non-hazardous material manifest after each truck is loaded. The transporter shall then sign and date noting time material was picked up at the site. Both the transporter and a representative of the disposal facility will sign the non-hazardous material manifest when the material has been delivered to disposal facility.

Non-Hazardous Soil Disposal and Transport

Non-hazardous historic fill material and petroleum contaminated soil classified as non-hazardous, will be handled, at a minimum, as a Municipal Solid Waste per 6NYCRR Part 360-1.2. Historical fill material and contaminated soils from the Site are prohibited from being disposed at Part 360-16 Registration Facilities (also known as Soil Recycling Facilities).

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

The multi-part manifest will be filled out for each load of soil shipped off of the Site. At a minimum, the following information will be recorded on each manifest:

1) Generator's Name, Address, and Phone Number
2) Destination Facility Name, Address and Phone Number
3) Transporter Name, Address, Phone Number, License Plate Number, Driver Name, and SW Haulers Permit #
4 Signatures – Generator or an authorized agent for the generator shall print, sign, and date each non-hazardous material manifest after each truck is loaded. The transporter shall then sign and date noting time material was picked up at the site. Both the transporter and a representative of the disposal facility will sign the non-hazardous material manifest when the material has been delivered to disposal facility.

A copy of the manifest will be retained by AMC on-Site personnel for each shipment. Final signed manifests will be forwarded by the disposal facility to the generator. Copies of the final manifests will be presented in the FER.

Clean Soil Disposal

Clean native soil removed from the Site for development purposes (i.e. basement levels) will be handled as unregulated or beneficial use disposal. This soil will undergo a testing program to confirm that it meets Unrestricted Use SCOs or Residential / Groundwater Protection SCOs prior to unregulated disposal or meets Unrestricted Use SCOs prior to reuse on-Site. Confirmation testing of clean soils will be in accordance with DER-10 Section 5.4(e)(10) as follows:

Contaminant	**VOCs**	**SVOCs, Inorganics & PCBs/Pesticides**	
Soil Quantity (cubic yards)	**Discrete Samples**	**Composite**	**Discrete Samples/Composite**
0-50	1	1	Each composite sample for analysis is created from 3-5 discrete samples from representative locations in the fill.
50-100	2	1	
100-200	3	1	
200-300	4	1	
300-400	4	2	
400-500	5	2	
500-800	6	2	
800-1000	7	2	
1000	Add an additional 2 VOC and 1 composite for each additional 1000 Cubic yards or consult with DER		

Uncontaminated native soil confirmed by the above testing program and removed from the site, will be disposed of as C&D material or sent to a beneficial re-use facility. Note that clean soils disposed of at an out-of-state facility will be subject to the testing requirements of that facility in lieu of testing program outlined above the final destination of soils whether classified as contaminated or uncontaminated must be approved by the Remedial Engineer.

C&D and Scrap Metal Disposal

Concrete demolition material generated on the Site from building slabs, parking areas and other structures will be segregated, sized and shipped to a concrete recycling facility. Concrete crushing or processing on-Site is prohibited. Asphalt removed from the parking areas will be sent to a separate recycling facility.

Additionally, it is common to encounter scrap metals and large boulders (greater than one foot in diameter) during excavation which may not be accepted by either the licensed disposal facility or the C&D facility. These materials will be segregated and subsequently recycled at local facilities. Uncontaminated metal objects will be taken to a local scrap metal facility.

Bricks and other C&D material are also not accepted by most soil disposal facilities if present at greater then 5% by volume. This material, if encountered, will be sent to a C&D landfill or other C&D processing facility. C&D material of this type is most often encountered on sites in which former basement structures have been filled in with material from demolishing a former building. There was no evidence of former basement areas identified during previous investigations performed at the Site.

Scale Tickets

All trucks to be utilized for transport of hazardous or non-hazardous contaminated soil shall be weighed before and after unloading at the disposal facility. Disposal facilities must provide truck scales capable of generating load tickets measured in tons. The tonnage transported and disposed will be determined by the disposal facility and reported on a certified scale ticket which will be attached to each returned manifest. Weights will be reported on the certified scale ticket as Tare and Gross weights.

C&D Transport Tickets / Bills of Lading

Bill of Lading system or equivalent will be used for the disposal of C&D and related materials. Documentation for materials disposed of at recycling facilities (such as metal, concrete, asphalt) and as non-regulated C&D will include transport tickets for each load stating the origin of the material, the destination of the material and the quantity transported. This information will be reported in the Final Engineering Report.

Disposal Facility Documentation

The following documentation will be obtained and reported by the Remedial Engineer for each disposal location used in this project to fully demonstrate and document that the disposal of material derived from the Site conforms with all applicable laws: (1) a letter from the Remedial Engineer or BCP Applicant to the receiving facility describing the material to be disposed and requesting formal written acceptance of the material. This letter will state that material to be disposed is contaminated material generated at an environmental remediation Site in New York State. The letter will provide the project identity and the name and phone number of the Remedial Engineer. The letter will include as an attachment a summary of all chemical data for the material being transported (including Site Characterization data); and (2) a letter from all receiving facilities stating it is in receipt of the correspondence (above) and is approved to accept the material. These documents will be included in the FER.

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

5.5.8 Materials Reuse On-Site

Re-use of on-Site clean native soil will only be allowed if the material is found to meet Unrestricted Use SCOs (for Track 1) or Restricted Residential Use SCOs (for Track 2) through the verification testing program detailed above. It is estimated that 500 cubic yards of clean native soil will be reused behind the shoring constructed around the perimeter of the Site. Additional soil may be re-used on-site to backfill over excavated areas.

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

Acceptable demolition material proposed for reuse on-Site, if any, will be sampled for asbestos. Concrete crushing or processing on-Site is prohibited. Contaminated on-Site material, including historic fill material and contaminated soil, removed for grading or other purposes will not be reused within a cover soil layer, within landscaping berms, or as backfill for subsurface utility lines.

5.5.9 Fluids Management

As the depth to groundwater at the Site is approximately 1 to 2 feet above the planned excavation depth, dewatering operations will be employed during construction. Dewatering fluids will be handled, transported and disposed of in accordance with applicable local, State, and Federal regulations. Liquids discharged into the New York City sewer system will be addressed through approval by the NYCDEP. The pumping and treatment system design will be detailed in the NYCDEP discharge permit submittal. This submittal as well as the approved permit will be provided to the DEC prior to initiating dewatering operations.

Based on conditions observed during dewatering operations on projects in the immediate area of the Site, it is expected that flow rates will not approach that required for a Long Island well permit. However, a permit package will be submitted to the NYSDEC Division of Water to obtain a LI well permit equivalency under the BCP, as a contingency should conditions vary considerably from expected.

Dewatered fluids will not be recharged back to the land surface or subsurface of the Site. A supplemental dewatering work plan will be submitted to the NYSDEC, which will include elements such as the quantity of dewatering expected, equipment specifications, pumping, storage, and discharge locations, and the dewatering treatment required. The supplemental dewatering work plan will be approved by the NYSDEC prior to the start of work.

5.5.10 Backfill from Off-Site Sources

Off-site fill material may be needed to stabilize the entrance - exit areas of the Site, for temporary driveways for loading trucks and as an underlayment to structural components of the

new buildings including slabs and footings. Recycled Concrete Aggregate (RCA) derived from recognizable and uncontaminated concrete and supplied by facilities permitted by, and in full compliance with Part 360-16 and DSNY regulations, is an acceptable form of backfill material. The Remedial Engineer is responsible for ensuring that the facility is compliant with the registration and permitting requirements of 6 NYCRR Part 360 and DSNY regulations at the time the RCA is acquired. RCA imported from compliant facilities does not require additional testing unless required by NYS DEC and DSNY under its terms of operations for the facility. Documentation of part 360-16 and DSNY compliance must be provided to the Remedial Engineer before the RCA is transported to the Site.

Fill material may also consist of virgin mined sand, gravel or stone products. Gravel or stone material from a virgin mined source may be imported to the Site without testing provided that that the material meets the specifications of the geotechnical engineer, Remedial Engineer, and Redevelopment Construction Documents and that the source of the material is approved by the Remediation Engineer and the NYSDEC Project Manager. This material must contain less than 10% fines and not be blended with soil or other material. As per DER-10, if soil from sourced from a virgin mine or pit is imported, at least one round of characterization sampling for the first 100 cubic yards is required in accordance with Table 4 of CP-51/Table 5.4(e)10 of DER-10.
The source approval process will require a review of the following information:

- The origin of the material;
- The address of the facility which mines/processes the material;
- A letter from the facility stating that the material to be delivered to the site is a virgin mined material and that it has not been co-mingled with other materials during processing or stockpiling.

All materials proposed for import onto the Site will be approved by the Remedial Engineer and will be in compliance with provisions in this RAWP prior to receipt at the Site. Material from industrial sites, spill sites or other potentially contaminated sites will not be imported to the Site.

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

Under no circumstances will fill materials be imported to the Site without prior approval from the NYSDEC Project Manager. Any soil imported to the Site needs to be tested in accordance with Table 4 of NYSDEC CP-51 Soil Cleanup Guidance Policy. Soils that meet 'exempt' fill requirements under 6 NYCRR Part 360, but do not meet backfill or cover soil objectives for this Site, will not be imported onto the Site without prior approval by NYSDEC. Solid waste will not be imported onto the Site.

5.5.11 Stormwater Pollution Prevention

Barriers and hay bale checks will be installed and inspected once a week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by NYSDEC. All necessary repairs shall be made immediately. Accumulated sediments will be removed as required to keep the barrier and hay bale check functional. All undercutting or erosion of the silt fence toe anchor shall be repaired immediately with appropriate backfill materials. Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering. Erosion and sediment control measures identified in the RAWP shall be observed to ensure that they are operating correctly. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters Silt fencing or hay bales will be installed around the entire perimeter of the remedial construction area.

5.5.12 Contingency Plan

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

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

5.5.13 Community Air Monitoring Plan

The Community Air Monitoring Plan (CAMP) provides measures for protection for on-site workers and the downwind community (i.e., off-site receptors including residences, businesses, and on-site workers not directly involved in the remedial work) from potential airborne contaminant releases resulting from remedial activities at construction sites.

The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that the remedial work did not spread contamination off-site through the air. The primary concerns for this site are odors associated with groundwater purging and sampling. Exceedances observed in the CAMP will be reported to NYSDEC and NYSDOH Project Managers and included in the Daily Report. The complete CAMP developed for this Site is included in **Attachment D**.

5.5.14 Odor, Dust and Nuisance Control Plan

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

5.5.14.1 Odor Control Plan

This odor control plan is capable of controlling emissions of nuisance odors off-Site and on-Site. If nuisance odors are identified, work will be halted, and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and NYSDOH will be notified of all odor events and of all other complaints about the project. Implementation of all odor controls, including the halt of work, will be the responsibility of the Applicant's Remediation Engineer, who is responsible for certifying the Final Engineering Report.

All necessary means will be employed to prevent on and off-Site nuisances. At a minimum, procedures will include: (a) use of closed settling tanks and carbon treatment of exhaust air from the pumping / dewatering system (b) limiting the area of open excavations; (c) shrouding open excavations with tarps and other covers; and (d) using foams to cover exposed odorous soils. If odors develop and cannot be otherwise controlled, additional means to eliminate odor nuisances

will include: (e) direct load-out of soils to trucks for off-Site disposal; (f) use of chemical odorants in spray or misting systems, (g) use of perimeter misting systems; and, (h) use of staff to monitor odors in surrounding neighborhoods.

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

5.5.14.2 Dust Control Plan

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

- Dust suppression will be achieved though spraying water directly onto off-road areas including excavations and stockpiles.
- Gravel will be used on roadways to provide a clean and dust-free road surface.
- On-Site roads will be limited in total area to minimize the area required for water application.

5.5.14.3 Nuisance Control Plan

A plan for rodent control will be developed and utilized by the contractor prior to and during Site clearing and Site grubbing, and during all remedial work. A plan will be developed and utilized by the contractor for all remedial work and conforms, to NYCDEP noise control standards.

6.0 RESIDUAL CONTAMINATION TO REMAIN ON-SITE

If a Track 1 cleanup is achieved, all on-Site soil remaining after completion of remediation will meet Track 1 Unrestricted Use SCOs and an Institutional Control (IC) will not be required to protect human health and the environment.

However, if a Track 1 cleanup is not achieved, the Track 2 alternative will be implemented as a contingency and an IC will be required. The Track 2 alternative will allow Restricted Residential use of the property. Long-term management of the IC will be executed under an environmental easement recorded with the NYC Department of Finance, Office of the City Register.

If Track 1 is not achieved, long-term management of ICs and of residual contamination will be executed under a Site-specific Site Management Plan (SMP) that will be developed and submitted to DEC, if needed. The FER will report residual contamination on the Site in tabular and map form.

7.0 ENGINEERING CONTROLS

The intent of this project is to achieve Track 1 Unrestricted Use remedy. If a Track 1 Cleanup cannot be achieved, then a Track 2 Restricted Residential cleanup is proposed. If neither a Track 1 nor Track 2 Cleanup can be achieved, then a Track 4 Cleanup will be achieved.

If a Track 4 remedy is achieved, the Site will be restricted to Restricted-Residential, Commercial and Industrial uses and a site cover may be required to allow for the intended use of the Site. The cover will consist either of the structures such as buildings, pavement, sidewalks comprising the site development or two feet of soil meeting the SCOs as set forth in 6 NYCRR Part 375-6.7(d) and Table 375-6.8(b). The soil cover will be placed over a demarcation layer, with the upper six inches of the soil of sufficient quality to maintain a vegetation layer. Any fill material brought to the Site will meet the requirements for the identified site use as set forth in 6 NYCRR Part 375-6.7(d).

8.0 INSTITUTIONAL CONTROLS

Since the intent of this project is to achieve Track 1 cleanup criteria, institutional controls are not expected to be part of the final remedy for the Site.

If Track 1 cleanup is not achieved, ICs will be incorporated into the remedy to render the overall Site remedy protective of public health and the environmental. Two elements have been designed to ensure continual and proper management of residual contamination in perpetuity: an Environmental Easement and a SMP.

If required, a Site-Specific Environmental Easement will be recorded with the City of New York to provide an enforceable means of ensuring the continual and proper management of residual contamination and protection of public health and the environment in perpetuity or until released in writing by NYSDEC. It requires that the grantor of the Environmental Easement and the grantor's successors and assigns adhere to all Engineering and Institutional Controls (ECs/ICs) placed on the Site by this NYSDEC-approved remedy. ICs provide restrictions on Site usage and mandate operation, maintenance, monitoring and reporting measures for all ECs and ICs.

The SMP describes appropriate methods and procedures to ensure compliance with all ECs and ICs that are required by the Environmental Easement. Once the SMP has been approved by the NYSDEC, compliance with the SMP is required by the grantor of the Environmental Easement and grantor's successors and assigns.

8.1 ENVIRONMENTAL EASEMENT

An Environmental Easement, as defined in Article 71 Title 36 of the Environmental Conservation Law, is required when residual contamination is left on-Site after the Remedial Action is complete. If the Site will have residual contamination after completion of all Remedial Actions than an Environmental Easement is required. If an Environmental Easement is needed following completion of the remedy an Environmental Easement approved by NYSDEC will be filed and recorded with the City of New York. The Environmental Easement (if needed) will be submitted as part of the Final Remediation Report.

The Environmental Easement renders the Site a Controlled Property. The Environmental Easement must be recorded with the City of New York before the Certificate of Completion can

be issued by NYSDEC. These Institutional Controls are requirements or restrictions placed on the Site that are listed in, and required by, the Environmental Easement. ICs can, generally, be subdivided between controls that support ECs, and those that place general restrictions on Site usage or other requirements. ICs in both of these groups are closely integrated with the SMP, which provides all of the methods and procedures to be followed to comply with this remedy.

The ICs which will be needed to support ECs are:

- Use of groundwater underlying the Controlled Property is prohibited without treatment rendering it safe for intended purpose;
- Compliance with the Environmental Easement by the Grantee and the Grantee's successor's is required;
- Grantor agrees to submit to NYSDEC a written statement that certifies, under penalty of perjury, that: (1) controls employed at the Controlled Property are unchanged from the previous certification or that any changes to the controls were approved by the NYSDEC; and, (2) nothing has occurred that impairs the ability of the controls to protect public health and environment or that constitute a violation or failure to comply with the Controls;
- NYSDEC retains the right to access such Controlled Property at any time in order to evaluate the continued maintenance of any and all controls. This certification shall be submitted annually, or an alternate period of time that NYSDEC may allow. This annual statement must be certified by an expert that the NYSDEC finds acceptable;

8.2 SITE MANAGEMENT PLAN

Site Management is the last phase of remediation and begins with the approval of the Final Engineering Report and issuance of the Certificate of Completion (COC) for the Remedial Action. The SMP is submitted as a separate and independent document from the FER. Site Management continues in perpetuity or until released in writing by NYSDEC. The property owner is responsible to ensure that all Site Management responsibilities defined in the Environmental Easement and the SMP are performed.

The SMP is intended to provide a detailed description of the procedures required to manage residual contamination left in place at the Site following completion of the Remedial Action in accordance with the BCA with the NYSDEC. This includes: (1) development, implementation,

and management of all Engineering and Institutional Controls; (2) development and implementation of monitoring systems and a Monitoring Plan; (3) development of a plan to operate and maintain any treatment, collection, containment, or recovery systems (including, where appropriate, preparation of an Operation and Maintenance Manual); (4) submittal of Site Management Reports, performance of inspections and certification of results, and demonstration of proper communication of Site information to NYSDEC; and (5) defining criteria for termination of treatment system operation.

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

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

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

9.0 FINAL ENGINEERING REPORT

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

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

The Final Engineering Report will include written and photographic documentation of all remedial work performed under this remedy. The FER will include an itemized tabular description of actual costs incurred during all aspects of the Remedial Action.

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

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

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

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

9.1 CERTIFICATIONS

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

I _____certify that I am currently a NYS registered professional engineer, I had primary direct responsibility for the implementation of the subject construction program, and I certify that the Remedial Work Plan (or Remedial Design or Plans and Specifications) was implemented and that all construction activities were completed in substantial conformance with the DER-approved Remedial Work Plan (or Remedial Design or Plans and Specifications).
Additionally, I certify that:

- *All documents generated in support of this report have been submitted in accordance with the DER's electronic submission protocols and have been accepted by the Department;*
- *All data generated in support of this report have been submitted in accordance with the Department's electronic data deliverable and have been accepted by the Department;*

- *All information and statements in this certification form are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law. I, [name], of [business address], am certifying as Owner's Designated Site Representative: [and I have been authorized and designated by all site owners to sign this certification] for this site.*

If the Remedial Action Work Plan (or Remedial Design or Plans and Specifications) identifies time frames to be achieved by the remedial program, the certification must include:

The data submitted to DER demonstrates that the remediation requirements set forth in the Remedial Work Plan (or Remedial Design or Plans and Specifications) and all applicable statutes and regulations have been or will be achieved in accordance with the time frames, if any, established in the work plan (or Remedial Design or Plans and Specifications).

If the remedial program requires ICs or ECs, the certification will include:

All use restrictions, institutional controls, engineering controls and/or any operation and maintenance requirements applicable to the site are contained in an environmental easement created and recorded pursuant to ECL 71-3605 and that any affected local governments, as defined in ECL 71-3603, have been notified that such easement has been recorded.

If the remedial program requires applicable SMP, the certification will include:

A Site Management Plan has been submitted for the continual and proper operation, maintenance, and monitoring of any engineering controls employed at the site including the proper maintenance of any remaining monitoring wells, and that such plan has been approved by DER.

If the remedial program requires financial assurance, the certification will include:

Any financial assurance mechanisms required by DEC pursuant to Environmental Conservation Law have been executed.

10.0 SCHEDULE

The remedial action will begin with mobilization of equipment and material to the Site which will begin approximately 3 weeks following RAWP approval and within 10 days of the distribution of the Construction Fact Sheet. Mobilization will be followed by the installation of shoring structures, installation and operation of dewatering equipment, removal and disposal of the USTs (if present), excavation and disposal of petroleum impacted soil, historic fill materials and native soil and by confirmation endpoint soil sampling. Excavation work may proceed in several stages as needed to accommodate pile or sheet driving equipment, underpinning and other components related to the support of excavation (SOE). The work is expected to take approximately 12 months as part of the construction excavation and foundation installation. The schedule of tasks completed under this RAWP is as follows:

Conduct pre-construction meeting with NYSDEC	Within 3 weeks of RAWP approval
Mobilize equipment to the site and construct truck pad and other designated areas	Within 3 weeks following the pre-construction meeting and issuance of Pre-Construction Fact Sheet
Mobilize shoring contractor and equipment to the Site	Within 3 weeks following the pre-construction meeting
Mobilize excavation contractor and equipment to the Site	Within 3 weeks following the installation of shoring or as shoring proceeds
Begin excavation of USTs (if present)	Upon discovery during initial excavation cut (top six feet of soil).
Mobilize dewatering contractor and equipment to the Site	Within 3 weeks following the installation of shoring or as shoring proceeds
Complete excavation and disposal of historic fill material and clean native soil.	Within 12 months of mobilization
Perform endpoint verification of entire site	Performed in sequence as final depth of each excavated area is complete.
Submit SMP (as a contingency) if Track 1 Cleanup is not achieved	By August 15th 2021 to receive the COC in 2021.
Submit FER	By September 15th 2021 to receive the COC in 2021.

TABLES

TABLE 1
Soil Cleanup Objectives

Contaminant	CAS Number	Protection of Public Health				Protection of Ecological Resources	Protection of Ground-water	Unrestricted Use
		Residential	Restricted-Residential	Commercial	Industrial			
METALS								
Arsenic	7440-38 -2	16f	16f	16f	16f	13f	16f	13 [c]
Barium	7440-39 -3	350f	400	400	10,000 d	433	820	350 [c]
Beryllium	7440-41 -7	14	72	590	2,700	10	47	7.2
Cadmium	7440-43 -9	2.5f	4.3	9.3	60	4	7.5	2.5 [c]
Chromium, hexavalent [h]	18540-29-9	22	110	400	800	1e	19	1 [b]
Chromium, trivalent[h]	16065-83-1	36	180	1,500	6,800	41	NS	30 [c]
Copper	7440-50 -8	270	270	270	10,000 d	50	1,720	50
Total Cyanide [h]		27	27	27	10,000 d	NS	40	27
Lead	7439-92 -1	400	400	1,000	3,900	63f	450	63 [c]
Manganese	7439-96 -5	2,000f	2,000f	10,000 d	10,000 d	1600f	2,000f	1600 [c]
Total Mercury		0.81j	0.81j	2.8j	5.7j	0.18f	0.73	0.18 [c]
Nickel	7440-02 -0	140	310	310	10,000 d	30	130	30
Selenium	7782-49 -2	36	180	1,500	6,800	3.9f	4f	3.9[c]
Silver	7440-22 -4	36	180	1,500	6,800	2	8.3	2
Zinc	7440-66 -6	2200	10,000 d	10,000 d	10,000 d	109f	2,480	109 [c]
PESTICIDES / PCBs								
2,4,5-TP Acid (Silvex)	93-72-1	58	100a	500b	1,000c	NS	3.8	3.8
4,4'-DDE	72-55-9	1.8	8.9	62	120	0.0033 e	17	0.0033 [b]
4,4'-DDT	50-29-3	1.7	7.9	47	94	0.0033 e	136	0.0033 [b]
4,4'-DDD	72-54-8	2.6	13	92	180	0.0033 e	14	0.0033 [b]
Aldrin	309-00-2	0.019	0.097	0.68	1.4	0.14	0.19	0.005 [c]
alpha-BHC	319-84-6	0.097	0.48	3.4	6.8	0.04g	0.02	0.02
beta-BHC	319-85-7	0.072	0.36	3	14	0.6	0.09	0.036
Chlordane (alpha)	5103-71 -9	0.91	4.2	24	47	1.3	2.9	0.094
delta-BHC	319-86-8	100a	100a	500b	1,000c	0.04g	0.25	0.04
Dibenzofuran	132-64-9	14	59	350	1,000c	NS	210	7
Dieldrin	60-57-1	0.039	0.2	1.4	2.8	0.006	0.1	0.005[c]
Endosulfan I	959-98-8	4.8i	24i	200i	920i	NS	102	2.4
Endosulfan II	33213-65-9	4.8i	24i	200i	920i	NS	102	2.4
Endosulfan sulfate	1031-07 -8	4.8i	24i	200i	920i	NS	1,000c	2.4
Endrin	72-20-8	2.2	11	89	410	0.014	0.06	0.014
Heptachlor	76-44-8	0.42	2.1	15	29	0.14	0.38	0.042
Lindane	58-89-9	0.28	1.3	9.2	23	6	0.1	0.1
Polychlorinated biphenyls	1336-36 -3	1	1	1	25	1	3.2	0.1
SEMI-VOLATILES								
Acenaphthene	83-32-9	100a	100a	500b	1,000c	20	98	20
Acenapthylene	208-96-8	100a	100a	500b	1,000c	NS	107	100 [a]
Anthracene	120-12-7	100a	100a	500b	1,000c	NS	1,000c	100 [a]
Benz(a)anthracene	56-55-3	1f	1f	5.6	11	NS	1f	1[c]
Benzo(a)pyrene	50-32-8	1f	1f	1f	1.1	2.6	22	1[c]
Benzo(b) fluoranthene	205-99-2	1f	1f	5.6	11	NS	1.7	1[c]
Benzo(g,h,i) perylene	191-24-2	100a	100a	500b	1,000c	NS	1,000c	100
Benzo(k) fluoranthene	207-08-9	1	3.9	56	110	NS	1.7	0.8 [c]
Chrysene	218-01-9	1f	3.9	56	110	NS	1f	1[c]
Dibenz(a,h) anthracene	53-70-3	0.33e	0.33e	0.56	1.1	NS	1,000c	0.33 [b]
Fluoranthene	206-44-0	100a	100a	500b	1,000c	NS	1,000c	100 [a]
Fluorene	86-73-7	100a	100a	500b	1,000c	30	386	30
Indeno(1,2,3-cd) pyrene	193-39-5	0.5f	0.5f	5.6	11	NS	8.2	0.5 [c]
m-Cresol	108-39-4	100a	100a	500b	1,000c	NS	0.33e	0.33 [b]
Naphthalene	91-20-3	100a	100a	500b	1,000c	NS	12	12
o-Cresol	95-48-7	100a	100a	500b	1,000c	NS	0.33e	0.33 [b]
p-Cresol	106-44-5	34	100a	500b	1,000c	NS	0.33e	0.33 [b]
Pentachlorophenol	87-86-5	2.4	6.7	6.7	55	0.8e	0.8e	0.8[b]
Phenanthrene	85-01-8	100a	100a	500b	1,000c	NS	1,000c	100
Phenol	108-95-2	100a	100a	500b	1,000c	30	0.33e	0.33[b]
Pyrene	129-00-0	100a	100a	500b	1,000c	NS	1,000c	100

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Contaminant	CAS Number	Protection of Public Health				Protection of Ecological Resources	Protection of Ground-water	Unrestricted Use
		Residential	Restricted-Residential	Commercial	Industrial			
VOLATILES								
1,1,1-Trichloroethane	71-55-6	100a	100a	500b	1,000c	NS	0.68	0.68
1,1-Dichloroethane	75-34-3	19	26	240	480	NS	0.27	0.27
1,1-Dichloroethene	75-35-4	100a	100a	500b	1,000c	NS	0.33	0.33
1,2-Dichlorobenzene	95-50-1	100a	100a	500b	1,000c	NS	1.1	1.1
1,2-Dichloroethane	107-06-2	2.3	3.1	30	60	10	0.02f	0.02[c]
cis-1,2-Dichloroethene	156-59-2	59	100a	500b	1,000c	NS	0.25	0.25
trans-1,2-Dichloroethene	156-60-5	100a	100a	500b	1,000c	NS	0.19	0.19
1,3-Dichlorobenzene	541-73-1	17	49	280	560	NS	2.4	2.4
1,4-Dichlorobenzene	106-46-7	9.8	13	130	250	20	1.8	1.8
1,4-Dioxane	123-91-1	9.8	13	130	250	0.1e	0.1e	0.1[b]
Acetone	67-64-1	100a	100b	500b	1,000c	2.2	0.05	0.05
Benzene	71-43-2	2.9	4.8	44	89	70	0.06	0.06
Butylbenzene	104-51-8	100a	100a	500b	1,000c	NS	12	12
Carbon tetrachloride	56-23-5	1.4	2.4	22	44	NS	0.76	0.76
Chlorobenzene	108-90-7	100a	100a	500b	1,000c	40	1.1	1.1
Chloroform	67-66-3	10	49	350	700	12	0.37	0.37
Ethylbenzene	100-41-4	30	41	390	780	NS	1	1
Hexachlorobenzene	118-74-1	0.33e	1.2	6	12	NS	3.2	0.33[b]
Methyl ethyl ketone	78-93-3	100a	100a	500b	1,000c	100a	0.12	0.12
Methyl tert-butyl ether	1634-04 -4	62	100a	500b	1,000c	NS	0.93	0.93
Methylene chloride	75-09-2	51	100a	500b	1,000c	12	0.05	0.05
n-Propylbenzene	103-65-1	100a	100a	500b	1,000c	NS	3.9	3.9
sec-Butylbenzene	135-98-8	100a	100a	500b	1,000c	NS	11	11
tert-Butylbenzene	98-06-6	100a	100a	500b	1,000c	NS	5.9	5.9
Tetrachloroethene	127-18-4	5.5	19	150	300	2	1.3	1.3
Toluene	108-88-3	100a	100a	500b	1,000c	36	0.7	0.7
Trichloroethene	79-01-6	10	21	200	400	2	0.47	0.47
1,2,4-Trimethylbenzene	95-63-6	47	52	190	380	NS	3.6	3.6
1,3,5-Trimethylbenzene	108-67-8	47	52	190	380	NS	8.4	8.4
Vinyl chloride	75-01-4	0.21	0.9	13	27	NS	0.02	0.02
Xylene (mixed)	1330-20 -7	100a	100a	500b	1,000c	0.26	1.6	0.26

All soil cleanup objectives (SCOs) are in parts per million (ppm). NS=Not specified. See Technical Support Document (TSD). Footnotes

a The SCOs for residential, restricted-residential and ecological resources use were capped at a maximum value of 100 ppm. See TSD section 9.3.

b The SCOs for commercial use were capped at a maximum value of 500 ppm. See TSD section 9.3.

c The SCOs for industrial use and the protection of groundwater were capped at a maximum value of 1000 ppm. See TSD section 9.3.

d The SCOs for metals were capped at a maximum value of 10,000 ppm. See TSD section 9.3.

e For constituents where the calculated SCO was lower than the contract required quantitation limit (CRQL), the CRQL is used as the SCO value.

TABLE 2

RI SAMPLING PROGRAM RATIONALE AND ANALYSIS

Matrix	Location	Approximate Number of Samples	Rationale for Sampling	Laboratory Analysis
Subsurface soil	From 3 Test Pits (SB2, SB3, SB4)and 9 soil borings (SB1, SB5, SB6, SB7, SB8 and SB9)	18	To assess quality of historic fill and clean native soil across the Site.	VOCs EPA Method 8260B, SVOCs EPA Method 8270, pesticide / PCBs EPA Method 8081/8082, TAL metals EPA 6010.
Subsurface soil	From 5 borings (ECB1-ECB5) throughout the site.	10	To evaluate the presense of emerging contaminants at the Site	21 PFAS Compounds by EPA Method 537 Modified, 1,4-dioxane EPA 8270.
Total (Soils)		28		
Groundwater (water table)	From 4 monitoring wells across the Site (GW1-GW4).	4	To assess groundwater quality at the Site.	VOCs EPA Method 8260B, SVOCs EPA Method 8270, pesticide / PCBs EPA Method 8081/8082, TAL metals EPA 6010 dissolved and total.
Groundwater (water table)	From 3 monitoring wells (MW1901, MW1902, MW1903) across the Site.	3	To assess groundwater quality at the Site with respect to emerging contaminants	21 PFAS Compounds by EPA Method 537 Modified, 1,4-dioxane EPA 8270 SIM.
Total (Groundwater)		7		
Soil Gas (6 ft below existing grade)	5 soil gas implants installed across the Site.	5	Evaluate soil gas across the Site.	VOCs EPA Method TO15
Total (Soil Gas)		5		

TABLE 3
146 Bayard Street/481 Graham Avenue
Brooklyn, New York
Soil Analytical Results
Volatile Organic Compounds

COMPOUND	NYSDEC Part 375.6 Unrestricted Use Soil Cleanup Objectives*	NYDEC Part 375.6 Restricted Residential Soil Cleanup Objectives*	SB1 (0-2') 10/19/2017 µg/Kg Result	RL	SB1 (2-4') 10/19/2017 µg/Kg Result	RL	SB2 (0-2') 10/20/2017 µg/Kg Result	RL	SB2 (2-4') 10/20/2017 µg/Kg Result	RL	SB3 (0-2') 10/19/2017 µg/Kg Result	RL	SB3 (2-4') 10/19/2017 µg/Kg Result	RL	SB4 (0-2') 10/20/2017 µg/Kg Result	RL	SB4 (2-4') 10/20/2017 µg/Kg Result	RL	SB5 (0-2') 10/18/2017 µg/Kg Result	RL	SB5 (7-9') 10/18/2017 µg/Kg Result	RL
1,1,1,2-Tetrachlorothane			<35	35	<44	44	<25	25	<10	10	<34	34	<30	30	<34	34	<24	24	< 38	38	<29	29
1,1,1-Trichloroethane	680	100,000	< 8.8	8.8	< 11	11	< 6.4	6.4	< 10	10	< 8.5	8.5	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
1,1,2,2-Tetrachloroethane			< 8.8	8.8	< 300	300	< 6.4	6.4	< 10	10	< 280	280	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
1,1,2-Trichloroethane			< 8.8	8.8	< 11	11	< 6.4	6.4	< 10	10	< 8.5	8.5	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
1,1-Dichloroethane	270	26,000	< 8.8	8.8	< 11	11	< 6.4	6.4	< 10	10	< 8.5	8.5	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
1,1-Dichloroethene	330	100,000	< 8.8	8.8	< 11	11	< 6.4	6.4	< 10	10	< 8.5	8.5	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
1,1-Dichloropropene			< 8.8	8.8	< 11	11	< 6.4	6.4	< 10	10	< 8.5	8.5	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
1,2,3-Trichlorobenzene			< 8.8	8.8	< 300	300	< 6.4	6.4	< 10	10	< 280	280	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
1,2,3-Trichloropropane			< 8.8	8.8	< 300	300	< 6.4	6.4	< 10	10	< 280	280	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
1,2,4-Trichlorobenzene			< 8.8	8.8	< 300	300	< 6.4	6.4	< 10	10	< 280	280	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
1,2,4-Trimethylbenzene	3,600	52,000	< 8.8	8.8	< 300	300	< 6.4	6.4	< 10	10	< 280	280	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
1,2-Dibromo-3-chloropropane			< 8.8	8.8	< 300	300	< 6.4	6.4	< 10	10	< 280	280	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
1,2-Dibromomethane			< 8.8	8.8	< 11	11	< 6.4	6.4	< 10	10	< 8.5	8.5	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
1,2-Dichlorobenzene	1,100	100,000	< 8.8	8.8	**34**	300	< 6.4	6.4	< 10	10	< 280	280	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
1,2-Dichloroethane	20	3,100	< 8.8	8.8	< 11	11	< 6.4	6.4	< 10	10	< 8.5	8.5	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
1,2-Dichloropropane			< 8.8	8.8	< 11	11	< 6.4	6.4	< 10	10	< 8.5	8.5	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
1,3,5-Trimethylbenzene	8,400	52,000	< 8.8	8.8	< 300	300	< 6.4	6.4	< 10	10	< 280	280	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
1,3-Dichlorobenzene	2,400	4,900	< 8.8	8.8	< 300	300	< 6.4	6.4	< 10	10	< 280	280	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
1,3-Dichloropropane			< 8.8	8.8	< 11	11	< 6.4	6.4	< 10	10	< 8.5	8.5	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
1,4-Dichlorobenzene	1,800	13,000	< 8.8	8.8	< 300	300	< 6.4	6.4	< 10	10	< 280	280	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
2,2-Dichloropropane			< 8.8	8.8	< 11	11	< 6.4	6.4	< 10	10	< 8.5	8.5	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
2-Chlorotoluene			< 8.8	8.8	< 300	300	< 6.4	6.4	< 10	10	< 280	280	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
2-Hexanone (Methyl Butyl Ketone)			< 44	44	< 55	55	< 32	32	< 51	51	< 43	43	< 38	38	< 43	43	< 30	30	< 48	48	< 37	37
2-Isopropyltoluene			< 8.8	8.8	< 300	300	< 6.4	6.4	< 10	10	< 280	280	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
4-Chlorotoluene			< 8.8	8.8	< 300	300	< 6.4	6.4	< 10	10	< 280	280	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
4-Methyl-2-Pentanone			< 44	44	< 55	55	< 32	32	< 51	51	< 43	43	< 38	38	< 43	43	< 30	30	< 48	48	< 37	37
Acetone	50	100,000	**35**	44	**96**	50	**28**	32	**33**	50	**62**	43	**76**	38	**36**	43	**36**	30	**110**	48	**36**	37
Acrolein			<35	35	<44	44	<25	25	<41	41	<34	34	<30	30	<34	34	<24	24	<38	38	<29	29
Acrylonitrile			<35	35	<44	44	<25	25	**20**	20	<34	34	<30	30	<34	34	<24	24	<38	38	<29	29
Benzene	60	4,800	< 8.8	8.8	< 11	11	< 6.4	6.4	< 10	10	< 8.5	8.5	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
Bromobenzene			< 8.8	8.8	< 300	300	< 6.4	6.4	< 10	10	< 280	280	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
Bromochloromethane			< 8.8	8.8	< 11	11	< 6.4	6.4	< 10	10	< 8.5	8.5	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
Bromodichloromethane			< 8.8	8.8	< 11	11	< 6.4	6.4	< 10	10	< 8.5	8.5	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
Bromoform			< 8.8	8.8	< 11	11	< 6.4	6.4	< 10	10	< 8.5	8.5	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
Bromomethane			< 8.8	8.8	< 11	11	< 6.4	6.4	< 10	10	< 8.5	8.5	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
Carbon Disulfide			< 8.8	8.8	< 11	11	< 6.4	6.4	< 10	10	< 8.5	8.5	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
Carbon tetrachloride	760	2,400	< 8.8	8.8	< 11	11	< 6.4	6.4	< 10	10	< 8.5	8.5	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
Chlorobenzene	1,100	100,000	< 8.8	8.8	< 11	11	< 6.4	6.4	< 10	10	< 8.5	8.5	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
Chloroethane			< 8.8	8.8	< 11	11	< 6.4	6.4	< 10	10	< 8.5	8.5	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
Chloroform	370	49,000	< 8.8	8.8	< 11	11	< 6.4	6.4	< 10	10	< 8.5	8.5	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
Chloromethane			< 8.8	8.8	< 11	11	< 6.4	6.4	< 10	10	< 8.5	8.5	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
cis-1,2-Dichloroethene	250	100,000	< 8.8	8.8	< 11	11	< 6.4	6.4	< 10	10	< 8.5	8.5	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
cis-1,3-Dichloropropene			< 8.8	8.8	< 11	11	< 6.4	6.4	< 10	10	< 8.5	8.5	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
Dibromochloromethane			< 8.8	8.8	< 11	11	< 6.4	6.4	< 10	10	< 8.5	8.5	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
Dibromomethane			< 8.8	8.8	< 11	11	< 6.4	6.4	< 10	10	< 8.5	8.5	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
Dichlorodifluoromethane			< 8.8	8.8	< 11	11	< 6.4	6.4	< 10	10	< 8.5	8.5	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
Ethylbenzene	1,000	41,000	< 8.8	8.8	< 11	11	< 6.4	6.4	< 10	10	**110**	100	**12**	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
Hexachlorobutadiene			< 8.8	8.8	< 300	300	< 6.4	6.4	< 10	10	< 280	280	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
Isopropylbenzene			< 8.8	8.8	< 300	300	< 6.4	6.4	< 10	10	< 280	280	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
m&p-Xylenes	260	100,000	< 8.8	8.8	< 11	11	< 6.4	6.4	< 10	10	**470**	280	**240**	220	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
Methyl Ethyl Ketone (2-Butanone)	120	100,000	< 53	53	< 67	67	< 38	38	< 61	61	< 51	51	< 45	45	< 51	51	< 37	37	< 57	57	< 44	44
Methyl t-butyl ether (MTBE)	930	100,000	< 18	18	< 22	22	< 13	13	< 20	20	< 17	17	< 15	15	< 17	17	< 12	12	< 19	19	< 15	15
Methylene chloride	50	100,000	< 8.8	8.8	< 11	11	< 6.4	6.4	< 10	10	< 8.5	8.5	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
Naphthalene	12,000	100,000	< 8.8	8.8	**580**	300	< 6.4	6.4	< 10	10	< 280	280	< 7.6	7.6	< 8.5	8.5	**3.2**	6.1	< 9.6	9.6	< 7.3	7.3
n-Butylbenzene	12,000	100,000	< 8.8	8.8	< 300	300	< 6.4	6.4	< 10	10	< 280	280	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
n-Propylbenzene	3,900	100,000	< 8.8	8.8	< 300	300	< 6.4	6.4	< 10	10	< 280	280	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
o-Xylene	260	100,000	< 8.8	8.8	< 11	11	< 6.4	6.4	< 10	10	**140**	110	**19**	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
p-Isopropyltoluene			< 8.8	8.8	< 300	300	< 6.4	6.4	< 10	10	< 280	280	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
sec-Butylbenzene	11,000	100,000	< 8.8	8.8	< 300	300	< 6.4	6.4	< 10	10	< 280	280	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
Styrene			< 8.8	8.8	< 11	11	< 6.4	6.4	< 10	10	< 8.5	8.5	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
Tert-butyl alcohol			<180	180	<220	220	<130	130	<200	200	<170	170	<150	150	<170	170	<120	120	<190	190	<150	150
tert-Butylbenzene	5,900	100,000	< 8.8	8.8	< 300	300	< 6.4	6.4	< 10	10	< 280	280	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
Tetrachloroethene	1,300	19,000	< 8.8	8.8	< 11	11	< 6.4	6.4	< 10	10	< 8.5	8.5	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
Tetrahydrofuran (THF)			< 18	18	< 22	22	< 13	13	< 20	20	< 17	17	< 15	15	< 17	17	< 12	12	< 19	19	< 15	15
Toluene	700	100,000	< 8.8	8.8	< 11	11	**0.77**	6.4	**1.1**	10	**1.4**	8.5	**1.1**	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
trans-1,2-Dichloroethene	190	100,000	< 8.8	8.8	< 11	11	< 6.4	6.4	< 10	10	< 8.5	8.5	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
trans-1,3-Dichloropropene			< 8.8	8.8	< 11	11	< 6.4	6.4	< 10	10	< 8.5	8.5	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
trabs-1,4-dichloro-2-butene			< 18	18	< 590	590	< 13	13	< 20	20	< 570	570	< 15	15	< 17	17	< 12	12	< 19	19	< 15	15
Trichloroethene	470	21,000	< 8.8	8.8	< 11	11	< 6.4	6.4	< 10	10	< 8.5	8.5	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
Trichlorofluoromethane			< 8.8	8.8	< 11	11	< 6.4	6.4	< 10	10	< 8.5	8.5	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	**1.6**	7.3
Trichlorotrifluoroethane			< 8.8	8.8	< 11	11	< 6.4	6.4	< 10	10	< 8.5	8.5	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
Vinyl Chloride	20	900	< 8.8	8.8	< 11	11	< 6.4	6.4	< 10	10	< 8.5	8.5	< 7.6	7.6	< 8.5	8.5	< 6.1	6.1	< 9.6	9.6	< 7.3	7.3
1,4-dioxane			<100	100	<100	100	<95	95	<100	100	<100	100	<100	100	<100	100	<91	91	<100	100	<100	100
Total BTEX Concentration			**0**		**0**		**0.77**		**1.1**		**721.4**		**272.1**		**0**		**0**		**0**		**0**	
Total VOCs Concentration			**35**		**710**		**28.77**		**34.10**		**783.4**		**348.1**		**36**		**39.2**		**110**		**37.6**	

COMPOUND	SB6 (0-2') 10/19/2017 µg/Kg Result	RL	SB6 (4-6') 10/19/2017 µg/Kg Result	RL	SB7 (0-2') 1/29/2018 µg/Kg Result	RL	SB7 (10-12') 1/29/2018 µg/Kg Result	RL	SB8 (0-2') 1/29/2018 µg/Kg Result	RL	SB8 (10-12') 1/29/2018 µg/Kg Result	RL	SB9 (0-2') 1/29/2018 µg/Kg Result	RL	SB9 (10-12') 1/29/2018 µg/Kg Result	RL	Duplicate SB2 (2-4') 10/20/2017 µg/Kg Result	RL
1,1,1,2-Tetrachlorothane	<6.6	6.6	<23	23	< 260	260	< 16	16	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	<24	24
1,1,1-Trichloroethane	< 6.6	6.6	< 5.7	5.7	< 260	260	< 1000	1,000	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
1,1,2,2-Tetrachloroethane	< 6.6	6.6	< 5.7	5.7	< 260	260	< 16	16	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
1,1,2-Trichloroethane	< 6.6	6.6	< 5.7	5.7	< 260	260	< 16	16	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
1,1-Dichloroethane	< 6.6	6.6	< 5.7	5.7	< 260	260	< 16	16	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
1,1-Dichloroethene	< 6.6	6.6	< 5.7	5.7	< 260	260	< 16	16	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
1,1-Dichloropropene	< 6.6	6.6	< 5.7	5.7	< 260	260	< 1000	1,000	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
1,2,3-Trichlorobenzene	< 6.6	6.6	< 5.7	5.7	< 260	260	< 1000	1,000	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
1,2,3-Trichloropropane	< 6.6	6.6	< 5.7	5.7	< 260	260	< 1000	1,000	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
1,2,4-Trichlorobenzene	< 6.6	6.6	< 5.7	5.7	< 260	260	< 1000	1,000	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
1,2,4-Trimethylbenzene	< 6.6	6.6	< 5.7	5.7	**31**	260	< 16	16	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
1,2-Dibromo-3-chloropropane	< 6.6	6.6	< 5.7	5.7	< 26	26	< 8.0	8.0	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
1,2-Dibromomethane	< 6.6	6.6	< 5.7	5.7	< 260	260	< 1000	1,000	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
1,2-Dichlorobenzene	< 6.6	6.6	< 5.7	5.7	< 20	20	< 16	16	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
1,2-Dichloroethane	< 6.6	6.6	< 5.7	5.7	< 260	260	< 16	16	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
1,2-Dichloropropane	< 6.6	6.6	< 5.7	5.7	< 260	260	< 1000	1,000	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
1,3,5-Trimethylbenzene	< 6.6	6.6	< 5.7	5.7	< 260	260	< 1000	1,000	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
1,3-Dichlorobenzene	< 6.6	6.6	< 5.7	5.7	< 260	260	< 16	16	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
1,3-Dichloropropane	< 6.6	6.6	< 5.7	5.7	< 260	260	< 1000	1,000	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
1,4-Dichlorobenzene	< 6.6	6.6	< 5.7	5.7	< 260	260	< 16	16	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
2,2-Dichloropropane	< 6.6	6.6	< 5.7	5.7	< 260	260	< 1000	1,000	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
2-Chlorotoluene	< 6.6	6.6	< 5.7	5.7	< 1300	1,300	< 78	78	< 26	26	< 36	36	< 26	26	< 26	26	< 6.0	6.0
2-Hexanone (Methyl Butyl Ketone)	< 33	33	< 28	28	< 260	260	< 1000	1,000	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 30	30
2-Isopropyltoluene	< 6.6	6.6	< 5.7	5.7	< 260	260	< 1000	1,000	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
4-Chlorotoluene	< 6.6	6.6	< 5.7	5.7	< 1300	1,300	< 78	78	< 26	26	< 36	36	< 26	26	< 26	26	< 6.0	6.0
4-Methyl-2-Pentanone	< 33	33	< 28	28	< 260	260	< 16	16	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 30	30
Acetone	**59**	33	**46**	28	**380**	1,300	**190**	78	**12**	26	**62**	36	**13**	26	**12**	26	**6.4**	30
Acrolein	<27	27	<23	23	< 260	260	< 1000	1,000	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	<24	24
Acrylonitrile	<13	13	<23	23	< 260	260	< 16	16	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	<24	24
Benzene	< 6.6	6.6	< 5.7	5.7	< 260	260	< 16	16	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
Bromobenzene	< 6.6	6.6	< 5.7	5.7	< 260	260	< 16	16	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
Bromochloromethane	< 6.6	6.6	< 5.7	5.7	< 260	260	< 16	16	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
Bromodichloromethane	< 6.6	6.6	< 5.7	5.7	< 260	260	< 16	16	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
Bromoform	< 6.6	6.6	< 5.7	5.7	< 260	260	< 16	16	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
Bromomethane	< 6.6	6.6	< 5.7	5.7	< 260	260	< 16	16	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
Carbon Disulfide	< 6.6	6.6	< 5.7	5.7	< 260	260	< 16	16	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
Carbon tetrachloride	< 6.6	6.6	< 5.7	5.7	< 260	260	< 16	16	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
Chlorobenzene	< 6.6	6.6	< 5.7	5.7	< 260	260	< 16	16	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
Chloroethane	< 6.6	6.6	< 5.7	5.7	< 250	250	< 16	16	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
Chloroform	< 6.6	6.6	< 5.7	5.7	< 260	260	< 16	16	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
Chloromethane	< 6.6	6.6	< 5.7	5.7	< 260	260	< 16	16	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
cis-1,2-Dichloroethene	< 6.6	6.6	< 5.7	5.7	< 260	260	< 16	16	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
cis-1,3-Dichloropropene	< 6.6	6.6	< 5.7	5.7	< 260	260	< 16	16	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
Dibromochloromethane	< 6.6	6.6	< 5.7	5.7	< 260	260	< 16	16	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
Dibromomethane	< 6.6	6.6	< 5.7	5.7	< 260	260	< 1000	1,000	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
Dichlorodifluoromethane	< 6.6	6.6	< 5.7	5.7	< 260	260	< 1000	1,000	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
Ethylbenzene	< 6.6	6.6	< 5.7	5.7	< 260	260	< 16	16	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
Hexachlorobutadiene	< 6.6	6.6	< 5.7	5.7	< 260	260	< 1000	1,000	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	31	< 6.0	6.0
Isopropylbenzene	< 6.6	6.6	< 5.7	5.7	< 260	260	< 1000	1,000	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	10	< 6.0	6.0
m&p-Xylenes	< 6.6	6.6	< 5.7	5.7	< 260	260	< 16	16	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
Methyl Ethyl Ketone (2-Butanone)	< 40	40	< 34	34	< 120	120	**53**	94	< 32	32	**21**	43	< 31	31	< 31	31	< 36	36
Methyl t-butyl ether (MTBE)	< 13	13	< 11	11	< 530	530	**3.5**	31	< 11	11	< 14	14	< 10	10	**2.5**	10	< 12	12
Methylene chloride	< 6.6	6.6	< 5.7	5.7	< 50	50	< 16	16	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
Naphthalene	< 6.6	6.6	< 5.7	5.7	**5,200**	260	< 1000	1,000	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	**57**	230
n-Butylbenzene	< 6.6	6.6	< 5.7	5.7	< 260	260	< 1000	1,000	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
n-Propylbenzene	< 6.6	6.6	< 5.7	5.7	< 260	260	< 1000	1,000	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
o-Xylene	< 6.6	6.6	< 5.7	5.7	< 260	260	< 16	16	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
p-Isopropyltoluene	< 6.6	6.6	< 5.7	5.7	< 260	260	< 1000	1,000	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
sec-Butylbenzene	< 6.6	6.6	< 5.7	5.7	< 260	260	< 16	16	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
Styrene	< 6.6	6.6	< 5.7	5.7	< 260	260	< 16	16	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
Tert-butyl alcohol	<130	130	<110	110	< 260	260	< 16	16	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	<120	120
tert-Butylbenzene	< 6.6	6.6	< 5.7	5.7	< 190	190	< 16	16	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
Tetrachloroethene	**2**	6.6	< 5.7	5.7	< 260	260	< 16	16	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
Tetrahydrofuran (THF)	< 13	13	< 11	11	< 530	530	**7.9**	31	< 11	11	< 14	14	< 10	10	< 10	10	< 12	12
Toluene	< 6.6	6.6	< 5.7	5.7	< 260	260	< 16	16	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
trans-1,2-Dichloroethene	< 6.6	6.6	< 5.7	5.7	< 260	260	< 16	16	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
trans-1,3-Dichloropropene	< 6.6	6.6	< 5.7	5.7	< 260	260	< 16	16	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 6.0	6.0
trabs-1,4-dichloro-2-butene	< 13	13	< 11	11	< 20	20	< 16	16	< 5.3	5.3	< 7.2	7.2	< 5.2	5.2	< 5.1	5.1	< 12	12
Trichloroethene	< 6.6	6.6	< 5.7	5.7	< 1100	1,100	< 63	63	< 21	21	< 29	29	< 21	21	< 20	20	< 6.0	6.0
Trichlorofluoromethane	< 6.6	6.6	< 5.7	5.7	< 500	500	< 63	63	< 21	21	< 29	29	< 21	21	< 20	20	< 6.0	6.0
Trichlorotrifluoroethane	< 6.6	6.6	< 5.7	5.7	< 900	900	< 63	63	< 21	21	< 29	29	< 21	21	< 20	20	< 6.0	6.0
Vinyl Chloride	< 6.6	6.6	< 5.7	5.7	< 5300	5,300	< 310	310	< 110	110	< 140	140	< 100	100	< 100	100	< 6.0	6.0
1,4-dioxane	<100	100	<85	85	< 2100	2,100	< 100	100	< 79	79	< 100	100	< 78	78	< 77	77	< 66	66
Total BTEX Concentration	**0**		**0**		**0**		**0**		**0**		**0**		**0**		**0**		**0**	
Total VOCs Concentration	**61**		**46**		**5,611**		**254**		**12**		**83**		**13**		**15**		**63.4**	

Notes:

* - 6 NYCRR Part 375-6 Remedial Program Soil Cleanup Objectives

RL - Reporting Limit

Bold/highlighted- Indicated exceedance of the NYSDEC UUSCO Guidance Value

Bold/highlighted- Indicated exceedance of the NYSDEC RRSCO Guidance Value

TABLE 4
146 Bayard Street/481 Graham Avenue
Brooklyn, New York
Soil Analytical Results
Semi-Volatile Organic Compounds

COMPOUND	NYSDEC Part 375.6 Unrestricted Use Soil Cleanup Objectives*	NYDEC Part 375.6 Restricted Residential Soil Cleanup Objectives*	SB1		SB2		SB3		SB4		SB5		SB6		SB7		SB8		SB9		Duplicate SB2
			(0-2') 10/19/2017 µg/Kg	(2-4') 10/19/2017 µg/Kg	(0-2') 10/20/2017 µg/Kg	(2-4') 10/20/2017 µg/Kg	(0-2') 10/19/2017 µg/Kg	(2-4') 10/19/2017 µg/Kg	(0-2') 10/20/2017 µg/Kg	(2-4') 10/20/2017 µg/Kg	(0-2') 10/18/2017 µg/Kg	(7-9') 10/18/2017 µg/Kg	(0-2') 10/19/2017 µg/Kg	(2-4') 10/19/2017 µg/Kg	(0-2') 1/29/2018 µg/Kg	(10-12') 1/29/2018 µg/Kg	(0-2') 1/29/2018 µg/Kg	(10-12') 1/29/2018 µg/Kg	(0-2') 1/29/2018 µg/Kg	(10-12') 1/29/2018 µg/Kg	(2-4') 10/20/2017 µg/Kg
			Result RL	Result RL	Result RL	Result RL	Result RL	Result RL	Result RL	Result RL	Result RL	Result RL	Result RL	Result RL	Result RL	Result RL	Result RL	Result RL	Result RL	Result RL	Result RL
1,2,4,5-Tetrachlorobenzene			< 260 260	< 280 280	< 250 250	< 240 240	< 270 270	< 240 240	< 270 270	< 260 260	< 250 250	< 250 250	< 250 250	< 270 270	< 1200 1,200	< 850 850	< 260 260	< 380 380	< 260 260	< 270 270	< 250 250
1,2,4-Trichlorobenzene			< 260 260	< 280 280	< 250 250	< 240 240	< 270 270	< 240 240	< 270 270	< 260 260	< 250 250	< 250 250	< 250 250	< 270 270	< 1200 1,200	< 850 850	< 260 260	< 380 380	< 260 260	< 270 270	< 250 250
1,2-Dichlorobenzene			< 260 260	< 280 280	< 250 250	< 240 240	< 270 270	< 240 240	< 270 270	< 260 260	< 250 250	< 250 250	< 250 250	< 270 270	< 1100 1,100	< 850 850	< 260 260	< 380 380	< 260 260	< 270 270	< 250 250
1,2-Diphenylhydrazine			< 260 260	< 280 280	< 250 250	< 240 240	< 270 270	< 240 240	< 270 270	< 260 260	< 250 250	< 250 250	< 250 250	< 270 270	< 700 700	< 700 700	< 260 260	< 380 380	< 260 260	< 270 270	< 250 250
1,3-Dichlorobenzene			< 260 260	< 280 280	< 250 250	< 240 240	< 270 270	< 240 240	< 270 270	< 260 260	< 250 250	< 250 250	< 250 250	< 270 270	< 1200 1,200	< 850 850	< 260 260	< 380 380	< 260 260	< 270 270	< 250 250
1,4-Dichlorobenzene			< 260 260	< 280 280	< 250 250	< 240 240	< 270 270	< 240 240	< 270 270	< 260 260	< 250 250	< 250 250	< 250 250	< 270 270	< 1200 1,200	< 850 850	< 260 260	< 380 380	< 260 260	< 270 270	< 250 250
2,4,5-Trichlorophenol			< 260 260	< 280 280	< 250 250	< 240 240	< 270 270	< 240 240	< 270 270	< 260 260	< 250 250	< 250 250	< 250 250	< 270 270	< 1200 1,200	< 850 850	< 260 260	< 380 380	< 260 260	< 270 270	< 250 250
2,4,6-Trichlorophenol			< 180 180	< 200 200	< 180 180	< 170 170	< 190 190	< 170 170	< 190 190	< 190 190	< 180 180	< 180 180	< 180 180	< 200 200	< 880 880	< 610 610	< 190 190	< 270 270	< 190 190	< 200 200	< 180 180
2,4-Dichlorophenol			< 180 180	< 200 200	< 180 180	< 170 170	< 190 190	< 170 170	< 190 190	< 190 190	< 180 180	< 180 180	< 180 180	< 200 200	< 880 880	< 610 610	< 190 190	< 270 270	< 190 190	< 200 200	< 180 180
2,4-Dimethylphenol			< 260 260	< 280 280	< 250 250	< 240 240	< 270 270	< 240 240	< 270 270	< 260 260	< 250 250	< 250 250	< 250 250	< 270 270	< 1200 1,200	< 850 850	< 260 260	< 380 380	< 260 260	< 270 270	< 250 250
2,4-Dinitrophenol			< 260 260	< 280 280	< 250 250	< 240 240	< 270 270	< 240 240	< 270 270	< 260 260	< 250 250	< 250 250	< 250 250	< 270 270	< 1200 1,200	< 850 850	< 260 260	< 380 380	< 260 260	< 270 270	< 250 250
2,4-Dinitrotoluene			< 180 180	< 200 200	< 180 180	< 170 170	< 190 190	< 170 170	< 190 190	< 190 190	< 180 180	< 180 180	< 180 180	< 200 200	< 700 700	< 610 610	< 190 190	< 270 270	< 190 190	< 200 200	< 180 180
2,6-Dinitrotoluene			< 180 180	< 200 200	< 180 180	< 170 170	< 190 190	< 170 170	< 190 190	< 190 190	< 180 180	< 180 180	< 180 180	< 200 200	< 700 700	< 610 610	< 190 190	< 270 270	< 190 190	< 200 200	< 180 180
2-Chloronaphthalene			< 260 260	< 280 280	< 250 250	< 240 240	< 270 270	< 240 240	< 270 270	< 260 260	< 250 250	< 250 250	< 250 250	< 270 270	< 1200 1,200	< 850 850	< 260 260	< 380 380	< 260 260	< 270 270	< 250 250
2-Chlorophenol			< 260 260	< 280 280	< 250 250	< 240 240	< 270 270	< 240 240	< 270 270	< 260 260	< 250 250	< 250 250	< 250 250	< 270 270	< 1200 1,200	< 850 850	< 260 260	< 380 380	< 260 260	< 270 270	< 250 250
2-Methylnaphthalene			< 260 260	**150** 280	< 250 250	**170** 240	< 270 270	< 240 240	**180** 270	**780** 260	< 250 250	< 250 250	< 250 250	< 270 270	**4,100** 1,200	< 850 850	< 260 260	< 380 380	< 260 260	< 270 270	**130** 250
2-Methylphenol (o-cresol)	330	100,000	< 260 260	< 280 280	< 250 250	< 240 240	< 270 270	< 240 240	< 270 270	< 260 260	< 250 250	< 250 250	< 250 250	< 270 270	< 300 300	< 330 330	< 260 260	< 330 330	< 260 260	< 270 270	< 250 250
2-Nitroaniline			< 260 260	< 280 280	< 250 250	< 240 240	< 270 270	< 240 240	< 270 270	< 260 260	< 250 250	< 250 250	< 250 250	< 270 270	< 1200 1,200	< 850 850	< 260 260	< 380 380	< 260 260	< 270 270	< 250 250
2-Nitrophenol			< 260 260	< 280 280	< 250 250	< 240 240	< 270 270	< 240 240	< 270 270	< 260 260	< 250 250	< 250 250	< 250 250	< 270 270	< 1200 1,200	< 850 850	< 260 260	< 380 380	< 260 260	< 270 270	< 250 250
3&4-Methylphenol (m&p-cresol)	330	100,000	< 260 260	< 280 280	< 250 250	< 240 240	< 270 270	< 240 240	< 270 270	< 260 260	< 250 250	< 250 250	< 250 250	< 270 270	< 1200 1,200	< 850 850	< 260 260	< 380 380	< 260 260	< 270 270	< 250 250
3,3'-Dichlorobenzidine			< 180 180	< 200 200	< 180 180	< 170 170	< 190 190	< 170 170	< 190 190	< 190 190	< 180 180	< 180 180	< 180 180	< 200 200	< 880 880	< 610 610	< 190 190	< 270 270	< 190 190	< 200 200	< 180 180
3-Nitroaniline			< 370 370	< 390 390	< 350 350	< 350 350	< 390 390	< 340 340	< 380 380	< 370 370	< 350 350	< 360 360	< 360 360	< 390 390	< 1800 1,800	< 1200 1,200	< 380 380	< 540 540	< 380 380	< 390 390	< 360 360
4,6-Dinitro-2-methylphenol			< 220 220	< 240 240	< 210 210	< 210 210	< 230 230	< 210 210	< 230 230	< 220 220	< 210 210	< 220 220	< 220 220	< 240 240	< 1100 1,100	< 730 730	< 230 230	< 330 330	< 230 230	< 240 240	< 210 210
4-Bromophenyl phenyl ether			< 260 260	< 280 280	< 250 250	< 240 240	< 270 270	< 240 240	< 270 270	< 260 260	< 250 250	< 250 250	< 250 250	< 270 270	< 1200 1,200	< 850 850	< 260 260	< 380 380	< 260 260	< 270 270	< 250 250
4-Chloro-3-methylphenol			< 260 260	< 280 280	< 250 250	< 240 240	< 270 270	< 240 240	< 270 270	< 260 260	< 250 250	< 250 250	< 250 250	< 270 270	< 1200 1,200	< 850 850	< 260 260	< 380 380	< 260 260	< 270 270	< 250 250
4-Chloroaniline			< 290 290	< 320 320	< 280 280	< 280 280	< 310 310	< 280 280	< 310 310	< 300 300	< 280 280	< 290 290	< 290 290	< 310 310	< 1400 1,400	< 970 970	< 300 300	< 440 440	< 300 300	< 310 310	< 290 290
4-Chlorophenyl phenyl ether			< 260 260	< 280 280	< 250 250	< 240 240	< 270 270	< 240 240	< 270 270	< 260 260	< 250 250	< 250 250	< 250 250	< 270 270	< 1200 1,200	< 850 850	< 260 260	< 380 380	< 260 260	< 270 270	< 250 250
4-Nitroaniline			< 370 370	< 390 390	< 350 350	< 350 350	< 390 390	< 340 340	< 380 380	< 370 370	< 350 350	< 360 360	< 360 360	< 390 390	< 1800 1,800	< 1200 1,200	< 380 380	< 540 540	< 380 380	< 390 390	< 360 360
4-Nitrophenol			< 370 370	< 390 390	< 350 350	< 350 350	< 390 390	< 340 340	< 380 380	< 370 370	< 350 350	< 360 360	< 360 360	< 390 390	< 1800 1,800	< 1200 1,200	< 380 380	< 540 540	< 380 380	< 390 390	< 360 360
Acenaphthene	20,000	100,000	< 260 260	**330** 280	< 250 250	**730** 240	**410** 270	< 240 240	**570** 270	**1,900** 260	< 250 250	**290** 250	< 250 250	< 270 270	**7,600** 1,200	< 850 850	< 260 260	< 380 380	< 260 260	< 270 270	**410** 250
Acenaphthylene	100,000	100,000	< 260 260	**150** 280	< 250 250	**220** 240	**300** 270	< 240 240	**350** 270	**830** 260	< 250 250	**150** 250	< 250 250	< 270 270	**1,100** 1,200	< 850 850	< 260 260	< 380 380	< 260 260	< 270 270	**170** 250
Acetophenone			< 260 260	< 280 280	< 250 250	< 240 240	< 270 270	< 240 240	< 270 270	< 260 260	< 250 250	< 250 250	< 250 250	< 270 270	< 1200 1,200	< 850 850	< 260 260	< 380 380	< 260 260	< 270 270	< 250 250
Aniline			< 290 290	< 320 320	< 280 280	< 280 280	< 310 310	< 280 280	< 310 310	< 300 300	< 280 280	< 290 290	< 290 290	< 310 310	< 1400 1,400	< 970 970	< 300 300	< 440 440	< 300 300	< 310 310	< 290 290
Anthracene	100,000	100,000	< 260 260	**820** 280	**190** 250	**1,800** 240	**1,100** 270	< 240 240	**1,400** 270	**4,700** 260	**280** 250	**720** 250	**270** 250	**330** 270	**18,000** 1,200	< 850 850	< 260 260	< 380 380	< 260 260	< 270 270	**820** 250
Benz(a)anthracene	1,000	1,000	**320** 260	**2,000** 280	**830** 250	**4,300** 240	**5,000** 270	**190** 240	**5,100** 270	**13,000** 2,600	**1,100** 250	**2,900** 250	**1,300** 250	**1,500** 270	**40,000** 12,000	< 850 850	**640** 260	< 380 380	< 260 260	< 270 270	**2,600** 250
Benzidine			< 370 370	< 390 390	< 350 350	< 350 350	< 390 390	< 340 340	< 380 380	< 370 370	< 350 350	< 360 360	< 360 360	< 390 390	< 700 700	< 680 680	< 380 380	< 540 540	< 380 380	< 390 390	< 360 360
Benzo(a)pyrene	1,000	1,000	**320** 180	**1,700** 200	**870** 180	**3,400** 170	**4,600** 190	**270** 170	**4,400** 190	**11,000** 1,900	**1,000** 180	**2,800** 180	**1,300** 180	**1,400** 200	**29,000** 8,800	< 500 500	**580** 190	< 270 270	< 190 190	< 200 200	**3,100** 180
Benzo(b)fluoranthene	1,000	1,000	**270** 260	**1,500** 280	**910** 250	**3,800** 240	**4,900** 270	**200** 240	**4,400** 270	**10,000** 2,600	**930** 250	**2,700** 250	**1,300** 250	**1,100** 270	**30,000** 12,000	< 850 850	**580** 260	< 380 380	< 260 260	< 270 270	**3,000** 250
Benzo(ghi)perylene	100,000	100,000	**330** 260	**1,100** 280	**690** 250	**1,700** 240	**2,800** 270	**440** 240	**3,000** 270	**5,400** 260	**610** 250	**1,800** 250	**1,100** 250	**930** 270	**16,000** 1,200	< 850 850	**480** 260	< 380 380	< 260 260	< 270 270	**1,500** 250
Benzo(k)fluoranthene	800	3,900	**260** 260	**1,500** 280	**860** 250	**3,000** 240	**3,900** 270	**210** 240	**3,500** 270	**8,400** 2,600	**760** 250	**2,400** 250	**1,100** 250	**1,100** 270	**29,000** 1,200	< 800 800	**500** 260	< 380 380	< 260 260	< 270 270	**2,300** 250
Benzoic acid			< 1800 1,800	< 2000 2,000	< 1800 1,800	< 1700 1,700	< 1900 1,900	< 1700 1,700	< 1900 1,900	< 1900 1,900	< 1800 1,800	< 1800 1,800	< 1800 1,800	< 2000 2,000	< 8800 8,800	< 6100 6,100	< 1900 1,900	< 2700 2,700	< 1900 1,900	< 2000 2,000	< 1800 1,800
Benzyl butyl phthalate			< 260 260	< 280 280	< 250 250	< 240 240	< 270 270	< 240 240	< 270 270	< 260 260	< 250 250	< 250 250	< 250 250	< 270 270	< 1200 1,200	< 850 850	**1,500** 260	< 380 380	< 260 260	< 270 270	< 250 250
Bis(2-chloroethoxy)methane			< 260 260	< 280 280	< 250 250	< 240 240	< 270 270	< 240 240	< 270 270	< 260 260	< 250 250	< 250 250	< 250 250	< 270 270	< 1200 1,200	< 850 850	< 260 260	< 380 380	< 260 260	< 270 270	< 250 250
Bis(2-chloroethyl)ether			< 180 180	< 200 200	< 180 180	< 170 170	< 190 190	< 170 170	< 190 190	< 190 190	< 180 180	< 180 180	< 180 180	< 200 200	< 350 350	< 400 400	< 190 190	< 270 270	< 190 190	< 200 200	< 180 180
Bis(2-chloroisopropyl)ether			< 260 260	< 280 280	< 250 250	< 240 240	< 270 270	< 240 240	< 270 270	< 260 260	< 250 250	< 250 250	< 250 250	< 270 270	< 1200 1,200	< 850 850	< 260 260	< 380 380	< 260 260	< 270 270	< 250 250
Bis(2-ethylhexyl)phthalate			< 260 260	**770** 280	< 250 250	< 240 240	< 270 270	< 240 240	**200** 270	**220** 260	< 250 250	< 250 250	< 250 250	< 270 270	< 1200 1,200	< 850 850	< 260 260	< 380 380	< 260 260	< 270 270	< 250 250
Carbazole			< 180 180	**330** 200	**140** 180	**1,500** 170	**620** 190	< 170 170	**770** 190	**2,500** 190	**150** 180	**340** 180	**160** 180	< 200 200	**11,000** 880	< 610 610	**160** 190	< 270 270	< 190 190	< 200 200	**420** 180
Chrysene	1,000	3,900	**350** 260	**2,000** 280	**990** 250	**4,600** 240	**5,600** 270	**190** 240	**5,800** 270	**14,000** 2,600	**1,200** 250	**3,100** 250	**1,500** 250	**1,600** 270	**42,000** 12,000	< 850 850	**670** 260	< 380 380	< 260 260	< 270 270	**3,100** 250
Dibenz(a,h)anthracene	330	330	< 180 180	**310** 200	**170** 180	**530** 170	**730** 190	**110** 170	**800** 190	**2,100** 190	< 180 180	**440** 180	**270** 180	**240** 200	**5,100** 880	< 330 330	**120** 190	< 270 270	< 190 190	< 200 200	**440** 180
Dibenzofuran	7,000	59,000	< 260 260	**270** 280	< 250 250	**710** 240	**240** 270	< 240 240	**400** 270	**1,400** 260	< 250 250	**200** 250	< 250 250	< 270 270	**6,200** 1,200	< 330 330	< 260 260	< 330 330	< 260 260	< 270 270	**200** 250
Diethyl phthalate			< 260 260	< 280 280	< 250 250	< 240 240	< 270 270	< 240 240	< 270 270	< 260 260	< 250 250	< 250 250	< 250 250	< 270 270	< 1200 1,200	< 850 850	< 260 260	< 380 380	< 260 260	< 270 270	< 250 250
Dimethylphthalate			< 260 260	< 280 280	< 250 250	< 240 240	< 270 270	< 240 240	< 270 270	< 260 260	< 250 250	< 250 250	< 250 250	< 270 270	< 1200 1,200	< 850 850	< 260 260	< 380 380	< 260 260	< 270 270	< 250 250
Di-n-butylphthalate			< 260 260	< 280 280	< 250 250	< 240 240	< 270 270	< 240 240	< 270 270	**140** 260	< 250 250	< 250 250	< 250 250	< 270 270	< 1200 1,200	< 850 850	**940** 260	< 380 380	< 260 260	< 270 270	< 250 250
Di-n-octylphthalate			< 260 260	< 280 280	< 250 250	< 240 240	< 270 270	< 240 240	< 270 270	< 260 260	< 250 250	< 250 250	< 250 250	< 270 270	< 1200 1,200	< 850 850	< 260 260	< 380 380	< 260 260	< 270 270	< 250 250
Fluoranthene	100,000	100,000	**680** 260	**4,200** 280	**1,800** 250	**12,000** 2,400	**9,600** 2,700	**370** 240	**11,000** 2,700	**29,000** 2,600	**2,200** 250	**5,000** 250	**2,100** 250	**2,700** 270	**98,000** 12,000	< 850 850	**1,400** 260	< 380 380	< 260 260	< 270 270	**4,800** 250
Fluorene	30,000	100,000	< 260 260	420 280	< 250 250	**910** 240	**350** 270	< 240 240	**500** 270	**2,000** 260	< 250 250	**240** 250	< 250 250	< 270 270	**9,200** 1,200	< 850 850	< 260 260	< 380 380	< 260 260	< 270 270	**350** 250
Hexachlorobenzene			< 180 180	< 200 200	< 180 180	< 170 170	< 190 190	< 170 170	< 190 190	< 190 190	< 180 180	< 180 180	< 180 180	< 200 200	< 300 300	< 300 300	< 190 190	< 270 270	< 190 190	< 200 200	< 180 180
Hexachlorobutadiene			< 260 260	< 280 280	< 250 250	< 240 240	< 270 270	< 240 240	< 270 270	< 260 260	< 250 250	< 250 250	< 250 250	< 270 270	< 1200 1,200	< 850 850	< 260 260	< 380 380	< 260 260	< 270 270	< 250 250
Hexachlorocyclopentadiene			< 260 260	< 280 280	< 250 250	< 240 240	< 270 270	< 240 240	< 270 270	< 260 260	< 250 250	< 250 250	< 250 250	< 270 270	< 1200 1,200	< 850 850	< 260 260	< 380 380	< 260 260	< 270 270	< 250 250
Hexachloroethane			< 180 180	< 200 200	< 180 180	< 170 170	< 190 190	< 170 170	< 190 190	< 190 190	< 180 180	< 180 180	< 180 180	< 200 200	< 880 880	< 610 610	< 190 190	< 270 270	< 190 190	< 200 200	< 180 180
Indeno(1,2,3-cd)pyrene	500	500	**330** 260	**1,300** 280	**680** 250	**1,900** 240	**3,000** 270	**450** 240	**3,100** 270	**5,900** 260	**680** 250	**1,900** 250	**1,100** 250	**950** 270	**19,000** 1,200	< 500 500	**470** 260	< 380 380	< 260 260	< 270 270	**1,700** 250
Isophorone			< 180 180	< 200 200	< 180 180	< 170 170	< 190 190	< 170 170	< 190 190	< 190 190	< 180 180	< 220 220	< 180 180	< 200 200	< 880 880	< 610 610	< 190 190	< 270 270	< 190 190	< 200 200	< 180 180
Naphthalene	12,000	100,000	< 260 260	**310** 280	< 250 250	**140** 240	**200** 270	< 240 240	**290** 270	**1,300** 260	< 250 250	**130** 250	< 250 250	< 270 270	**6,500** 1,200	< 850 850	< 260 260	< 380 380	< 260 260	< 270 270	**240** 250
Nitrobenzene			< 180 180	< 200 200	< 180 180	< 170 170	< 190 190	< 170 170	< 190 190	< 190 190	< 180 180	< 180 180	< 180 180	< 200 200	< 880 880	< 610 610	< 190 190	< 270 270	< 190 190	< 200 200	< 180 180
N-Nitrosodimethylamine			< 260 260	< 280 280	< 250 250	< 240 240	< 270 270	< 240 240	< 270 270	< 260 260	< 250 250	< 250 250	< 250 250	< 270 270	< 700 700	< 700 700	< 260 260	< 380 380	< 260 260	< 270 270	< 250 250
N-Nitrosodi-n-propylamine			< 180 180	< 200 200	< 180 180	< 170 170	< 190 190	< 170 170	< 190 190	< 190 190	< 180 180	< 180 180	< 180 180	< 200 200	< 280 280	< 200 200	< 190 190	< 200 200	< 190 190	< 200 200	< 180 180
N-Nitrosodiphenylamine			< 260 260	< 280 280	< 250 250	< 240 240	< 270 270	< 240 240	< 270 270	< 260 260	< 250 250	< 250 250	< 250 250	< 270 270	< 1200 1,200	< 850 850	< 260 260	< 380 380	< 260 260	< 270 270	< 250 250
Pentachloronitrobenzene			< 260 260	< 280 280	< 250 250	< 240 240	< 270 270	< 240 240	< 270 270	< 260 260	< 250 250	< 250 250	< 250 250	< 270 270	< 1200 1,200	< 850 850	< 260 260	< 380 380	< 260 260	< 270 270	< 250 250
Pentachlorophenol	800	6,700	< 220 220	< 240 240	< 210 210	< 210 210	< 230 230	< 210 210	< 230 230	< 220 220	< 210 210	< 220 220	< 220 220	< 240 240	< 800 800	< 730 730	< 230 230	< 330 330	< 230 230	< 240 240	< 210 210
Phenanthrene	100,000	100,000	**570** 260	**3,700** 280	**1,200** 250	**11,000** 2,400	**6,900** 270	**220** 240	**8,100** 2,700	**25,000** 2,600	**1,500** 250	**4,100** 250	**1,500** 250	**1,600** 270	**98,000** 12,000	< 850 850	**1,400** 260	< 380 380	< 260 260	< 270 270	**5,900** 250
Phenol	330	100,000	< 260 260	< 280 280	< 250 250	< 240 240	< 270 270	< 240 240	< 270 270	< 260 260	< 250 250	< 250 250	< 250 250	< 270 270	< 320 320	< 330 330	< 260 260	< 330 330	< 260 260	< 270 270	< 250 250
Pyrene	100,000	100,000	**620** 260	**3,400** 280	**1,500** 250	**8,800** 2,400	**8,600** 2,700	**310** 240	**9,400** 2,700	**26,000** 2,600	**2,000** 250	**4,500** 250	**1,900** 250	**2,700** 270	**73,000** 12,000	< 850 850	**1,100** 260	< 380 380	< 260 260	< 270 270	**4,800** 250
Pyridine			< 260 260	< 280 280	< 250 250	< 240 240	< 270 270	< 240 240	< 270 270	< 260 260	< 250 250	< 250 250	< 250 250	< 270 270	< 1200 1,200	< 850 850	< 260 260	< 380 380	< 260 260	< 270 270	< 250 250

Notes:

* - 6 NYCRR Part 375-6 Remedial Program Soil Cleanup Objectives

RL - Reporting Limit

Bold/highlighted- indicated exceedance of the NYSDEC UUSCO Guidance Value

Bold/highlighted- indicated exceedance of the NYSDEC RRSCO Guidance Value

TABLE 5
146 Bayard Street/481 Graham Avenue
Brooklyn, New York
Soil Analytical Results
Pesticides PCBs

	COMPOUND	NYSDEC Part 375.6 Unrestricted Use Soil Cleanup Objectives*	NYDEC Part 375.6 Restricted Residential Soil Cleanup Objectives*	SB1				SB2				SB3				SB4			
				(0-2') 10/19/2017 µg/Kg		(2-4') 10/19/2017 µg/Kg		(0-2') 10/20/2017 µg/Kg		(2-4') 10/20/2017 µg/Kg		(0-2') 10/19/2017 µg/Kg		(2-4') 10/19/2017 µg/Kg		(0-2') 10/20/2017 µg/Kg		(2-4') 10/20/2017 µg/Kg	
				Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL
Pesticides	4,4' -DDD	3.3	13,000	< 2.2	2.2	< 2.4	2.4	**34**	2.1	< 2.1	2.1	**19**	2.3	< 2.1	2.1	**23**	2.3	< 15	15
	4,4' -DDE	3.3	8,900	< 2.2	2.2	< 2.4	2.4	**38**	2.1	**13**	2.1	**28**	2.3	< 2.1	2.1	**60**	2.3	**37**	23
	4,4' -DDT	3.3	7,900	< 2.2	2.2	**4**	2.4	**150**	11	**40**	2.1	**62**	2.3	< 2.1	2.1	**130**	11	**100**	23
	a-BHC	20	480	< 7.4	7.4	< 8.1	8.1	< 7.1	7.1	< 7.0	7.0	< 7.8	7.8	< 6.9	6.9	< 7.6	7.6	< 7.5	7.5
	a-Chlordane	94	4,200	< 3.7	3.7	< 4.1	4.1	< 3.6	3.6	< 3.5	3.5	**13**	3.9	< 3.5	3.5	**5**	3.8	< 38	38
	Aldrin	5	97	< 3.7	3.7	< 4.1	4.1	< 3.6	3.6	< 3.5	3.5	< 3.9	3.9	< 3.5	3.5	< 3.8	3.8	< 3.8	3.8
	b-BHC	36	360	< 7.4	7.4	< 8.1	8.1	< 7.1	7.1	< 7.0	7.0	< 7.8	7.8	< 6.9	6.9	< 7.6	7.6	< 25	25
	Chlordane	94	4,200	< 37	37	< 41	41	< 36	36	< 35	35	**55**	39	< 35	35	**110**	38	< 38	38
	d-BHC	40	100,000	< 7.4	7.4	< 8.1	8.1	< 7.1	7.1	< 7.0	7.0	< 7.8	7.8	< 6.9	6.9	< 7.6	7.6	< 19	19
	Dieldrin	5	200	< 3.7	3.7	< 4.1	4.1	< 3.6	3.6	< 3.5	3.5	< 3.9	3.9	< 3.5	3.5	**4.4**	3.8	< 5.0	5.0
	Endosulfan I	2,400	24,000	< 7.4	7.4	< 8.1	8.1	< 7.1	7.1	< 7.0	7.0	< 7.8	7.8	< 6.9	6.9	< 7.6	7.6	< 75	75
	Endosulfan II	2,400	24,000	< 7.4	7.4	< 8.1	8.1	< 7.1	7.1	< 7.0	7.0	< 7.8	7.8	< 6.9	6.9	< 7.6	7.6	< 75	75
	Endosulfan sulfate	2,400	24,000	< 7.4	7.4	< 8.1	8.1	< 7.1	7.1	< 7.0	7.0	< 7.8	7.8	< 6.9	6.9	< 7.6	7.6	< 75	75
	Endrin	14	11,000	< 7.4	7.4	< 8.1	8.1	< 7.1	7.1	< 7.0	7.0	< 7.8	7.8	< 6.9	6.9	< 7.6	7.6	< 7.5	7.5
	Endrin aldehyde			< 7.4	7.4	< 8.1	8.1	< 7.1	7.1	< 7.0	7.0	< 7.8	7.8	< 6.9	6.9	< 7.6	7.6	< 75	75
	Endrin ketone			< 7.4	7.4	< 8.1	8.1	< 7.1	7.1	< 7.0	7.0	< 7.8	7.8	< 6.9	6.9	< 7.6	7.6	< 75	75
	g-BHC			< 1.5	1.5	< 1.6	1.6	< 1.4	1.4	< 1.4	1.4	< 1.6	1.6	< 1.4	1.4	< 1.5	1.5	< 1.5	1.5
	g-Chlordane			< 3.7	3.7	< 4.1	4.1	< 3.6	3.6	< 3.5	3.5	**11**	3.9	< 3.5	3.5	**9.3**	3.8	< 38	38
	Heptachlor	42	2,100	< 7.4	7.4	< 8.1	8.1	< 7.1	7.1	< 7.0	7.0	< 7.8	7.8	< 6.9	6.9	< 7.6	7.6	< 19	19
	Heptachlor epoxide			< 7.4	7.4	< 8.1	8.1	< 7.1	7.1	< 7.0	7.0	< 7.8	7.8	< 6.9	6.9	< 7.6	7.6	< 75	75
	Methoxychlor			< 37	37	< 41	41	< 36	36	< 35	35	< 39	39	< 35	35	< 38	38	< 380	380
	Toxaphene			< 150	150	< 160	160	< 140	140	< 140	140	< 160	160	< 140	140	< 150	150	< 150	150
PCBs	PCB-1016	100	1,000	< 74	74	< 81	81	< 71	71	< 70	70	< 78	78	< 69	69	< 76	76	< 75	75
	PCB-1221	100	1,000	< 74	74	< 81	81	< 71	71	< 70	70	< 78	78	< 69	69	< 76	76	< 75	75
	PCB-1232	100	1,000	< 74	74	< 81	81	< 71	71	< 70	70	< 78	78	< 69	69	< 76	76	< 75	75
	PCB-1242	100	1,000	< 74	74	< 81	81	< 71	71	< 70	70	< 78	78	< 69	69	< 76	76	< 75	75
	PCB-1248	100	1,000	< 74	74	< 81	81	< 71	71	< 70	70	< 78	78	< 69	69	< 76	76	< 75	75
	PCB-1254	100	1,000	< 74	74	< 81	81	**74**	71	**89**	70	< 78	78	< 69	69	< 76	76	< 75	75
	PCB-1260	100	1,000	< 74	74	< 81	81	< 71	71	< 70	70	< 78	78	< 69	69	< 76	76	< 75	75
	PCB-1262	100	1,000	< 74	74	< 81	81	< 71	71	< 70	70	< 78	78	< 69	69	< 76	76	< 75	75
	PCB-1268	100	1,000	< 74	74	< 81	81	< 71	71	< 70	70	< 78	78	< 69	69	< 76	76	< 75	75

	COMPOUND	SB5				SB6				SB7				SB8				SB9				Soil Duplicate
		(0-2') 10/18/2017 µg/Kg		(7-9') 10/18/2017 µg/Kg		(0-2') 10/19/2017 µg/Kg		(2-4') 10/19/2017 µg/Kg		(0-2') 1/29/2018 µg/Kg		(10-12') 1/29/2018 µg/Kg		(0-2') 1/29/2018 µg/Kg		(10-12') 1/29/2018 µg/Kg		(0-2') 1/29/2018 µg/Kg		(10-12') 1/29/2018 µg/Kg		(2-4') 10/20/2017 µg/Kg	
		Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL
Pesticides	4,4' -DDD	< 2.1	2.1	< 2.1	2.1	< 2.1	2.1	< 2.4	2.4	< 11	11	< 3.3	3.3	< 2.2	2.2	< 3.3	3.3	< 2.2	2.2	< 2.3	2.3	< 2.1	2.1
	4,4' -DDE	< 2.1	2.1	**9.3**	2.1	**16**	2.1	**8.3**	2.4	< 12	12	< 3.3	3.3	< 2.2	2.2	< 3.3	3.3	< 2.2	2.2	< 2.3	2.3	**12**	2.1
	4,4' -DDT	**32**	2.1	**25**	2.1	**40**	2.1	**12**	2.4	< 14	14	< 3.3	3.3	**33**	2.2	< 3.3	3.3	< 2.2	2.2	< 2.3	2.3	**42**	2.1
	a-BHC	< 7.0	7.0	< 7.2	7.2	< 7.2	7.2	< 8.0	8.0	< 18	18	< 16	16	< 7.4	7.4	< 11	11	< 7.4	7.4	< 7.8	7.8	< 7.1	7.1
	a-Chlordane	< 3.5	3.5	< 3.6	3.6	**5**	3.6	< 4.0	4.0	< 36	36	< 8.2	8.2	< 3.7	3.7	< 5.5	5.5	< 3.7	3.7	< 3.9	3.9	< 3.6	3.6
	Aldrin	< 3.5	3.5	< 3.6	3.6	< 3.6	3.6	< 4.0	4.0	< 27	27	< 4.1	4.1	< 3.7	3.7	< 2.7	2.7	< 3.7	3.7	< 3.9	3.9	< 3.6	3.6
	b-BHC	< 7.0	7.0	< 7.2	7.2	< 7.2	7.2	< 8.0	8.0	< 18	18	< 16	16	< 7.4	7.4	< 11	11	< 7.4	7.4	< 7.8	7.8	< 7.1	7.1
	Chlordane	< 35	35	< 36	36	< 36	36	< 40	40	< 200	200	< 82	82	< 37	37	< 55	55	< 37	37	< 39	39	< 36	36
	d-BHC	< 7.0	7.0	< 7.2	7.2	< 7.2	7.2	< 8.0	8.0	< 18	18	< 16	16	< 7.4	7.4	< 11	11	< 7.4	7.4	< 7.8	7.8	< 7.1	7.1
	Dieldrin	< 3.5	3.5	< 3.6	3.6	< 3.6	3.6	< 4.0	4.0	< 11	11	< 4.1	4.1	< 3.7	3.7	< 2.7	2.7	< 3.7	3.7	< 3.9	3.9	< 3.6	3.6
	Endosulfan I	< 7.0	7.0	< 7.2	7.2	< 7.2	7.2	< 8.0	8.0	< 72	72	< 16	16	< 7.4	7.4	< 11	11	< 7.4	7.4	< 7.8	7.8	< 7.1	7.1
	Endosulfan II	< 7.0	7.0	< 7.2	7.2	< 7.2	7.2	< 8.0	8.0	< 72	72	< 16	16	< 7.4	7.4	< 11	11	< 7.4	7.4	< 7.8	7.8	< 7.1	7.1
	Endosulfan sulfate	< 7.0	7.0	< 7.2	7.2	< 7.2	7.2	< 8.0	8.0	< 72	72	< 16	16	< 7.4	7.4	< 11	11	< 7.4	7.4	< 7.8	7.8	< 7.1	7.1
	Endrin	< 7.0	7.0	< 7.2	7.2	< 7.2	7.2	< 8.0	8.0	< 60	60	< 8.2	8.2	< 7.4	7.4	< 11	11	< 7.4	7.4	< 7.8	7.8	< 7.1	7.1
	Endrin aldehyde	< 7.0	7.0	< 7.2	7.2	< 7.2	7.2	< 8.0	8.0	< 72	72	< 16	16	**96**	37	< 11	11	< 7.4	7.4	< 7.8	7.8	< 7.1	7.1
	Endrin ketone	< 7.0	7.0	< 7.2	7.2	< 7.2	7.2	< 8.0	8.0	< 72	72	< 16	16	< 7.4	7.4	< 11	11	< 7.4	7.4	< 7.8	7.8	< 7.1	7.1
	g-BHC	< 1.4	1.4	< 1.4	1.4	< 1.4	1.4	< 1.6	1.6	< 14	14	< 3.3	3.3	< 1.5	1.5	< 2.2	2.2	< 1.5	1.5	< 1.6	1.6	< 1.4	1.4
	g-Chlordane	< 3.5	3.5	< 3.6	3.6	**4.7**	3.6	< 4.0	4.0	< 36	36	< 8.2	8.2	< 3.7	3.7	< 5.5	5.5	< 3.7	3.7	< 3.9	3.9	< 3.6	3.6
	Heptachlor	< 7.0	7.0	< 7.2	7.2	< 7.2	7.2	< 8.0	8.0	< 18	18	< 16	16	< 7.4	7.4	< 11	11	< 7.4	7.4	< 7.8	7.8	< 7.1	7.1
	Heptachlor epoxide	< 7.0	7.0	< 7.2	7.2	< 7.2	7.2	< 8.0	8.0	< 20	20	< 16	16	< 7.4	7.4	< 11	11	< 7.4	7.4	< 7.8	7.8	< 7.1	7.1
	Methoxychlor	< 35	35	< 36	36	< 36	36	< 40	40	< 360	360	< 82	82	< 37	37	< 55	55	< 37	37	< 39	39	< 36	36
	Toxaphene	< 140	140	< 140	140	< 140	140	< 160	160	< 600	600	< 330	330	< 150	150	< 220	220	< 150	150	< 160	160	< 140	140
PCBs	PCB-1016	< 70	70	< 72	72	< 72	72	< 80	80	< 72	72	< 82	82	< 74	74	< 55	55	< 74	74	< 78	78	< 71	71
	PCB-1221	< 70	70	< 72	72	< 72	72	< 80	80	< 72	72	< 82	82	< 74	74	< 55	55	< 74	74	< 78	78	< 71	71
	PCB-1232	< 70	70	< 72	72	< 72	72	< 80	80	< 72	72	< 82	82	< 74	74	< 55	55	< 74	74	< 78	78	< 71	71
	PCB-1242	< 70	70	< 72	72	< 72	72	< 80	80	< 72	72	< 82	82	< 74	74	< 55	55	< 74	74	< 78	78	< 71	71
	PCB-1248	< 70	70	< 72	72	< 72	72	< 80	80	< 72	72	< 82	82	< 74	74	< 55	55	< 74	74	< 78	78	< 71	71
	PCB-1254	< 70	70	< 72	72	< 72	72	< 80	80	< 72	72	< 82	82	< 74	74	< 55	55	< 74	74	< 78	78	**80**	71
	PCB-1260	< 70	70	< 72	72	< 72	72	< 80	80	< 72	72	< 82	82	< 74	74	< 55	55	< 74	74	< 78	78	< 71	71
	PCB-1262	< 70	70	< 72	72	< 72	72	< 80	80	< 72	72	< 82	82	< 74	74	< 55	55	< 74	74	< 78	78	< 71	71
	PCB-1268	< 70	70	< 72	72	< 72	72	< 80	80	< 72	72	< 82	82	< 74	74	< 55	55	< 74	74	< 78	78	< 71	71

Notes:

* - 6 NYCRR Part 375-6 Remedial Program Soil Cleanup Objectives

RL- Reporting Limit

Bold/highlighted- indicated exceedance of the NYSDEC UUSCO Guidance Value

Bold/highlighted- indicated exceedance of the NYSDEC RRSCO Guidance Value

TABLE 6
146 Bayard Street/481 Graham Avenue
Brooklyn, New York
Soil Analytical Results
Metals

COMPOUND	NYSDEC Part 375.6 Unrestricted Use Soil Cleanup Objectives*	NYDEC Part 375.6 Restricted Residential Soil Cleanup Objectives*	SB1				SB2				SB3				SB4				SB5				SB6				SB7				SB8				SB9				Soil Duplicate	
			(0-2') 10/19/2017 µg/Kg		(2-4') 10/19/2017 µg/Kg		(0-2') 10/20/2017 µg/Kg		(2-4') 10/20/2017 µg/Kg		(0-2') 10/19/2017 µg/Kg		(2-4') 10/19/2017 µg/Kg		(0-2') 10/20/2017 µg/Kg		(2-4') 10/20/2017 µg/Kg		(0-2') 10/18/2017 µg/Kg		(7-9') 10/18/2017 µg/Kg		(0-2') 10/19/2017 µg/Kg		(2-4') 10/19/2017 µg/Kg		(0-2') 1/29/2018 µg/Kg		(10-12') 1/29/2018 µg/Kg		(0-2') 1/29/2018 µg/Kg		(10-12') 1/29/2018 µg/Kg		(0-2') 1/29/2018 µg/Kg		(10-12') 1/29/2018 µg/Kg		(2-4') 10/20/2017 µg/Kg	
			Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL
Aluminum			7,430	34	6,560	40	6,230	34	6,700	35	9,190	40	5,040	33	9,660	35	6,610	37	8,220	35	7,700	39	6,910	35	8,490	39	3,810	37	22,300	80	7,040	41	17,100	55	4,350	38	4,690	40	7,680	34
Antimony			< 1.7	1.7	< 2.0	2.0	< 1.7	1.7	< 1.7	1.7	< 2.0	2.0	< 1.6	1.6	< 1.8	1.8	6.3	1.9	< 1.8	1.8	< 2.0	2.0	< 1.7	1.7	< 2.0	2.0	< 1.9	1.9	< 4.0	4.0	< 2.0	2.0	< 2.8	2.8	< 1.9	1.9	< 2.0	2.0	< 1.7	1.7
Arsenic	13	16	2.59	0.68	14.7	0.79	6.63	0.68	5.06	0.70	9.24	0.79	3.86	0.66	9.34	0.70	14.2	0.75	3.64	0.71	4.91	0.78	6.9	0.70	7.61	0.78	10.7	0.75	2.9	1.6	4.3	0.81	1.9	1.1	< 0.77	0.77	< 0.80	0.80	6.4	0.69
Barium	350	400	373	0.7	222	0.8	346	0.7	391	0.7	1,530	0.8	94.1	0.7	1,770	7.0	940	0.7	426	0.7	459	0.8	178	0.7	495	0.8	164	0.7	225	1.6	320	0.8	149	1.1	36	0.8	39.5	0.8	478	0.7
Beryllium	7.2	72	0.39	0.27	0.43	0.32	0.51	0.27	0.38	0.28	0.42	0.32	0.28	0.26	0.45	0.28	0.44	0.30	0.41	0.28	0.36	0.31	0.41	0.28	0.45	0.31	0.31	0.30	2.08	0.64	0.39	0.32	1.43	0.44	0.3	0.31	0.29	0.32	0.41	0.28
Cadmium	2.5	4.3	0.71	0.34	1.69	0.40	1.3	0.34	1.02	0.35	2.2	0.40	0.34	0.33	2.2	0.35	2.03	0.37	0.5	0.35	0.66	0.39	1.32	0.35	1.7	0.39	1.11	0.37	< 0.80	0.80	0.87	0.41	< 0.55	0.55	< 0.38	0.38	< 0.40	0.40	1.4	0.34
Calcium			9,940	34	10,400	4.0	15,100	34	21,500	35	10,400	4.0	664	3.3	19,000	35	21,900	37	8,430	35	17,600	39	14,600	35	19,300	39	25,900	37	9,170	8.0	29,400	41	6,700	5.5	1,480	3.8	1,180	4.0	27,800	34
Chromium	30	180	17.3	0.34	36.8	0.40	30.4	0.34	20.7	0.35	30.5	0.40	16.6	0.33	36.1	0.35	29	0.37	23.8	0.35	18.1	0.39	25.9	0.35	18.5	0.39	14.1	0.37	30.2	0.80	19.3	0.41	32.4	0.55	14.3	0.38	14.5	0.40	19.7	0.34
Cobalt			7.11	0.34	9.39	0.40	7.17	0.34	6.68	0.35	8.51	0.40	7.13	0.33	7.46	0.35	6.49	0.37	10.6	0.35	7.57	0.39	7	0.35	6.15	0.39	4.11	0.37	7.15	0.80	6.65	0.41	5.43	0.55	7.2	0.38	5.91	0.40	7.07	0.34
Copper	50	270	30.1	0.34	145	4.0	132	0.34	98.2	0.35	112	0.40	35.8	0.33	89.5	0.35	183	3.7	41.4	0.35	56.2	0.39	87.7	0.35	62.1	0.39	106	0.37	24.6	0.80	43.6	0.41	15.2	0.55	14.8	0.38	12	0.40	216	3.4
Iron			18,000	34	20,600	40	27,100	34	15,500	35	32,700	40	14,400	33	23,700	35	21,200	37	16,200	35	16,400	39	17,600	35	24,600	39	13,800	37	14,600	8.0	21,200	41	10,900	5.5	14,400	38	14,700	40	16,600	34
Lead	63	400	137	6.8	440	7.9	702	6.8	699	7.0	1,110	7.9	276	6.6	1,290	7.0	1,340	7.5	236	7.1	514	7.8	298	7.0	673	7.8	411	7.5	4.7	1.6	477	8.1	5.6	1.1	9.9	0.8	4	0.8	899	6.9
Magnesium			2,890	3.4	2,390	4.0	2,910	3.4	2,920	3.5	2,280	4.0	1,190	3.3	2,890	3.5	2,450	3.7	4,520	3.5	3,360	3.9	4,460	3.5	3,510	3.9	4,110	3.7	2,950	8.0	3,590	4.1	2,290	5.5	1,700	3.8	1,610	4.0	2,940	3.4
Manganese	1,600	2,000	336	3.4	337	4.0	301	3.4	308	3.5	298	4.0	143	3.3	391	3.5	272	3.7	311	3.5	275	3.9	266	3.5	322	3.9	173	3.7	330	8.0	404	4.1	190	0.55	241	3.8	212	4.0	339	3.4
Mercury	0.18	0.81	0.22	0.03	0.53	0.03	0.44	0.03	0.53	0.03	1.11	0.03	0.43	0.03	0.73	0.03	2.54	0.29	0.26	0.03	0.6	0.03	0.62	0.03	0.36	0.03	0.15	0.03	0.05	0.07	0.15	0.03	< 0.04	0.04	0.08	0.03	< 0.03	0.03	0.45	0.03
Nickel	30	310	10.9	0.34	17.6	0.40	57.2	0.34	28.5	0.35	23.6	0.40	9.19	0.33	22.8	0.35	21.5	0.37	47.9	0.35	22.1	0.39	21.1	0.35	16.8	0.39	11	0.37	16.1	0.80	18	0.41	12.3	0.55	11.6	0.38	10.7	0.40	25.7	0.34
Potassium			1,030	7	1,100	8	1,190	7	1,290	7	1,140	8	789	7	1,250	7	1,180	7	1,530	7	1,100	8	1,420	7	1,210	78	909	7	791	16	1,290	8	637	11	1,180	8	1,140	8	1,250	7
Selenium	3.9	180	< 1.4	1.4	< 1.6	1.6	< 1.4	1.4	< 1.4	1.4	< 1.6	1.6	< 1.3	1.3	< 1.4	1.4	< 1.5	1.5	< 1.4	1.4	< 1.6	1.6	< 1.4	1.4	< 1.6	1.6	< 1.5	1.5	< 3.2	3.2	< 1.6	1.6	< 2.2	2.2	< 1.5	1.5	< 1.6	1.6	< 1.4	1.4
Silver	2	180	< 0.34	0.34	< 0.40	0.40	< 0.34	0.34	< 0.35	0.35	1.06	0.40	< 0.33	0.33	0.87	0.35	0.86	0.37	< 0.35	0.35	< 0.39	0.39	< 0.35	0.35	< 0.39	0.39	< 0.37	0.37	< 0.80	0.80	< 0.41	0.41	< 0.55	0.55	< 0.38	0.38	< 0.40	0.40	< 0.34	0.34
Sodium			191	7	253	8	345	7	495	7	284	8	132	7	348	7	383	7	575	7	782	8	921	7	1,020	8	1,210	7	535	16	901	8	368	11	150	8	133	8	537	7
Thallium			< 1.4	1.4	< 1.6	1.6	< 1.4	1.4	< 1.4	1.4	< 1.6	1.6	< 1.3	1.3	< 1.4	1.4	< 1.5	1.5	< 1.4	1.4	< 1.6	1.6	< 1.4	1.4	< 1.6	1.6	< 1.5	1.5	< 3.2	3.2	< 1.6	1.6	< 2.2	2.2	< 1.5	1.5	< 1.6	1.6	< 1.4	1.4
Vanadium			24.5	0.34	32.4	0.40	34.5	0.34	29.5	0.35	31.9	0.40	21	0.33	35.8	0.35	39.3	0.37	31.1	0.35	28.6	0.39	25	0.35	32.1	0.39	20.1	0.37	25.2	0.80	26.7	0.41	22.8	0.55	22.4	0.38	21	0.40	30.9	0.34
Zinc	109	10,000	238	6.8	593	7.9	482	6.8	442	7.0	917	7.9	56.9	0.7	941	7.0	811	7.5	373	7.1	387	7.8	341	7.0	589	7.8	322	7.5	46.4	1.6	309	8.1	35.9	1.1	66.7	0.8	29.7	0.8	627	6.9

Notes:

* - 6 NYCRR Part 375-6 Remedial Program Soil Cleanup Objectives

RL- Reporting Limit

Bold/highlighted- Indicated exceedance of the NYSDEC UUSCO Guidance Value

Bold/highlighted- Indicated exceedance of the NYSDEC RRSCO Guidance Value

Table 7
146 Bayard Street/481 Graham Avenue
Brooklyn, New York
Soil Analytical Results
Emerging Contaminants

Compound	EC-B1				EC-B2				EC-B3				EC-B4				EC-B5				Duplicate	
	(0-2')		(5-7')		(0-2')		(5-7')		(0-2')		(5-7')		(0-2')		(5-7')		(0-2')		(5-7')		EC-B1 (0-2')	
	1/27/2020		1/27/2020		1/27/2020		1/27/2020		1/27/2020		1/27/2020		1/27/2020		1/27/2020		1/27/2020		1/27/2020		1/27/2020	
	µg/Kg		µg/Kg		µg/Kg		µg/Kg		µg/Kg		µg/Kg		µg/Kg		µg/Kg		µg/Kg		µg/Kg		µg/Kg	
	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL
Perfluorobutanoic Acid (PFBA)	ND	1.04	ND	1.3	ND	1.08	ND	1.19	ND	0.999	ND	1.05	0.029J	1.12	ND	1.08	ND	1.1	ND	1.11	ND	1.11
Perfluoropentanoic Acid (PFPeA)	ND	1.04	ND	1.3	ND	1.08	0.097J	1.19	ND	0.999	ND	1.05	ND	1.12	ND	1.08	ND	1.1	ND	1.11	ND	1.11
Perfluorobutanesulfonic Acid (PFBS)	ND	1.04	ND	1.3	ND	1.08	ND	1.19	ND	0.999	ND	1.05	ND	1.12	ND	1.08	ND	1.1	ND	1.11	ND	1.11
Perfluorohexanoic Acid (PFHxA)	ND	1.04	0.087J	1.3	ND	1.08	0.141J	1.19	0.059J	0.999	ND	1.05	0.072J	1.12	ND	1.08	ND	1.1	ND	1.11	0.067J	1.11
Perfluoroheptanoic Acid (PFHpA)	ND	1.04	ND	1.3	ND	1.08	ND	1.19	ND	0.999	ND	1.05	ND	1.12	ND	1.08	ND	1.1	ND	1.11	ND	1.11
Perfluorohexanesulfonic Acid (PFHxS)	ND	1.04	ND	1.3	ND	1.08	ND	1.19	ND	0.999	ND	1.05	ND	1.12	ND	1.08	ND	1.1	ND	1.11	ND	1.11
Perfluorooctanoic Acid (PFOA)	0.054J	1.04	0.294J	1.3	ND	1.08	0.479J	1.19	0.133J	0.999	0.231J	1.05	0.062J	1.12	0.055J	1.08	0.071J	1.1	0.067J	1.11	0.077J	1.11
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND	1.04	ND	1.3	ND	1.08	ND	1.19	ND	0.999	ND	1.05	ND	1.12	ND	1.08	ND	1.1	ND	1.11	ND	1.11
Perfluoroheptanesulfonic Acid (PFHpS)	ND	1.04	ND	1.3	ND	1.08	ND	1.19	ND	0.999	ND	1.05	ND	1.12	ND	1.08	ND	1.1	ND	1.11	ND	1.11
Perfluorononanoic Acid (PFNA)	ND	1.04	0.116J	1.3	ND	1.08	ND	1.19	ND	0.999	ND	1.05	ND	1.12	ND	1.08	ND	1.1	ND	1.11	ND	1.11
Perfluorooctanesulfonic Acid (PFOS)	0.192J	1.04	0.400J	1.3	ND	1.08	0.308J	1.19	0.431J	0.999	ND	1.05	ND	1.12	ND	1.08	ND	1.1	ND	1.11	0.230J	1.11
Perfluorodecanoic Acid (PFDA)	ND	1.04	ND	1.3	ND	1.08	ND	1.19	ND	0.999	ND	1.05	ND	1.12	ND	1.08	ND	1.1	ND	1.11	ND	1.11
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND	1.04	ND	1.3	ND	1.08	ND	1.19	ND	0.999	ND	1.05	ND	1.12	ND	1.08	ND	1.1	ND	1.11	ND	1.11
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND	1.04	ND	1.3	ND	1.08	ND	1.19	ND	0.999	ND	1.05	ND	1.12	ND	1.08	ND	1.1	ND	1.11	ND	1.11
Perfluoroundecanoic Acid (PFUnA)	ND	1.04	0.062J	1.3	ND	1.08	ND	1.19	ND	0.999	ND	1.05	ND	1.12	ND	1.08	ND	1.1	ND	1.11	ND	1.11
Perfluorodecanesulfonic Acid (PFDS)	ND	1.04	ND	1.3	ND	1.08	ND	1.19	ND	0.999	ND	1.05	ND	1.12	ND	1.08	ND	1.1	ND	1.11	ND	1.11
Perfluorooctanesulfonamide (FOSA)	ND	1.04	ND	1.3	ND	1.08	ND	1.19	ND	0.999	ND	1.05	ND	1.12	ND	1.08	ND	1.1	ND	1.11	ND	1.11
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND	1.04	ND	1.3	ND	1.08	ND	1.19	ND	0.999	ND	1.05	ND	1.12	ND	1.08	ND	1.1	ND	1.11	ND	1.11
Perfluorododecanoic Acid (PFDoA)	ND	1.04	ND	1.3	ND	1.08	ND	1.19	ND	0.999	ND	1.05	ND	1.12	ND	1.08	ND	1.1	ND	1.11	ND	1.11
Perfluorotridecanoic Acid (PFTrDA)	ND	1.04	ND	1.3	ND	1.08	ND	1.19	ND	0.999	ND	1.05	ND	1.12	ND	1.08	ND	1.1	ND	1.11	ND	1.11
Perfluorotetradecanoic Acid (PFTA)	ND	1.04	ND	1.3	ND	1.08	ND	1.19	ND	0.999	ND	1.05	ND	1.12	ND	1.08	ND	1.1	ND	1.11	ND	1.11
Combined PFOA and PFOS	**0.246**		**0.694**		**ND**		**0.787**		**0.564**		**0.231**		**0.062**		**0.055**		**0.071**		**0.067**		**0.307**	
Combined Total Detections	**0.246**		**0.959**		**ND**		**1.025**		**0.623**		**0.231**		**0.163**		**0.055**		**0.071**		**0.067**		**0.374**	

Notes:

DL- Detection Limit

J- The value is estimated.

ND- Not Detected

The USEPA Health Advisory Level for drinking water is 70 ng/L (ppt) for combined detections of PFOA and PFOs

COMPOUND	NYSDEC Part 375.6 Unrestricted Use Soil	NYDEC Part 375.6 Restricted Residential	EC-B1				EC-B2				EC-B3				EC-B4				EC-B5				DUPLICATE	
			(0-2')		(5-7')		(0-2')		(5-7')		(0-2')		(5-7')		(0-2')		(5-7')		(0-2')		(5-7')		EC-B1 (0-2')	
			1/27/2020		1/27/2020		1/27/2020		1/27/2020		1/27/2020		1/27/2020		1/27/2020		1/27/2020		1/27/2020		1/27/2020		1/27/2020	
	µg/Kg	µg/Kg	µg/Kg		µg/Kg		µg/Kg		µg/Kg		µg/Kg		µg/Kg		µg/Kg		µg/Kg		µg/Kg		µg/Kg		µg/Kg	
			Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL
1,4-Dioxane	100	13,000	< 76	76	< 86	86	< 71	71	< 86	86	< 74	74	< 76	76	< 75	75	< 76	76	< 75	75	< 80	80	< 76	76

Notes:

* - 6 NYCRR Part 375-6 Remedial Program Soil Cleanup Objectives

RL - Reporting Limit

Bold/highlighted- Indicated exceedance of the NYSDEC UUSCO Guidance Value

Bold/highlighted- Indicated exceedance of the NYSDEC RRSCO Guidance Value

TABLE 8
146 Bayard Street/481 Graham Avenue
Brooklyn, New York
Ground Water Analytical Results
Volatile Organic Compounds

Compound	NYSDEC Groundwater Quality Standards	GW1 10/23/2017 µg/L		GW2 10/23/2017 µg/L		GW3 10/23/2017 µg/L		GW4 3/9/2018 µg/L		Duplicate (GW1) 10/23/2017 µg/L	
	µg/L	Results	RL	Results	RL	Results	RL	Results	RL	Results	RL
1,1,1,2-Tetrachlorothane	5	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0
1,1,1-Trichloroethane	5	< 5.0	5.0	< 5.0	5.0	< 5.0	5.0	< 5.0	5.0	< 5.0	5.0
1,1,2,2-Tetrachloroethane	5	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0
1,1,2-Trichloroethane	1	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0
1,1-Dichloroethane	5	< 5.0	5.0	< 5.0	5.0	< 5.0	5.0	< 5.0	5.0	< 5.0	5.0
1,1-Dichloroethene	5	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0
1,1-Dichloropropene		< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0
1,2,3-Trichlorobenzene		< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0
1,2,3-Trichloropropane	0.04	< 0.25	0.25	< 0.25	0.25	< 0.25	0.25	< 0.25	0.25	< 0.25	0.25
1,2,4-Trichlorobenzene		< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0
1,2,4-Trimethylbenzene	5	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0
1,2-Dibromo-3-chloropropane	0.04	< 0.50	0.50	< 0.50	0.50	< 0.50	0.50	< 0.50	0.50	< 0.50	0.50
1,2-Dibromoethane		< 0.25	0.25	< 0.25	0.25	< 0.25	0.25	< 0.25	0.25	< 0.25	0.25
1,2-Dichlorobenzene	5	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0
1,2-Dichloroethane	0.6	< 0.60	0.60	< 0.60	0.60	< 0.60	0.60	< 0.60	0.60	< 0.60	0.60
1,2-Dichloropropane	0.94	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0
1,3,5-Trimethylbenzene	5	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0
1,3-Dichlorobenzene		< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0
1,3-Dichloropropane	5	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0
1,4-Dichlorobenzene	5	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0
2,2-Dichloropropane	5	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0
2-Chlorotoluene	5	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0
2-Hexanone (Methyl Butyl Ketone)		< 2.5	2.5	< 2.5	2.5	< 2.5	2.5	< 2.5	2.5	< 2.5	2.5
2-Isopropyltoluene	5	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0
4-Chlorotoluene	5	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0
4-Methyl-2-Pentanone		< 2.5	2.5	< 2.5	2.5	< 2.5	2.5	< 2.5	2.5	< 2.5	2.5
Acetone	50	**5.4**	5.0	**6.5**	5.0	**3.8**	5.0	**2.9**	5.0	**5.9**	5.0
Acrolein		< 5.0	5.0	< 5.0	5.0	< 5.0	5.0	< 5.0	5.0	< 5.0	5.0
Acrylonitrile	5	< 5.0	5.0	< 5.0	5.0	< 5.0	5.0	< 5.0	5.0	< 5.0	5.0
Benzene	1	< 0.70	0.70	< 0.70	0.70	< 0.70	0.70	< 0.70	0.70	< 0.70	0.70
Bromobenzene	5	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0
Bromochloromethane	5	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0
Bromodichloromethane		< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0
Bromoform		< 5.0	5.0	< 5.0	5.0	< 5.0	5.0	< 5.0	5.0	< 5.0	5.0
Bromomethane	5	< 5.0	5.0	**0.4**	5.0	< 5.0	5.0	< 5.0	5.0	< 5.0	5.0
Carbon Disulfide	60	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0
Carbon tetrachloride	5	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0
Chlorobenzene	5	< 5.0	5.0	< 5.0	5.0	< 5.0	5.0	< 5.0	5.0	< 5.0	5.0
Chloroethane	5	< 5.0	5.0	< 5.0	5.0	< 5.0	5.0	< 5.0	5.0	< 5.0	5.0
Chloroform	7	< 5.0	5.0	< 5.0	5.0	< 5.0	5.0	< 5.0	5.0	< 5.0	5.0
Chloromethane	60	< 5.0	5.0	**1.1**	5.0	< 5.0	5.0	< 5.0	5.0	< 5.0	5.0
cis-1,2-Dichloroethene	5	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0
cis-1,3-Dichloropropene		< 0.40	0.40	< 0.40	0.40	< 0.40	0.40	< 0.40	0.40	< 0.40	0.40
Dibromochloromethane		< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0
Dibromomethane	5	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0
Dichlorodifluoromethane	5	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0
Ethylbenzene	5	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0
Hexachlorobutadiene	0.5	< 0.50	0.50	< 0.50	0.50	< 0.50	0.50	< 0.50	0.50	< 0.50	0.50
Isopropylbenzene	5	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0
m&p-Xylenes	5	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0
Methyl Ethyl Ketone (2-Butanone)	50	< 2.5	2.5	< 2.5	2.5	< 2.5	2.5	< 2.5	2.5	< 2.5	2.5
Methyl t-butyl ether (MTBE)	10	**1.7**	1.0	**230**	50	**26**	1.0	**34**	2.0	**2.2**	1.0
Methylene chloride	5	< 3.0	3.0	< 3.0	3.0	< 3.0	3.0	< 3.0	3.0	< 3.0	3.0
Naphthalene	10	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	**1.4**	1.0	< 1.0	1.0
n-Butylbenzene	5	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0
n-Propylbenzene	5	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0
o-Xylene	5	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0
p-Isopropyltoluene		< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0
sec-Butylbenzene	5	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0
Styrene	5	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0
tert-Butylbenzene	5	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0
Tetrachloroethene	5	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0
Tetrahydrofuran (THF)		< 5.0	5.0	< 5.0	5.0	< 5.0	5.0	< 5.0	5.0	< 5.0	5.0
Toluene	5	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0
trans-1,2-Dichloroethene	5	< 5.0	5.0	< 5.0	5.0	< 5.0	5.0	< 5.0	5.0	< 5.0	5.0
trans-1,3-Dichloropropene	0.4	< 0.40	0.40	< 0.40	0.40	< 0.40	0.40	< 0.40	0.40	< 0.40	0.40
trans-1,4-dichloro-2-butene	5	< 2.5	2.5	< 2.5	2.5	< 2.5	2.5	< 2.5	2.5	< 2.5	2.5
Trichloroethene	5	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0
Trichlorofluoromethane	5	< 1.0	1.0	< 1.0	1.0	**0.35**	1.0	< 1.0	1.0	< 1.0	1.0
Trichlorotrifluoroethane		< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0
Vinyl Chloride	2	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0

Notes:
RL- Reporting Limit
Bold/highlighted- indicated exceedance of the NYSDEC Groundwater Standard

TABLE 9
146 Bayard Street/481 Graham Avenue
Brooklyn, New York
Groundwater Analytical Results
Semi-Volatile Organic Compounds

Compound	NYSDEC Groundwater Quality Standards	GW1 10/23/2017 µg/L		GW2 10/23/2017 µg/L		GW3 10/23/2017 µg/L		GW4 3/9/2018 µg/L		Duplicate (GW1) 10/23/2017 µg/L	
		Results	RL	Results	RL	Results	RL	Results	RL	Results	RL
1,2,4-Trichlorobenzene		< 5.0	5.0	< 5.0	5.0	< 5.1	5.1	< 4.7	4.7	< 4.9	4.9
1,2-Dichlorobenzene		< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 0.94	0.94	< 0.98	0.98
1,2-Diphenylhydrazine		< 5.0	5.0	< 5.0	5.0	< 5.1	5.1	< 4.7	4.7	< 4.9	4.9
1,3-Dichlorobenzene	3	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 0.94	0.94	< 0.98	0.98
1,4-Dichlorobenzene		< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 0.94	0.94	< 0.98	0.98
2,4,5-Trichlorophenol	1	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 0.94	0.94	< 0.98	0.98
2,4,6-Trichlorophenol	1	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 0.94	0.94	< 0.98	0.98
2,4-Dichlorophenol	5	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 0.94	0.94	< 0.98	0.98
2,4-Dimethylphenol	1	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 0.94	0.94	< 0.98	0.98
2,4-Dinitrophenol	5	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 0.94	0.94	< 0.98	0.98
2,4-Dinitrotoluene	5	< 5.0	5.0	< 5.0	5.0	< 5.0	5.0	< 4.7	4.7	< 4.9	4.9
2,6-Dinitrotoluene	5	< 5.0	5.0	< 5.0	5.0	< 5.0	5.0	< 4.7	4.7	< 4.9	4.9
2-Chloronaphthalene	10	< 5.0	5.0	< 5.0	5.0	< 5.1	5.1	< 4.7	4.7	< 4.9	4.9
2-Chlorophenol	1	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 0.94	0.94	< 0.98	0.98
2-Methylnaphthalene		< 5.0	5.0	< 5.0	5.0	< 5.1	5.1	< 4.7	4.7	< 4.9	4.9
2-Methylphenol (o-cresol)	1	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 0.94	0.94	< 0.98	0.98
2-Nitroaniline	5	< 5.0	5.0	< 5.0	5.0	< 5.0	5.0	< 4.7	4.7	< 4.9	4.9
2-Nitrophenol	1	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 0.94	0.94	< 0.98	0.98
3&4-Methylphenol (m&p-cresol)		< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 0.94	0.94	< 0.98	0.98
3,3'-Dichlorobenzidine	5	< 5.0	5.0	< 5.0	5.0	< 5.0	5.0	< 4.7	4.7	< 4.9	4.9
3-Nitroaniline	5	< 5.0	5.0	< 5.0	5.0	< 5.0	5.0	< 4.7	4.7	< 4.9	4.9
4,6-Dinitro-2-methylphenol	1	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 0.94	0.94	< 0.98	0.98
4-Bromophenyl phenyl ether		< 5.0	5.0	< 5.0	5.0	< 5.1	5.1	< 4.7	4.7	< 4.9	4.9
4-Chloro-3-methylphenol	1	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 0.94	0.94	< 0.98	0.98
4-Chloroaniline	5	< 3.5	3.5	< 3.5	3.5	< 3.6	3.6	< 3.3	3.3	< 3.4	3.4
4-Chlorophenyl phenyl ether		< 5.0	5.0	< 5.0	5.0	< 5.1	5.1	< 4.7	4.7	< 4.9	4.9
4-Nitroaniline	5	< 5.0	5.0	< 5.0	5.0	< 5.0	5.0	< 4.7	4.7	< 4.9	4.9
4-Nitrophenol	1	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 0.94	0.94	< 0.98	0.98
Acenaphthene	20	< 5.0	5.0	< 5.0	5.0	< 5.1	5.1	< 4.7	4.7	< 4.9	4.9
Acetophenone		< 5.0	5.0	< 5.0	5.0	< 5.1	5.1	< 4.7	4.7	< 4.9	4.9
Aniline	5	< 3.5	3.5	< 3.5	3.5	< 3.6	3.6	< 3.3	3.3	< 3.4	3.4
Anthracene	50	< 5.0	5.0	< 5.0	5.0	< 5.1	5.1	< 4.7	4.7	< 4.9	4.9
Benzidine	5	< 4.5	4.5	< 4.5	4.5	< 4.6	4.6	< 4.2	4.2	< 4.4	4.4
Benzoic acid		< 25	25	< 25	25	< 25	25	< 23	23	< 25	25
Benzyl butyl phthalate	50	< 5.0	5.0	< 5.0	5.0	< 5.1	5.1	< 4.7	4.7	< 4.9	4.9
Bis(2-chloroethoxy)methane	5	< 5.0	5.0	< 5.0	5.0	< 5.0	5.0	< 4.7	4.7	< 4.9	4.9
Bis(2-chloroethyl)ether	1	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 0.94	0.94	< 0.98	0.98
Bis(2-chloroisopropyl)ether		< 5.0	5.0	< 5.0	5.0	< 5.1	5.1	< 4.7	4.7	< 4.9	4.9
Carbazole		< 5.0	5.0	< 5.0	5.0	< 5.1	5.1	< 4.7	4.7	< 4.9	4.9
Dibenzofuran		< 5.0	5.0	< 5.0	5.0	< 5.0	5.0	< 4.7	4.7	< 4.9	4.9
Diethyl phthalate	50	< 5.0	5.0	< 5.0	5.0	< 5.1	5.1	< 4.7	4.7	< 4.9	4.9
Dimethylphthalate	50	< 5.0	5.0	< 5.0	5.0	< 5.1	5.1	< 4.7	4.7	< 4.9	4.9
Di-n-butylphthalate	50	< 5.0	5.0	< 5.0	5.0	< 5.1	5.1	< 4.7	4.7	< 4.9	4.9
Di-n-octylphthalate	50	< 5.0	5.0	< 5.0	5.0	< 5.1	5.1	< 4.7	4.7	< 4.9	4.9
Fluoranthene	50	< 5.0	5.0	< 5.0	5.0	< 5.1	5.1	< 4.7	4.7	< 4.9	4.9
Fluorene	50	< 5.0	5.0	< 5.0	5.0	< 5.1	5.1	< 4.7	4.7	< 4.9	4.9
Hexachlorocyclopentadiene	5	< 5.0	5.0	< 5.0	5.0	< 5.0	5.0	< 4.7	4.7	< 4.9	4.9
Isophorone	50	< 5.0	5.0	< 5.0	5.0	< 5.1	5.1	< 4.7	4.7	< 4.9	4.9
Naphthalene	10	< 5.0	5.0	< 5.0	5.0	< 5.0	5.0	**1.8**	4.7	< 4.9	4.9
N-Nitrosodi-n-propylamine		< 5.0	5.0	< 5.0	5.0	< 5.1	5.1	< 4.7	4.7	< 4.9	4.9
N-Nitrosodiphenylamine	50	< 5.0	5.0	< 5.0	5.0	< 5.1	5.1	< 4.7	4.7	< 4.9	4.9
Phenol	1	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 0.94	0.94	< 0.98	0.98
Pyrene	50	< 5.0	5.0	< 5.0	5.0	< 5.1	5.1	< 4.7	4.7	< 4.9	4.9
Pyridine	50	< 10	10	< 10	10	< 10	10	< 9.4	9.4	< 9.8	9.8
1,2,4,5-Tetrachlorobenzene		< 0.50	0.50	< 0.50	0.50	< 0.51	0.51	< 0.47	0.47	< 0.49	0.49
Acenaphthylene		< 0.10	0.10	< 0.10	0.10	< 0.10	0.10	< 0.09	0.09	< 0.10	0.10
Benz(a)anthracene	0.002	**0.25**	0.02	**0.04**	0.02	**0.34**	0.02	**0.15**	0.02	**0.17**	0.02
Benzo(a)pyrene		**0.19**	0.02	< 0.02	0.02	**0.27**	0.02	**0.09**	0.02	**0.14**	0.02
Benzo(b)fluoranthene	0.002	**0.18**	0.02	< 0.02	0.02	**0.24**	0.02	**0.09**	0.02	**0.13**	0.02
Benzo(ghi)perylene		**0.12**	0.02	< 0.02	0.02	**0.16**	0.02	**0.06**	0.02	**0.08**	0.02
Benzo(k)fluoranthene	0.002	**0.18**	0.02	< 0.02	0.02	**0.24**	0.02	**0.09**	0.02	**0.12**	0.02
Bis(2-ethylhexyl)phthalate	5	< 1.0	1.0	< 1.0	1.0	< 1.0	1.0	< 0.94	0.94	< 0.98	0.98
Chrysene	0.002	**0.22**	0.02	**0.02**	0.02	**0.3**	0.02	**0.15**	0.02	**0.15**	0.02
Dibenz(a,h)anthracene		**0.04**	0.02	< 0.02	0.02	**0.06**	0.02	< 0.02	0.02	**0.03**	0.02
Hexachlorobenzene	0.04	< 0.02	0.02	< 0.02	0.02	< 0.02	0.02	< 0.04	0.04	< 0.02	0.02
Hexachlorobutadiene		< 0.40	0.40	< 0.40	0.40	< 0.41	0.41	< 0.38	0.38	< 0.39	0.39
Hexachloroethane	5	< 0.50	0.50	< 0.50	0.50	< 0.51	0.51	< 0.47	0.47	< 0.49	0.49
Indeno(1,2,3-cd)pyrene	0.002	**0.11**	0.02	< 0.02	0.02	**0.16**	0.02	**0.05**	0.02	**0.08**	0.02
Nitrobenzene		< 0.10	0.10	< 0.10	0.10	< 0.10	0.10	< 0.2	0.2	< 0.10	0.10
N-Nitrosodimethylamine		< 0.10	0.10	< 0.10	0.10	< 0.10	0.10	< 0.5	0.5	< 0.10	0.10
Pentachloronitrobenzene		< 0.10	0.10	< 0.10	0.10	< 0.10	0.10	< 0.09	0.09	< 0.10	0.10
Pentachlorophenol	1	< 0.10	0.10	< 0.10	0.10	< 0.10	0.10	< 0.09	0.09	< 0.10	0.10
Phenanthrene	50	**0.44**	0.10	**0.18**	0.10	**0.88**	0.10	**2.5**	0.09	**0.41**	0.10

Notes:

RL- Reporting Limit

Bold/highlighted- Indicated exceedance of the NYSDEC Groundwater Standard

TABLE 10
146 Bayard Street/481 Graham Avenue
Brooklyn, New York
Groundwater Analytical Results
Pesticides/PCBs

	Compound	NYSDEC Groundwater Quality Standards µg/L	GW1 10/23/2017 µg/L		GW2 10/23/2017 µg/L		GW3 10/23/2017 µg/L		GW4 3/9/2018 µg/L		Duplicate (GW1) 10/23/2017 µg/L	
			Results	RL	Results	RL	Results	RL	Results	RL	Results	RL
PCBs	PCB-1016	0.09	< 0.050	0.050	< 0.069	0.069	< 0.050	0.050	< 0.090	0.090	< 0.051	0.051
	PCB-1221	0.09	< 0.050	0.050	< 0.069	0.069	< 0.050	0.050	< 0.090	0.090	< 0.051	0.051
	PCB-1232	0.09	< 0.050	0.050	< 0.069	0.069	< 0.050	0.050	< 0.090	0.090	< 0.051	0.051
	PCB-1242	0.09	< 0.050	0.050	< 0.069	0.069	< 0.050	0.050	< 0.090	0.090	< 0.051	0.051
	PCB-1248	0.09	< 0.050	0.050	< 0.069	0.069	< 0.050	0.050	< 0.090	0.090	< 0.051	0.051
	PCB-1254	0.09	< 0.050	0.050	< 0.069	0.069	< 0.050	0.050	< 0.090	0.090	< 0.051	0.051
	PCB-1260	0.09	< 0.050	0.050	< 0.069	0.069	< 0.050	0.050	< 0.090	0.090	< 0.051	0.051
	PCB-1262	0.09	< 0.050	0.050	< 0.069	0.069	< 0.050	0.050	< 0.090	0.090	< 0.051	0.051
	PCB-1268	0.09	< 0.050	0.050	< 0.069	0.069	< 0.050	0.050	< 0.090	0.090	< 0.051	0.051
Pesticides	4,4-DDD	0.3	< 0.005	0.005	< 0.007	0.007	< 0.005	0.005	< 0.005	0.005	< 0.005	0.005
	4,4-DDE	0.2	< 0.005	0.005	< 0.007	0.007	< 0.005	0.005	< 0.005	0.005	< 0.005	0.005
	4,4-DDT	0.11	< 0.005	0.005	< 0.007	0.007	< 0.005	0.005	< 0.005	0.005	< 0.010	0.010
	a-BHC	0.94	< 0.005	0.005	< 0.007	0.007	< 0.005	0.005	< 0.005	0.005	< 0.005	0.005
	a-Chlordane		< 0.010	0.010	< 0.014	0.014	< 0.010	0.010	< 0.009	0.009	< 0.010	0.010
	Alachlor		< 0.075	0.075	< 0.10	0.10	< 0.075	0.075	< 0.070	0.070	< 0.076	0.076
	Aldrin		< 0.002	0.002	< 0.002	0.002	< 0.002	0.002	< 0.001	0.001	< 0.002	0.002
	b-BHC	0.04	< 0.005	0.005	< 0.007	0.007	< 0.005	0.005	< 0.005	0.005	< 0.005	0.005
	Chlordane	0.05	< 0.050	0.050	< 0.050	0.050	< 0.050	0.050	< 0.047	0.047	< 0.050	0.050
	d-BHC	0.04	< 0.005	0.005	< 0.007	0.007	< 0.005	0.005	< 0.005	0.005	< 0.005	0.005
	Dieldrin	0.004	< 0.002	0.002	< 0.002	0.002	< 0.002	0.002	< 0.004	0.004	< 0.003	0.003
	Endosulfan I		< 0.010	0.010	< 0.014	0.014	< 0.010	0.010	< 0.009	0.009	< 0.010	0.010
	Endosulfan II		< 0.010	0.010	< 0.014	0.014	< 0.010	0.010	< 0.009	0.009	< 0.010	0.010
	Endosulfan Sulfate		< 0.010	0.010	< 0.014	0.014	< 0.010	0.010	< 0.009	0.009	< 0.010	0.010
	Endrin		< 0.010	0.010	< 0.003	0.003	< 0.010	0.010	< 0.009	0.009	< 0.003	0.003
	Endrin aldehyde	5	< 0.010	0.010	< 0.014	0.014	< 0.010	0.010	< 0.009	0.009	< 0.010	0.010
	Endrin ketone		< 0.010	0.010	< 0.014	0.014	< 0.010	0.010	< 0.009	0.009	< 0.010	0.010
	gamma-BHC	0.05	< 0.005	0.005	< 0.007	0.007	< 0.005	0.005	< 0.005	0.005	< 0.005	0.005
	g-Chlordane		< 0.010	0.010	< 0.014	0.014	< 0.010	0.010	< 0.009	0.009	< 0.050	0.050
	Heptachlor	0.04	< 0.010	0.010	< 0.003	0.003	< 0.010	0.010	< 0.009	0.009	< 0.003	0.003
	Heptachlor epoxide	0.03	< 0.010	0.010	< 0.003	0.003	< 0.010	0.010	< 0.009	0.009	< 0.003	0.003
	Methoxychlor	35	< 0.10	0.10	< 0.14	0.14	< 0.10	0.10	< 0.094	0.094	< 0.10	0.10
	Toxaphene		< 0.20	0.20	< 0.27	0.27	< 0.20	0.20	< 0.19	0.19	< 0.20	0.20

Notes:
RL- Reporting limit
ND - Non-detect
ND* - Due to matrix interference from non target compounds in the sample an elevated RL was reported.
Bold/highlighted- Indicated exceedance of the NYSDEC Groundwater Standard

TABLE 11
146 Bayard Street/481 Graham Avenue
Brooklyn, New York
Groundwater Analytical Results
Total Metals

Compound	NYSDEC Groundwater Quality Standards mg/L	GW1 10/23/2017 mg/L		GW2 10/23/2017 mg/L		GW3 10/23/2017 mg/L		GW4 3/9/2018 mg/L		Duplicate (GW1) 10/23/2017 mg/L	
		Results	RL	Results	RL	Results	RL	Results	RL	Results	RL
Aluminum	0.1	**53.9**	0.10	**19.4**	0.010	**2.55**	0.010	**4.14**	0.010	**17.4**	0.010
Antimony	0.003	**0.002**	0.002	< 0.002	0.002	< 0.002	0.002	< 0.001	0.004	< 0.002	0.002
Arsenic	0.025	**0.064**	0.004	**0.002**	0.004	< 0.004	0.004	**0.004**	0.010	**0.018**	0.004
Barium	1	**1.69**	0.010	**0.491**	0.010	**0.107**	0.010	**0.167**	0.001	**0.634**	0.010
Beryllium	0.003	**0.005**	0.001	**0.001**	0.001	< 0.001	0.001	< 0.001	0.004	**0.001**	0.001
Cadmium	0.005	**0.007**	0.004	**0.001**	0.004	< 0.004	0.004	< 0.004	1.0	**0.002**	0.004
Calcium	NS	**326**	0.10	**177**	1.0	**104**	0.010	**220**	0.001	**141**	0.010
Chromium	0.05	**0.124**	0.001	**0.036**	0.001	**0.004**	0.001	**0.007**	0.005	**0.046**	0.001
Cobalt	NS	**0.041**	0.005	**0.014**	0.005	**0.003**	0.005	**0.016**	0.005	**0.011**	0.005
Copper	0.2	**0.344**	0.005	**0.065**	0.005	**0.011**	0.005	**0.009**	0.01	**0.097**	0.005
Iron	0.5	**72.8**	0.01	**25.9**	0.01	**3.54**	0.01	**5.12**	0.002	**28**	0.01
Lead	0.025	**4.02**	0.020	**0.046**	0.002	**0.036**	0.002	**0.003**	0.010	**0.925**	0.002
Magnesium	35	**26.4**	0.010	**62.1**	0.010	**13.6**	0.010	**68.4**	0.50	**12.8**	0.010
Manganese	0.3	**3.09**	0.050	**3.98**	0.50	**1.35**	0.005	**6.42**	0.0002	**1.04**	0.005
Mercury	0.0007	**0.0016**	0.0002	< 0.0002	0.0002	< 0.0002	0.0002	< 0.0002	0.004	**0.0003**	0.0002
Nickel	0.1	**0.063**	0.004	**0.029**	0.004	**0.005**	0.004	**0.010**	0.1	**0.022**	0.004
Potassium	NS	**19.6**	0.1	**20.3**	0.1	**15.5**	0.1	**13.5**	0.0010	**13.5**	0.1
Selenium	0.01	< 0.002	0.002	< 0.002	0.002	< 0.002	0.002	< 0.002	0.002	< 0.002	0.002
Silver	0.05	< 0.005	0.005	< 0.005	0.005	< 0.005	0.005	< 0.005	0.005	< 0.005	0.005
Sodium	2	**31.6**	1.0	**286**	10	**136**	1.0	**276**	10	**27.5**	0.10
Thallium	0.0005	< 0.0005	0.0005	< 0.0005	0.0005	< 0.0005	0.0005	< 0.0005	0.0005	< 0.0005	0.0005
Vanadium	NS	**0.176**	0.010	**0.046**	0.010	**0.007**	0.010	**0.007**	0.010	**0.046**	0.010
Zinc	2	**2.22**	0.10	**0.166**	0.010	**0.031**	0.010	**0.013**	0.010	**0.499**	0.010

Notes:
RL- Reporting limit
NS - No Standard
Bold/highlighted- Indicated exceedance of the NYSDEC Groundwater Standard

TABLE 12
146 Bayard Street/481 Graham Avenue
Brooklyn, New York
Groundwater Analytical Results
Dissolved Metals

Compound	NYSDEC Groundwater Quality Standards mg/L	GW1 10/23/2017 mg/L		GW2 10/23/2017 mg/L		GW3 10/23/2017 mg/L		GW4 3/9/2018 mg/L		Duplicate (GW1) 10/23/2017 mg/L	
		Results	RL	Results	RL	Results	RL	Results	RL	Results	RL
Aluminum	0.1	< 0.011	0.011	< 0.011	0.011	**0.16**	0.011	< 0.011	0.011	**0.142**	0.011
Antimony	0.003	< 0.003	0.003	< 0.003	0.003	<0.0010	0.003	<0.0010	0.0010	< 0.003	0.003
Arsenic	0.025	**0.029**	0.003	**0.002**	0.003	**0.007**	0.003	**0.002**	0.003	0.002	0.003
Barium	1	**0.077**	0.011	**0.311**	0.011	**0.073**	0.011	**0.135**	0.011	**0.12**	0.011
Beryllium	0.003	< 0.001	0.001	< 0.001	0.001	< 0.001	0.001	**0.001**	0.001	< 0.001	0.001
Cadmium	0.005	< 0.004	0.004	< 0.004	0.004	< 0.004	0.004	< 0.004	0.0005	< 0.004	0.004
Calcium	NS	**154**	0.01	**167**	0.11	**97.6**	0.01	**194**	1.1	**88.3**	0.01
Chromium	0.05	< 0.001	0.001	< 0.001	0.001	< 0.001	0.001	**0.001**	0.001	< 0.001	0.001
Cobalt	NS	< 0.005	0.005	**0.002**	0.005	**0.002**	0.005	**0.014**	0.005	< 0.005	0.005
Copper	0.2	**0.002**	0.005	**0.002**	0.005	**0.004**	0.005	**0.004**	0.005	**0.002**	0.005
Iron	0.5	**0.02**	0.01	< 0.01	0.01	**0.02**	0.01	<0.01	0.01	**0.01**	0.01
Lead	0.025	< 0.002	0.002	**0.001**	0.002	< 0.002	0.002	**0.002**	0.002	< 0.002	0.002
Magnesium	35	**3.54**	0.01	**54.9**	0.01	**13.1**	0.01	**65.2**	0.01	**5.29**	0.01
Manganese	0.3	**0.019**	0.005	**3.24**	0.053	**1.23**	0.005	**5.36**	0.53	**0.407**	0.005
Mercury	0.0007	< 0.0002	0.0002	< 0.0002	0.0002	< 0.0002	0.0002	<0.0002	0.0002	< 0.0002	0.0002
Nickel	0.1	< 0.004	0.004	**0.002**	0.004	**0.003**	0.004	**0.006**	0.004	< 0.004	0.004
Potassium	NS	**14.7**	0.1	**14.8**	0.1	**13.7**	0.1	**11**	0.1	**9**	0.1
Selenium	0.01	< 0.004	0.004	< 0.004	0.004	< 0.004	0.004	<0.002	0.002	< 0.004	0.004
Silver	0.05	< 0.005	0.005	< 0.005	0.005	< 0.005	0.005	<0.005	0.005	< 0.005	0.005
Sodium	2	**43.2**	0.11	**265**	1.1	**142**	11	**246**	11	**19.5**	0.11
Thallium	0.0005	< 0.0005	0.0005	< 0.0005	0.0005	< 0.0005	0.0005	<0.0005	0.0005	< 0.0005	0.0005
Vanadium	NS	**0.018**	0.011	**0.004**	0.011	**0.002**	0.011	< 0.011	0.011	**0.002**	0.011
Zinc	2	< 0.011	0.011	**0.006**	0.011	**0.002**	0.011	**0.003**	0.011	**0.002**	0.011

Notes:
RL- Reporting limit
NS - No Standard
Bold/highlighted- Indicated exceedance of the NYSDEC Groundwater Standard

Table 13
146 Bayard Street / 481 Graham Avenue
Brooklyn, NY
Groundwater Analytical Results
Emerging Contaminants

Compound	MW 1901		MW 1902		MW 1903		Duplicate (MW1902)	
	1/28/2020		1/28/2020		1/28/2020		1/28/2020	
	ng/L		ng/L		ng/L		ng/L	
	Result	DL	Result	DL	Result	DL	Result	DL
Perfluorobutanoic Acid (PFBA)	7.79	2.22	11.3	2.07	18.8	2.28	11.3	2.14
Perfluoropentanoic Acid (PFPeA)	8.46	2.22	20.4	2.07	56.8	2.28	19.6	2.14
Perfluorobutanesulfonic Acid (PFBS)	3.71	2.22	4.24	2.07	12.3	2.28	4.13	2.14
Perfluorohexanoic Acid (PFHxA)	9.14	2.22	18	2.07	48.6	2.28	17.9	2.14
Perfluoroheptanoic Acid (PFHpA)	10.2	2.22	7.3	2.07	32.4	2.28	7.11	2.14
Perfluorohexanesulfonic Acid (PFHxS)	3.28	2.22	2.16	2.07	4.96	2.28	2.14	2.14
Perfluorooctanoic Acid (PFOA)	127	2.22	87.1	2.07	188	2.28	84.2	2.14
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND	2.22	ND	2.07	ND	2.28	ND	2.14
Perfluoroheptanesulfonic Acid (PFHpS)	ND	2.22	ND	2.07	ND	2.28	ND	2.14
Perfluorononanoic Acid (PFNA)	1.20J	2.22	1.19J	2.07	0.968J	2.28	1.00J	2.14
Perfluorooctanesulfonic Acid (PFOS)	16.4	2.22	5.54	2.07	3.99	2.28	6.06	2.14
Perfluorodecanoic Acid (PFDA)	ND	2.22	ND	2.07	ND	2.28	ND	2.14
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND	2.22	ND	2.07	ND	2.28	ND	2.14
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND	2.22	ND	2.07	ND	2.28	ND	2.14
Perfluoroundecanoic Acid (PFUnA)	ND	2.22	ND	2.07	ND	2.28	ND	2.14
Perfluorodecanesulfonic Acid (PFDS)	ND	2.22	ND	2.07	ND	2.28	ND	2.14
Perfluorooctanesulfonamide (FOSA)	ND	2.22	ND	2.07	ND	2.28	ND	2.14
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND	2.22	ND	2.07	ND	2.28	ND	2.14
Perfluorododecanoic Acid (PFDoA)	ND	2.22	ND	2.07	ND	2.28	ND	2.14
Perfluorotridecanoic Acid (PFTrDA)	ND	2.22	ND	2.07	ND	2.28	ND	2.14
Perfluorotetradecanoic Acid (PFTA)	ND	2.22	ND	2.07	ND	2.28	ND	2.14
Combined PFOA and PFOS	**143**		**92.6**		**192**		**90.3**	
Combined Total Detections	**185.98**		**156.04**		**365.85**		**152.44**	

Notes:

DL- Detection Limit

J- The value is estimated.

ND- Not Detected

The USEPA Health Advisory Level for drinking water is 70 ng/L (ppt) for combined detections of PFOA and PFOs
NYS Screeing value is 10 ppt

Compound	MW 1901		MW 1902		MW 1903		Duplicate (MW 1902)	
	1/28/2020		1/28/2020		1/28/2020		1/28/2020	
	µg/L		µg/L		µg/L		µg/L	
	Results	RL	Results	RL	Results	RL	Results	RL
1,4-Dioxane	< 0.20	0.20	< 0.20	0.20	< 0.20	0.20	< 0.20	0.20

Table 14
146 Bayard Street/481 Graham Avenue
Brooklyn, New York
Soil Gas Results
Volatile Organic Compounds

COMPOUNDS	SV1		SV2		SV3		SV4		SV5	
	10/23/2017		10/23/2017		10/23/2017		10/23/2017		10/23/2017	
	(µg/m3)		(µg/m3)		(µg/m3)		(µg/m3)		(µg/m3)	
	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL
1,1,1,2-Tetrachloroethane	< 1.00	1.00	< 1.00	1.00	< 1.00	4	< 1.00	1.00	< 1.00	1.00
1,1,1-Trichloroethane	< 1.00	1.00	**3.17**	1.00	**1.28**	1.00	< 1.00	1.00	< 1.00	1.00
1,1,2,2-Tetrachloroethane	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
1,1,2-Trichloroethane	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
1,1-Dichloroethane	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
1,1-Dichloroethene	< 0.20	0.20	< 0.20	0.20	< 0.20	0.20	< 0.20	0.20	< 0.20	0.20
1,2,4-Trichlorobenzene	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
1,2,4-Trimethylbenzene	**25.6**	1.00	**26.4**	1.00	**25.1**	1.00	**24.2**	1.00	**21.3**	1.00
1,2-Dibromoethane	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
1,2-Dichlorobenzene	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
1,2-Dichloroethane	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
1,2-Dichloropropane	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
1,2-Dichlorotetrafluoroethane	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
1,3,5-Trimethylbenzene	**9.33**	1.00	**9.63**	1.00	**9.43**	1.00	**8.94**	1.00	**7.52**	1.00
1,3-Butadiene	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
1,3-Dichlorobenzene	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
1,4-Dichlorobenzene	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
1,4-Dioxane	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
2-Hexanone	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
4-Ethyltoluene	**6.78**	1.00	**6.24**	1.00	**6.68**	1.00	**5.8**	1.00	**5.5**	1.00
4-Isopropyltoluene	**1.29**	1.00	**1.35**	1.00	**1.36**	1.00	**1.28**	1.00	**1.11**	1.00
4-Methyl-2-pentanone	**5.65**	1.00	**7.33**	1.00	**5.94**	1.00	**5.12**	1.00	**4.63**	1.00
Acetone	**195**	5.01	**268**	15.0	**146**	15.0	**87.1**	1.00	**71**	1.00
Acrylonitrile	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
Benzene	**4.53**	1.00	**25.8**	1.00	**12.1**	1.00	**13.2**	1.00	**3.74**	1.00
Benzyl Chloride	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
Bromodichloromethane	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
Bromoform	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
Bromomethane	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
Carbon Disulfide	**4.51**	1.00	**72.5**	1.00	**13.1**	1.00	**140**	5.01	**2.49**	1.00
Carbon Tetrachloride	**0.3**	0.20	**0.62**	0.20	**0.26**	0.20	**0.28**	0.20	**0.36**	0.20
Chlorobenzene	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
Chloroethane	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
Chloroform	**12.2**	1.00	**132**	1.00	**38.2**	1.00	**38.3**	1.00	**2.35**	1.00
Chloromethane	< 1.00	1.00	**5.9**	1.00	< 1.00	1.00	< 1.00	1.00	**1.51**	1.00
cis-1,2-Dichloroethene	< 0.20	0.20	< 0.20	0.20	< 0.20	0.20	**1.79**	0.20	**0.23**	0.20
cis-1,3-Dichloropropene	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
Cyclohexane	**30.4**	1.00	**122**	15.0	**30.7**	1.00	**14.7**	1.00	< 1.00	1.00
Dibromochloromethane	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
Dichlorodifluromethane	**20.7**	1.00	**7.02**	1.00	**4.78**	1.00	**16.9**	1.00	**3.24**	1.00
Ethanol	**220**	5.01	**51.4**	1.00	**190**	1.00	**141**	5.01	**53.1**	1.00
Ethyl Acetate	**1.72**	1.00	< 1.00	1.00	**2.25**	1.00	**1.26**	1.00	**1.15**	1.00
Ethylbenzene	**25.6**	1.00	**27.3**	1.00	**26.4**	1.00	**26.5**	1.00	**20.8**	1.00
Heptane	**8.11**	1.00	**45.1**	1.00	**11.4**	1.00	**19**	1.00	**5.82**	1.00
Hexachlorobutadiene	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
Hexane	**8.1**	1.00	**100**	1.00	**19.7**	1.00	**29**	1.00	**4.3**	1.00
Isopropylalcohol	**165**	5.01	**51.6**	1.00	**137**	15.0	**83.5**	1.00	**49.1**	1.00
Isopropylbenzene	**4.85**	1.00	**5.16**	1.00	**4.72**	1.00	**4.82**	1.00	**4**	1.00
Xylene (m&p)	**97.2**	1.00	**102**	1.00	**97.2**	1.00	**94.6**	1.00	**79.8**	1.00
Methyl Ethyl Ketone	**7.99**	1.00	**13.1**	1.00	**7.63**	1.00	**5.25**	1.00	**4.3**	1.00
MTBE	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	**51.5**	1.00	< 1.00	1.00
Methylene Chloride	< 3.00	3.00	< 3.00	3.00	**3.61**	3.00	< 3.00	3.00	< 3.00	3.00
n-Butylbenzene	**2.17**	1.00	**2.19**	1.00	**2.35**	1.00	**2.24**	1.00	**1.91**	1.00
Xylene (o)	**46**	1.00	**47.7**	1.00	**44.7**	1.00	**44.3**	1.00	**37**	1.00
Propylene	**16.8**	1.00	< 1.00	1.00	**90.3**	15.0	**51.6**	1.00	< 1.00	1.00
sec-Butylbenzene	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
Styrene	**2.37**	1.00	**2.49**	1.00	**2.49**	1.00	**2.14**	1.00	**1.86**	1.00
Tetrachloroethene	**3.28**	0.25	**4.18**	0.25	**4.11**	0.25	**11**	0.25	**3.23**	0.25
Tetrahydrofuran	**5.6**	1.00	**4.27**	1.00	**5.63**	1.00	**4.16**	1.00	**3.24**	1.00
Toluene	**87.4**	1.00	**107**	1.00	**101**	1.00	**102**	1.00	**74.2**	1.00
trans-1,2-Dichloroethene	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
trans-1,3-Dichloropropene	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
Trichloroethene	**0.31**	0.20	**0.26**	0.20	**0.26**	0.20	**2.43**	0.20	< 0.20	0.20
Trichlorofluoromethane	**42.3**	1.00	**1,780**	15.0	**6,010**	30.0	**663**	5.00	**43**	1.00
Trichlorotrifluoroethane	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
Vinyl Chloride	< 0.20	0.20	< 0.20	0.20	< 0.20	0.20	**0.22**	0.20	< 0.20	0.20
BTEX	**260.73**		**309.80**		**281.40**		**280.60**		**215.54**	
Total VOCs	**1061.09**		**3031.71**		**7055.68**		**1697.13**		**511.8**	

Notes:
NA No guidance value or standard available
Evaluating Soil Vapor
Intrusion in the State of New
(b) NYSDOH Guidance for
Evaluating Soil Vapor

Table 15
146 Bayard Street/481 Graham Avenue
Brooklyn, New York
Remaining Soil Sample Exceedences
Parameters Detected Above Track 1 Soil Cleanup Objectives

COMPOUND	Range in Exceedances	Frequency of Detection	SB1		SB2		SB3		SB4		SB5		SB6		SB7		SB8	
			(0-2')	(2-4')	(0-2')	(2-4')	(0-2')	(2-4')	(0-2')	(2-4')	(0-2')	(7-9')	(0-2')	(2-4')	(0-2')	(10-12')	(0-2')	(10-12')
			10/19/2017	10/19/2017	10/19/2017	10/19/2017	10/19/2017	10/19/2017	10/19/2017	10/19/2017	10/19/2017	10/19/2017	10/19/2017	10/19/2017	1/29/2018	1/29/2018	1/29/2018	1/29/2018
Sample Results in ug/kg																		
Acetone	59 - 380	8	-	**96**	-	-	**62**	**76**	-	-	**110**	-	**59**	-	**380**	**190**	-	**62**
m&p-Xylenes	470	1	-	-	-	-	**470**	-	-	-	-	-	-	-	-	-	-	-
Sample Results in ug/kg																		
Benz(a)anthracene	1,100 - 40,000	10	-	**2,000**	-	**4,300**	**5,000**	-	**5,100**	**13,000**	**1,100**	**2,900**	**1,300**	**1,500**	**40,000**	-	-	-
Benzo(a)pyrene	1,000 - 29,000	10	-	**1,700**	-	**3,400**	**4,600**	-	**4,400**	**11,000**	**1,000**	**2,800**	**1,300**	**1,400**	**29,000**	-	-	-
Benzo(b)fluoranthene	1,100 - 30,000	9	-	**1,500**	-	**3,800**	**4,900**	-	**4,400**	**10,000**	-	**2,700**	**1,300**	**1,100**	**30,000**	-	-	-
Benzo(k)fluoranthene	860 - 29,000	10	-	**1,500**	**860**	**3,000**	**3900**	-	**3,500**	**8,400**	-	**2,400**	**1,100**	**1,100**	**29,000**	-	-	-
Chrysene	1,500 - 42,000	9	-	**2,000**	-	**4,600**	**5,600**	-	**5,800**	**14,000**	-	**3,100**	**1,500**	**1,600**	**42,000**	-	-	-
Dibenz(a,h)anthracene	530 - 5,100	5	-	-	-	**530**	**730**	-	**800**	**2,100**	-	-	-	-	**5,100**	-	-	-
Indeno(1,2,3-cd)pyrene	680 - 19,000	11	-	**1,300**	**680**	**1,900**	**3,000**	-	**3,100**	**5,900**	**680**	**1,900**	**1,100**	**950**	**19,000**	-	-	-
Sample Results in ug/kg																		
4,4' -DDD	19 - 34	3	-	-	**34**	-	**19**	-	**23**	-	-	-	-	-	-	-	-	-
4,4' -DDE	8.3 - 60	9	-	-	**38**	**13**	**28**	-	**60**	**37**	**15**	**9.3**	**16**	**8.3**	-	-	-	-
4,4' -DDT	4 - 150	11	-	**4**	**150**	**40**	**62**	-	**130**	**100**	**32**	**25**	**40**	**12**	-	-	**33**	-
Chlordane	110	1	-	-	-	-	-	-	**110**	-	-	-	-	-	-	-	-	-
Sample Results in mg/kg																		
Arsenic	14.2 - 14.7	2	-	**14.7**	-	-	-	-	-	**14.2**	-	-	-	-	-	-	-	-
Barium	373 - 1,770	8	**373**	-	-	**391**	**1,530**	-	**1,770**	**940**	**426**	**459**	-	**495**	-	-	-	-
Chromium	30.4 - 36.8	5	-	**36.8**	**30.4**	**-**	**30.5**	-	**36.1**	-	-	-	-	-	-	-	-	**32.4**
Copper	30.2 - 183	11	-	**145**	**132**	**98.2**	**112**	-	**89.5**	**183**	-	**56.2**	**87.7**	**62.1**	**106**	**30.2**	-	-
Lead	137 - 1,340	14	**137**	**440**	**702**	**699**	**1,110**	**276**	**1,290**	**1,340**	**236**	**514**	**298**	**673**	**411**	-	**477**	-
Mercury	0.22 - 2.54	12	**0.22**	**0.53**	**0.44**	**0.53**	**1.11**	**0.43**	**0.73**	**2.54**	**0.26**	**0.6**	**0.62**	**0.36**	-	-	-	-
Nickel	47.9 - 57.2	2	-	-	**57.2**	-	-	-	-	-	**47.9**	-	-	-	-	-	-	-
Zinc	238 - 941	13	**238**	**593**	**482**	**442**	**917**	-	**941**	**811**	**373**	**387**	**341**	**589**	**322**	-	**309**	-

Notes:

* - 6 NYCRR Part 375-6 Remedial Program Soil Cleanup Objectives

RL - Reporting Limit

- - Not Analyzed

Bold/highlighted- Indicated exceedance of the NYSDEC UUSCO Guidance Value

Bold/highlighted- Indicated exceedance of the NYSDEC Residential SCO Guidance Value

Table 16
146 Bayard Street/481 Graham Avenue
Brooklyn, New York
Parameters Detected Above Ambient Groundwater Standards

COMPOUND	Range in Exceedances	Frequency of Detection	GW1	GW2	GW3	GW4
			10/23/2017	10/23/2017	10/23/2017	3/9/2018
Sample Results in ug/kg						
Methyl t-butyl ether (MTBE)	26 - 230	3	-	**230**	**26**	**34**
Sample Results in ug/kg						
Benz(a)anthracene	0.04 - 0.34	4	**0.25**	**0.04**	**0.34**	**0.15**
Benzo(b)fluoranthene	0.09 - 0.24	3	**0.18**	-	**0.24**	**0.09**
Benzo(k)fluoranthene	0.09 - 0.24	3	**0.18**	-	**0.24**	**0.09**
Chrysene	0.02 - 0.3	4	**0.22**	**0.02**	**0.3**	**0.15**
Indeno(1,2,3-cd)pyrene	0.05 - 0.16	3	**0.11**	-	**0.16**	**0.05**
Sample Results in mg/kg						
Aluminum	4.14	1	-	-	-	**4.14**
Arsenic	0.064	1	**0.064**	-	-	-
Barium	1.69	1	**1.69**	-	-	-
Beryllium	0.005	1	**0.005**	-	-	-
Cadmium	0.007	1	**0.007**	-	-	-
Chromium	0.124	1	**0.124**	-	-	-
Copper	0.344	1	**0.344**	-	-	-
Iron	3.54 - 72.8	4	**72.8**	**25.9**	**3.54**	**5.12**
Lead	0.036 - 4.02	3	**4.02**	**0.046**	**0.036**	-
Magnesium	62.1 - 68.4	2	-	**62.1**	-	**68.4**
Manganese	1.35 - 6.42	4	**3.09**	**3.98**	**1.35**	**6.42**
Mercury	0.0016	1	**0.0016**	-	-	-
Sodium	31.6 - 286	4	**31.6**	**286**	**136**	**276**
Zinc	2.22	1	**2.22**	-	-	-
Sample Results in mg/kg						
Arsenic	0.029	1	**0.029**	-	-	-
Magnesium	54.9 - 65.2	2	-	**54.9**	-	**65.2**
Manganese	1.23 - 5.36	3	-	**3.24**	**1.23**	**5.36**
Sodium	43.2 - 265	4	**43.2**	**265**	**142**	**246**

Notes:

- - Not Analyzed

Bold/highlighted- Indicated exceedance of the NYSDEC Groundwater Standard

TABLE 17

Project Permit Listing

To Be Updated as Project Progresses

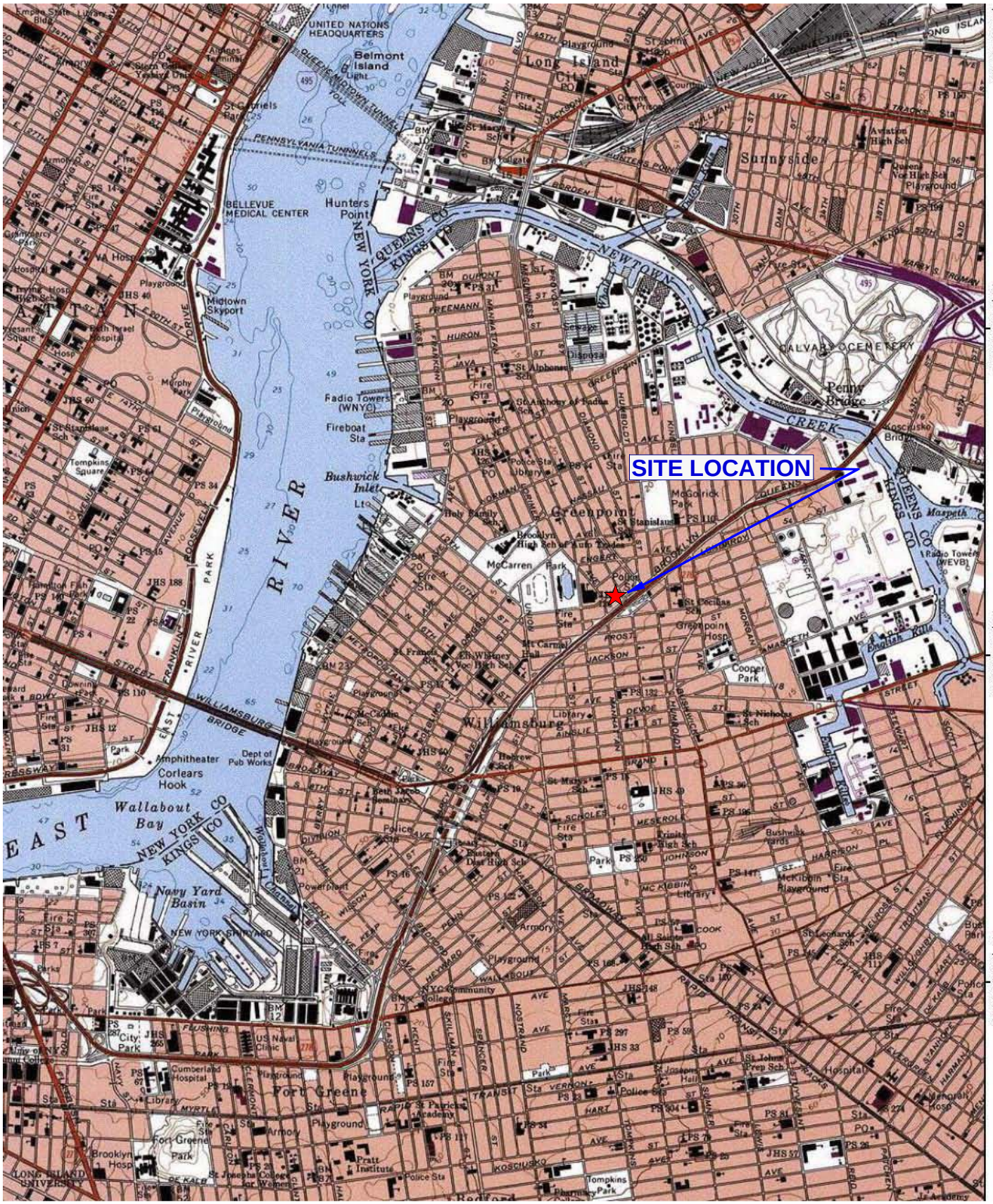
Permit	*Permit Number*	*Originating Agency*	*Pursuant to*	*Issued*	*Expires*	*Contact Phone*

Note: This list will be updated as the project progresses

Table 18
Emergency Contact List

General Emergencies		911
NYC Police		911
NYC Fire Department		911
NYC Health + Hospitals/Woodhull		(718) 963-8000
NYSDEC Spills Hotline		1-800-457-7362
NYSDEC Project Manager	Christopher Allan	(718) 482-4065
NYSDOH Project Manager	Christine Vooris	(518) 402-7860
NYC Department of Health		(212) 676-2400
National Response Center		1-800-424-8802
Poison Control		1-800-222-1222
EBC Project Manager	Keith Butler	(631) 504-6000
EBC BCP Program Manager	Charles Sosik	(631) 504-6000
EBC Site Safety Officer	Thomas Gallo	(631) 504-6000
Remedial Engineer	Ariel Czemerinski	(516) 987-1662
Developer	Simon Drummer	(718) 938-5690
Construction Manager	To be determined	

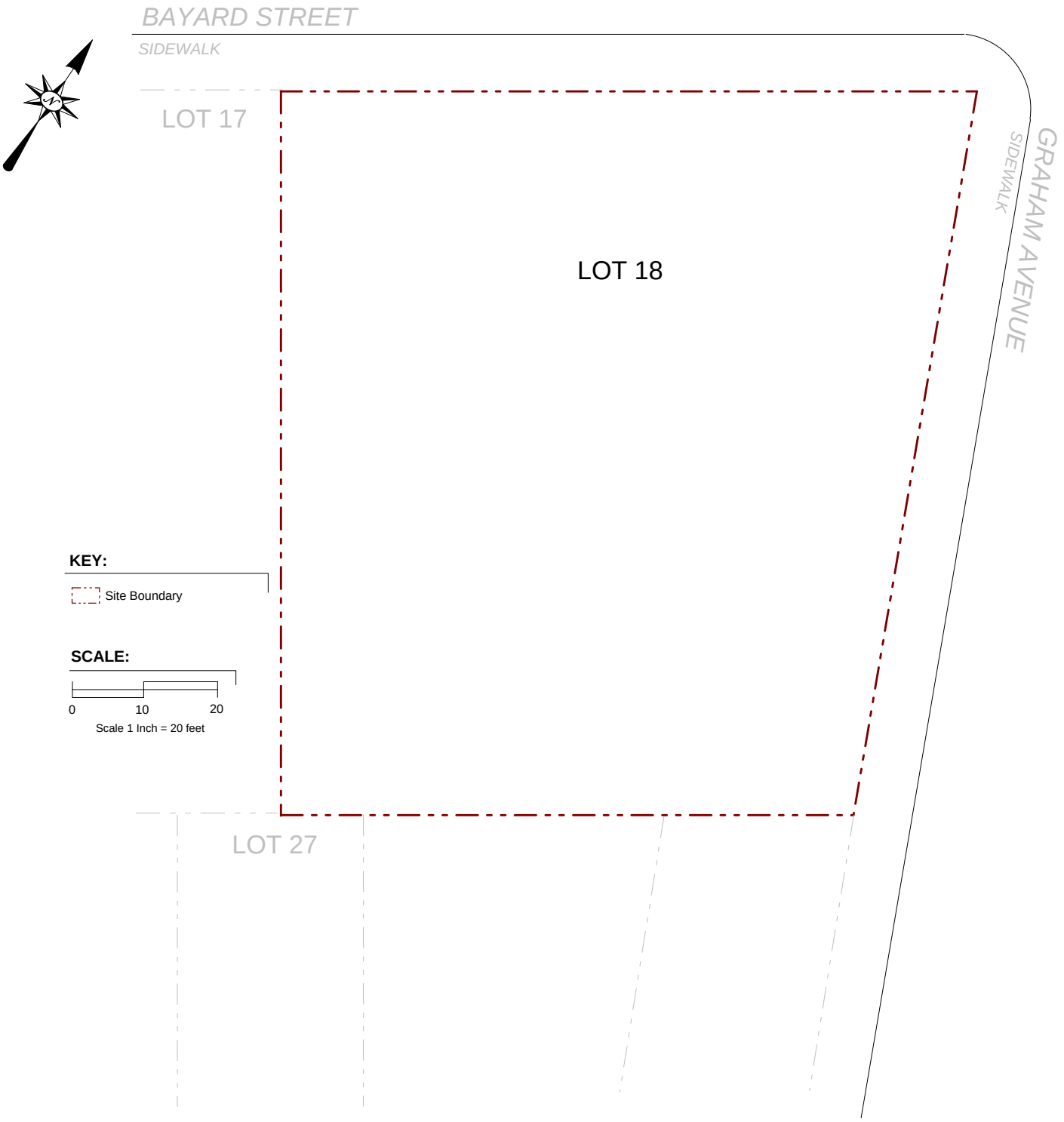
FIGURES



EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
Phone 631.504.6000
Fax 631. 924 .2870

Figure No. 1

Site Name: 146 BAYARD
Site Address: 146-150 BAYARD STREET, BROOKLYN, NY 11222
Drawing Title: SITE LOCATION MAP



EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
Phone 631.504.6000
Fax 631. 924 .2870

Figure No. 2

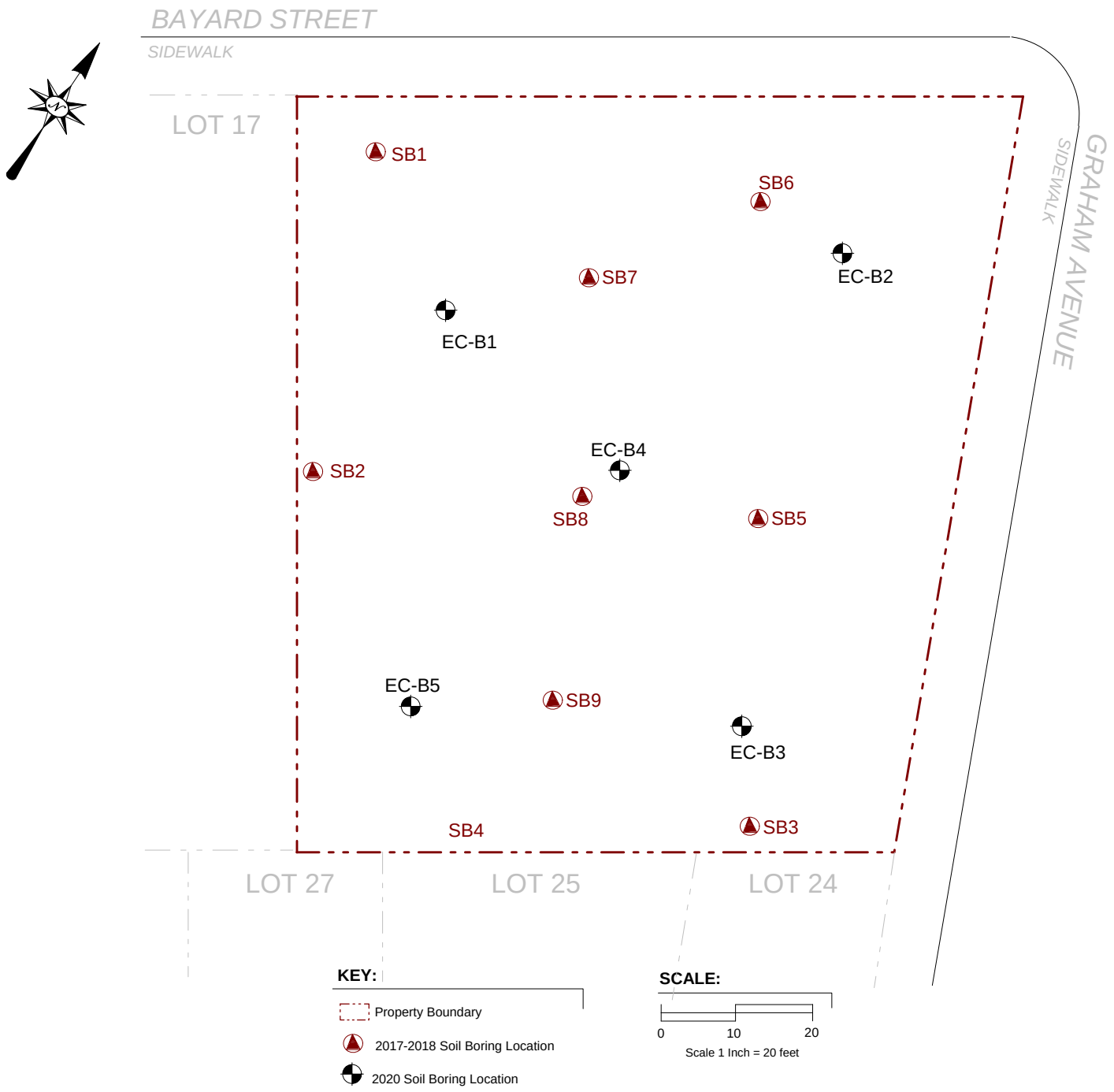
Site Name: 146 BAYARD
Site Address: 146-150 BAYARD STREET, BROOKLYN, NY
Drawing Title: SITE BOUNDARY MAP

Source: http://www.oasisnyc.net/map.aspx

FIGURE 3
SURROUNDING LAND USE MAP

146 BAYARD STREET, BROOKLYN, NY

EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
1808 MIDDLE COUNTRY ROAD, RIDGE, NEW YORK 11961
PHONE: (631) 504-6000 FAX: (631) 924-2870



EBC
Environmental Business Consultants
Phone 631.504.6000
Fax 631. 924 .2870

Figure No. 4

3/6/2020

Site Name: 146 Bayard

Site Address: 146-150 BAYARD STREET, BROOKLYN, NY

Drawing Title: SOIL BORING LOCATIONS

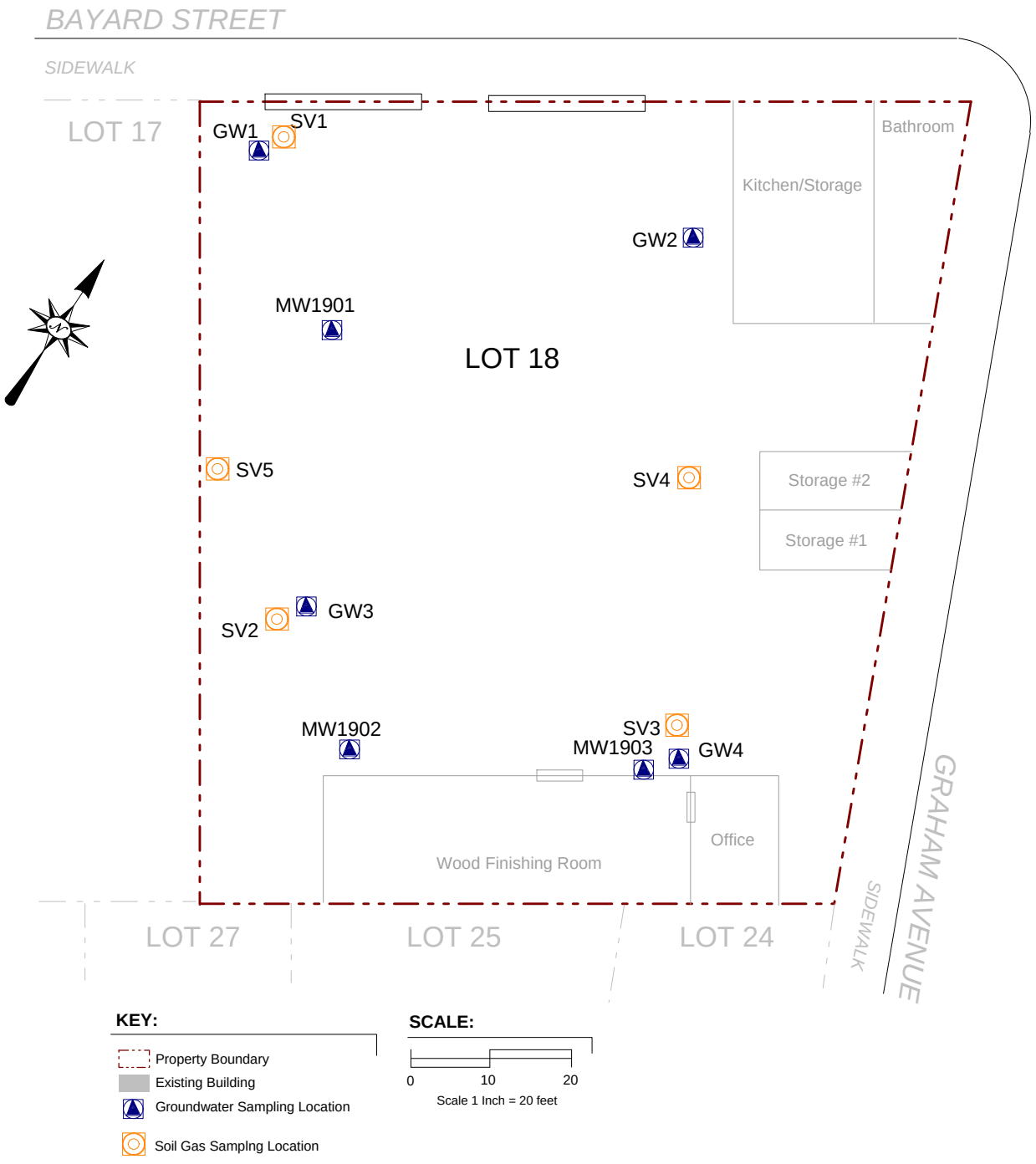


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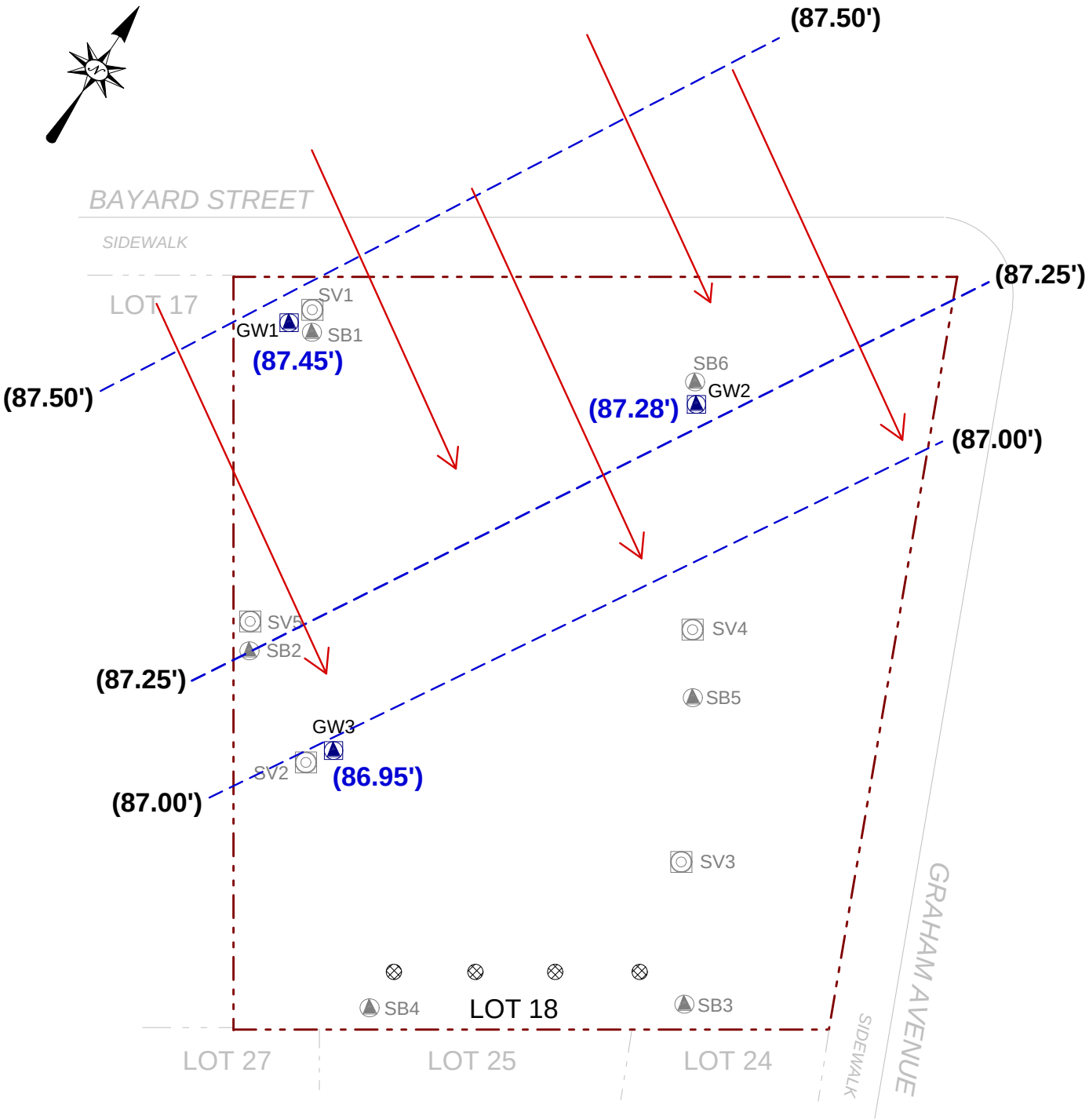
Figure No. 5

3/6/2020

Site Name: 146 BAYARD

Site Address: 146-150 BAYARD STREET, BROOKLYN, NEW YORK

Drawing Title: SOIL VAPOR AND GROUNDWATER SAMPLING LOCATIONS



KEY:

- Property Boundary
- Existing Building
- Groundwater Sampling Location
- Soil Boring Location
- Soil Gas Samplng Location
- Floor drain locations

SCALE:

0 10 20

Scale 1 Inch = 20 feet

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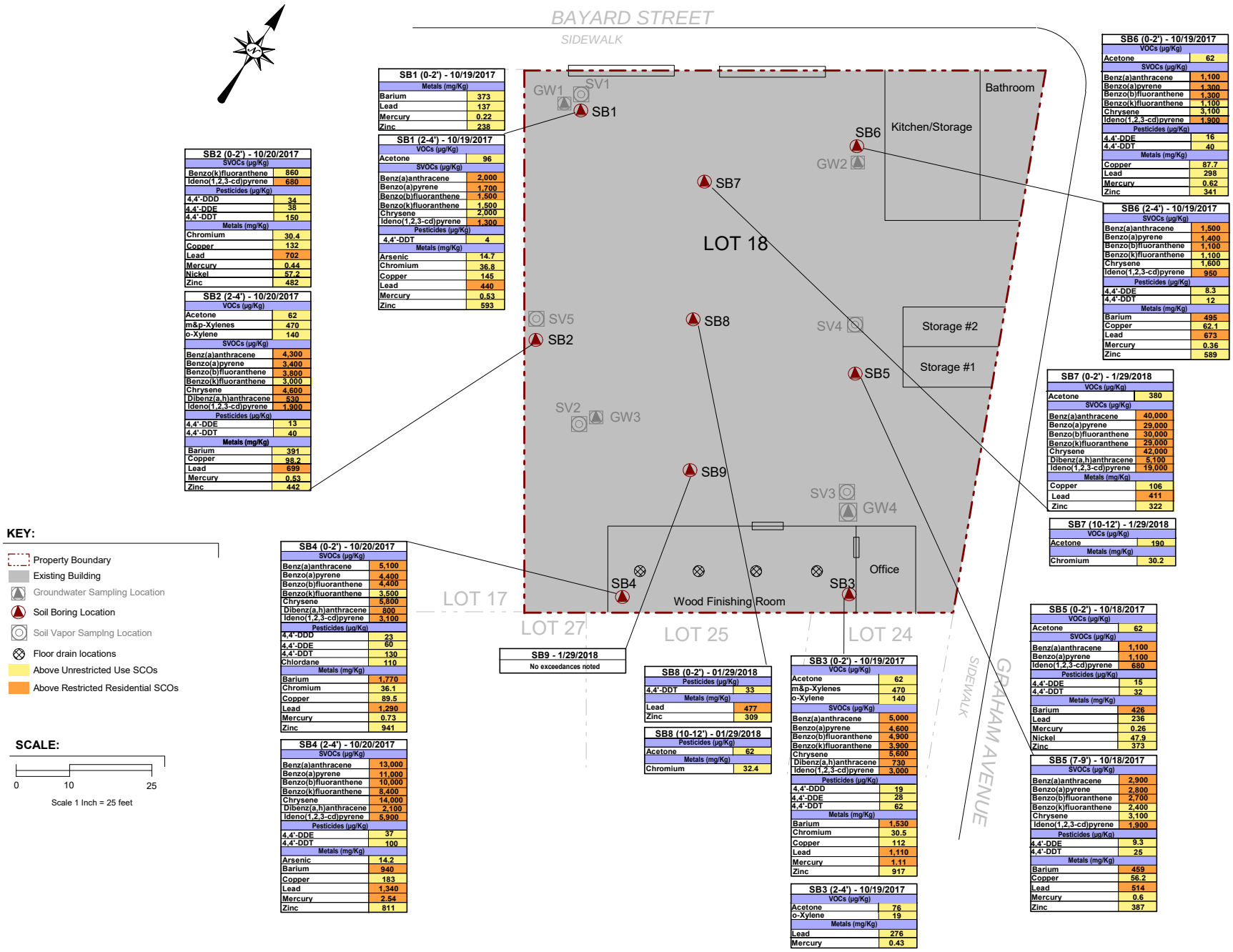
Figure No. 6

Site Name: 146 BAYARD STREET SITE
Site Address: 146-150 BAYARD STREET, BROOKLYN, NY
Drawing Title: GROUNDWATER ELEVATION MAP



SB1 (0-2') - 10/19/2017	
Metals (mg/Kg)	
Barium	373
Lead	137
Mercury	0.22
Zinc	238

SB1 (2-4') - 10/19/2017	
VOCs (µg/Kg)	
Acetone	96
SVOCs (µg/Kg)	
Benz(a)anthracene	2,000
Benzo(a)pyrene	1,700
Benzo(b)fluoranthene	1,500
Benzo(k)fluoranthene	1,500
Chrysene	2,000
Ideno(1,2,3-cd)pyrene	1,300
Pesticides (µg/Kg)	
4,4'-DDT	4
Metals (mg/Kg)	
Arsenic	14.7
Chromium	36.8
Copper	145
Lead	440
Mercury	0.53
Zinc	593

SB2 (0-2') - 10/20/2017	
SVOCs (µg/Kg)	
Benzo(k)fluoranthene	860
Ideno(1,2,3-cd)pyrene	680
Pesticides (µg/Kg)	
4,4'-DDD	34
4,4'-DDE	38
4,4'-DDT	150
Metals (mg/Kg)	
Chromium	30.4
Copper	132
Lead	702
Mercury	0.44
Nickel	57.2
Zinc	482

SB2 (2-4') - 10/20/2017	
VOCs (µg/Kg)	
Acetone	62
m&p-Xylenes	470
o-Xylene	140
SVOCs (µg/Kg)	
Benz(a)anthracene	4,300
Benzo(a)pyrene	3,400
Benzo(b)fluoranthene	3,800
Benzo(k)fluoranthene	3,000
Chrysene	4,600
Dibenz(a,h)anthracene	530
Ideno(1,2,3-cd)pyrene	1,900
Pesticides (µg/Kg)	
4,4'-DDE	13
4,4'-DDT	40
Metals (mg/Kg)	
Barium	391
Copper	98.2
Lead	699
Mercury	0.53
Zinc	442

SB4 (0-2') - 10/20/2017	
SVOCs (µg/Kg)	
Benz(a)anthracene	5,100
Benzo(a)pyrene	4,400
Benzo(b)fluoranthene	4,400
Benzo(k)fluoranthene	3,500
Chrysene	5,800
Dibenz(a,h)anthracene	800
Ideno(1,2,3-cd)pyrene	3,100
Pesticides (µg/Kg)	
4,4'-DDD	23
4,4'-DDE	60
4,4'-DDT	130
Chlordane	110
Metals (mg/Kg)	
Barium	1,770
Chromium	36.1
Copper	89.5
Lead	1,290
Mercury	0.73
Zinc	941

SB4 (2-4') - 10/20/2017	
SVOCs (µg/Kg)	
Benz(a)anthracene	13,000
Benzo(a)pyrene	11,000
Benzo(b)fluoranthene	10,000
Benzo(k)fluoranthene	8,400
Chrysene	14,000
Dibenz(a,h)anthracene	2,100
Ideno(1,2,3-cd)pyrene	5,900
Pesticides (µg/Kg)	
4,4'-DDE	37
4,4'-DDT	100
Metals (mg/Kg)	
Arsenic	14.2
Barium	940
Copper	183
Lead	1,340
Mercury	2.54
Zinc	811

SB9 - 1/29/2018
No exceedances noted

SB8 (0-2') - 01/29/2018	
Pesticides (µg/Kg)	
4,4'-DDT	33
Metals (mg/Kg)	
Lead	477
Zinc	309

SB8 (10-12') - 01/29/2018	
Pesticides (µg/Kg)	
Acetone	62
Metals (mg/Kg)	
Chromium	32.4

SB3 (0-2') - 10/19/2017	
VOCs (µg/Kg)	
Acetone	62
m&p-Xylenes	470
o-Xylene	140
SVOCs (µg/Kg)	
Benz(a)anthracene	5,000
Benzo(a)pyrene	4,600
Benzo(b)fluoranthene	4,900
Benzo(k)fluoranthene	3,900
Chrysene	5,600
Dibenz(a,h)anthracene	730
Ideno(1,2,3-cd)pyrene	3,000
Pesticides (µg/Kg)	
4,4'-DDD	19
4,4'-DDE	28
4,4'-DDT	62
Metals (mg/Kg)	
Barium	1,530
Chromium	30.5
Copper	112
Lead	1,110
Mercury	1.11
Zinc	917

SB3 (2-4') - 10/19/2017	
VOCs (µg/Kg)	
Acetone	76
o-Xylene	19
Metals (mg/Kg)	
Lead	276
Mercury	0.43

SB6 (0-2') - 10/19/2017	
VOCs (µg/Kg)	
Acetone	62
SVOCs (µg/Kg)	
Benz(a)anthracene	1,100
Benzo(a)pyrene	1,300
Benzo(b)fluoranthene	1,300
Benzo(k)fluoranthene	1,100
Chrysene	3,100
Ideno(1,2,3-cd)pyrene	1,900
Pesticides (µg/Kg)	
4,4'-DDE	16
4,4'-DDT	40
Metals (mg/Kg)	
Copper	87.7
Lead	298
Mercury	0.62
Zinc	341

SB6 (2-4') - 10/19/2017	
SVOCs (µg/Kg)	
Benz(a)anthracene	1,500
Benzo(a)pyrene	1,400
Benzo(b)fluoranthene	1,100
Benzo(k)fluoranthene	1,100
Chrysene	1,600
Ideno(1,2,3-cd)pyrene	950
Pesticides (µg/Kg)	
4,4'-DDE	8.3
4,4'-DDT	12
Metals (mg/Kg)	
Barium	495
Copper	62.1
Lead	673
Mercury	0.36
Zinc	589

SB7 (0-2') - 1/29/2018	
VOCs (µg/Kg)	
Acetone	380
SVOCs (µg/Kg)	
Benz(a)anthracene	40,000
Benzo(a)pyrene	29,000
Benzo(b)fluoranthene	30,000
Benzo(k)fluoranthene	29,000
Chrysene	42,000
Dibenz(a,h)anthracene	5,100
Ideno(1,2,3-cd)pyrene	19,000
Metals (mg/Kg)	
Copper	106
Lead	411
Zinc	322

SB7 (10-12') - 1/29/2018	
VOCs (µg/Kg)	
Acetone	190
Metals (mg/Kg)	
Chromium	30.2

SB5 (0-2') - 10/18/2017	
VOCs (µg/Kg)	
Acetone	62
SVOCs (µg/Kg)	
Benz(a)anthracene	1,100
Benzo(a)pyrene	1,100
Ideno(1,2,3-cd)pyrene	680
Pesticides (µg/Kg)	
4,4'-DDE	15
4,4'-DDT	32
Metals (mg/Kg)	
Barium	426
Lead	236
Mercury	0.26
Nickel	47.9
Zinc	373

SB5 (7-9') - 10/18/2017	
SVOCs (µg/Kg)	
Benz(a)anthracene	2,900
Benzo(a)pyrene	2,800
Benzo(b)fluoranthene	2,700
Benzo(k)fluoranthene	2,400
Chrysene	3,100
Ideno(1,2,3-cd)pyrene	1,900
Pesticides (µg/Kg)	
4,4'-DDE	9.3
4,4'-DDT	25
Metals (mg/Kg)	
Barium	459
Copper	56.2
Lead	514
Mercury	0.6
Zinc	387

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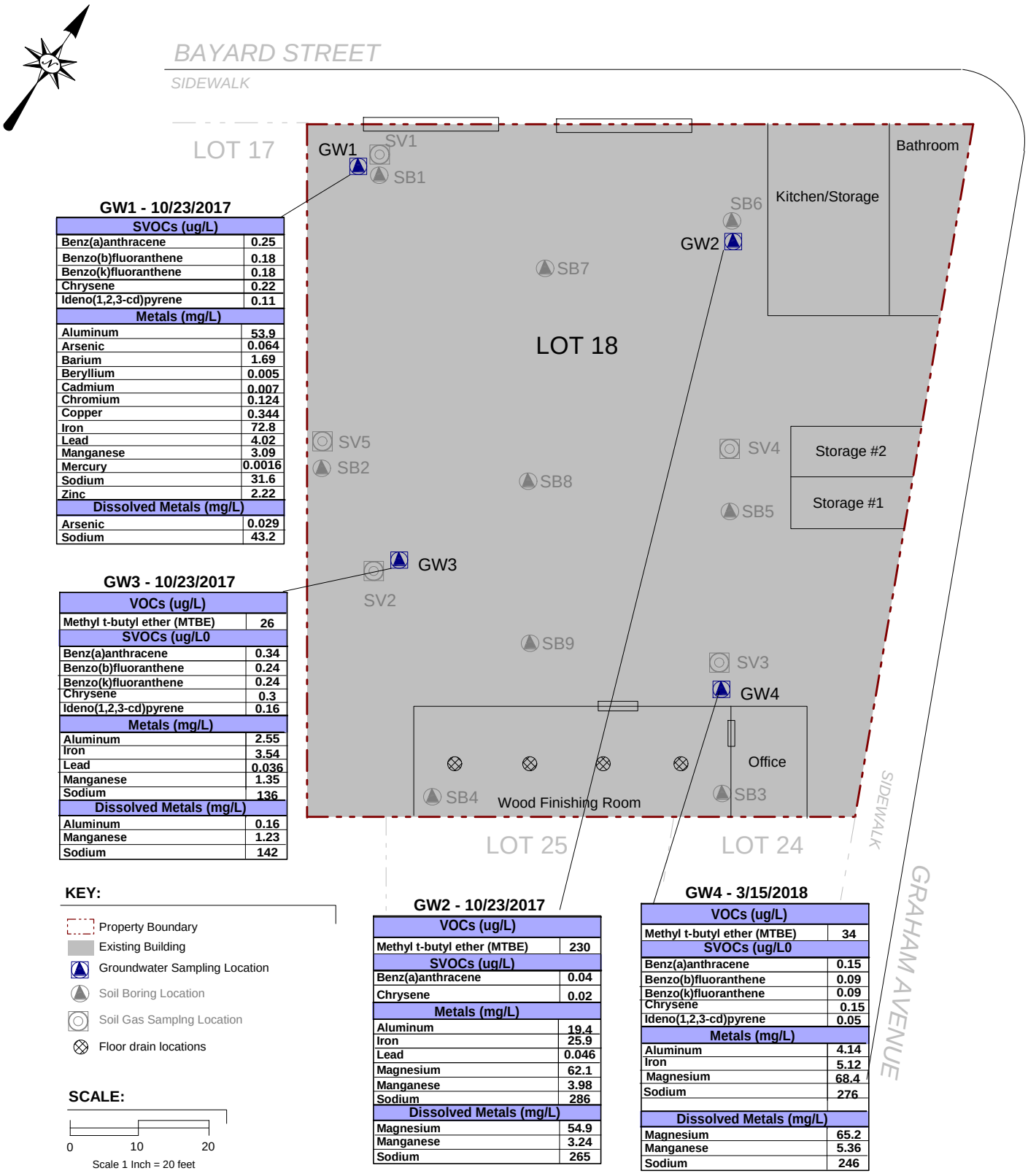
Figure No. 7

Site Name: 146 Bayard

Site Address: 146-150 Bayard Street, Brooklyn, NY

Drawing Title: SOIL EXCEEDANCE FIGURE



GW1 - 10/23/2017

SVOCs (ug/L)	
Benz(a)anthracene	0.25
Benzo(b)fluoranthene	0.18
Benzo(k)fluoranthene	0.18
Chrysene	0.22
Ideno(1,2,3-cd)pyrene	0.11
Metals (mg/L)	
Aluminum	53.9
Arsenic	0.064
Barium	1.69
Beryllium	0.005
Cadmium	0.007
Chromium	0.124
Copper	0.344
Iron	72.8
Lead	4.02
Manganese	3.09
Mercury	0.0016
Sodium	31.6
Zinc	2.22
Dissolved Metals (mg/L)	
Arsenic	0.029
Sodium	43.2

GW3 - 10/23/2017

VOCs (ug/L)	
Methyl t-butyl ether (MTBE)	26
SVOCs (ug/L0	
Benz(a)anthracene	0.34
Benzo(b)fluoranthene	0.24
Benzo(k)fluoranthene	0.24
Chrysene	0.3
Ideno(1,2,3-cd)pyrene	0.16
Metals (mg/L)	
Aluminum	2.55
Iron	3.54
Lead	0.036
Manganese	1.35
Sodium	136
Dissolved Metals (mg/L)	
Aluminum	0.16
Manganese	1.23
Sodium	142

KEY:

- Property Boundary
- Existing Building
- Groundwater Sampling Location
- Soil Boring Location
- Soil Gas Samplng Location
- Floor drain locations

SCALE:

0 10 20

Scale 1 Inch = 20 feet

GW2 - 10/23/2017

VOCs (ug/L)	
Methyl t-butyl ether (MTBE)	230
SVOCs (ug/L)	
Benz(a)anthracene	0.04
Chrysene	0.02
Metals (mg/L)	
Aluminum	19.4
Iron	25.9
Lead	0.046
Magnesium	62.1
Manganese	3.98
Sodium	286
Dissolved Metals (mg/L)	
Magnesium	54.9
Manganese	3.24
Sodium	265

GW4 - 3/15/2018

VOCs (ug/L)	
Methyl t-butyl ether (MTBE)	34
SVOCs (ug/L0	
Benz(a)anthracene	0.15
Benzo(b)fluoranthene	0.09
Benzo(k)fluoranthene	0.09
Chrysene	0.15
Ideno(1,2,3-cd)pyrene	0.05
Metals (mg/L)	
Aluminum	4.14
Iron	5.12
Magnesium	68.4
Sodium	276
Dissolved Metals (mg/L)	
Magnesium	65.2
Manganese	5.36
Sodium	246

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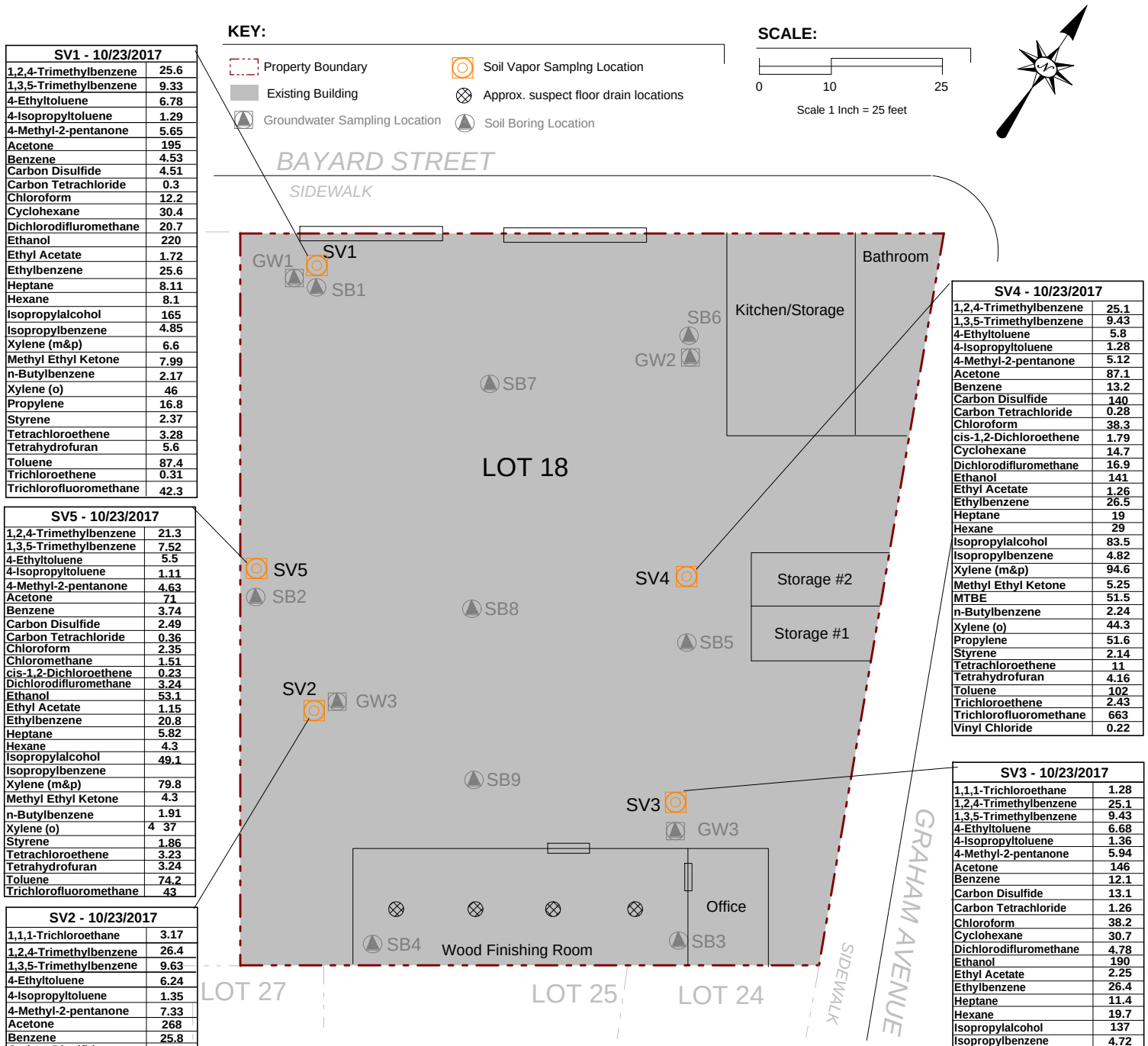
Figure No. 8

Site Name: 146 BAYARD
Site Address: 145-150 Bayard Street, Brooklyn, NY
Drawing Title: GROUNDWATER RESULTS ABOVE STANDARDS



SV1 - 10/23/2017	
1,2,4-Trimethylbenzene	25.6
1,3,5-Trimethylbenzene	9.33
4-Ethyltoluene	6.78
4-Isopropyltoluene	1.29
4-Methyl-2-pentanone	5.65
Acetone	195
Benzene	4.53
Carbon Disulfide	4.51
Carbon Tetrachloride	0.3
Chloroform	12.2
Cyclohexane	30.4
Dichlorodifluromethane	20.7
Ethanol	220
Ethyl Acetate	1.72
Ethylbenzene	25.6
Heptane	8.11
Hexane	8.1
Isopropylalcohol	165
Isopropylbenzene	4.85
Xylene (m&p)	6.6
Methyl Ethyl Ketone	7.99
n-Butylbenzene	2.17
Xylene (o)	46
Propylene	16.8
Styrene	2.37
Tetrachloroethene	3.28
Tetrahydrofuran	5.6
Toluene	87.4
Trichloroethene	0.31
Trichlorofluoromethane	42.3

SV5 - 10/23/2017	
1,2,4-Trimethylbenzene	21.3
1,3,5-Trimethylbenzene	7.52
4-Ethyltoluene	5.5
4-Isopropyltoluene	1.11
4-Methyl-2-pentanone	4.63
Acetone	71
Benzene	3.74
Carbon Disulfide	2.49
Carbon Tetrachloride	0.36
Chloroform	2.35
Chloromethane	1.51
cis-1,2-Dichloroethene	0.23
Dichlorodifluromethane	3.24
Ethanol	53.1
Ethyl Acetate	1.15
Ethylbenzene	20.8
Heptane	5.82
Hexane	4.3
Isopropylalcohol	49.1
Isopropylbenzene	
Xylene (m&p)	79.8
Methyl Ethyl Ketone	4.3
n-Butylbenzene	1.91
Xylene (o)	4 37
Styrene	1.86
Tetrachloroethene	3.23
Tetrahydrofuran	3.24
Toluene	74.2
Trichlorofluoromethane	43

SV2 - 10/23/2017	
1,1,1-Trichloroethane	3.17
1,2,4-Trimethylbenzene	26.4
1,3,5-Trimethylbenzene	9.63
4-Ethyltoluene	6.24
4-Isopropyltoluene	1.35
4-Methyl-2-pentanone	7.33
Acetone	268
Benzene	25.8
Carbon Disulfide	72.5
Carbon Tetrachloride	0.62
Chloroform	132
Chloromethane	5.9
Cyclohexane	122
Dichlorodifluromethane	7.02
Ethanol	51.4
Ethylbenzene	27.3
Heptane	45.1
Hexane	100
Isopropylalcohol	51.6
Isopropylbenzene	5.16
Xylene (m&p)	102
Methyl Ethyl Ketone	13.1
n-Butylbenzene	2.19
Xylene (o)	47.7
Styrene	2.49
Tetrachloroethene	4.18
Tetrahydrofuran	4.27
Toluene	107
Trichloroethene	0.26
Trichlorofluoromethane	1,780

SV4 - 10/23/2017	
1,2,4-Trimethylbenzene	25.1
1,3,5-Trimethylbenzene	9.43
4-Ethyltoluene	5.8
4-Isopropyltoluene	1.28
4-Methyl-2-pentanone	5.12
Acetone	87.1
Benzene	13.2
Carbon Disulfide	140
Carbon Tetrachloride	0.28
Chloroform	38.3
cis-1,2-Dichloroethene	1.79
Cyclohexane	14.7
Dichlorodifluromethane	16.9
Ethanol	141
Ethyl Acetate	1.26
Ethylbenzene	26.5
Heptane	19
Hexane	29
Isopropylalcohol	83.5
Isopropylbenzene	4.82
Xylene (m&p)	94.6
Methyl Ethyl Ketone	5.25
MTBE	51.5
n-Butylbenzene	2.24
Xylene (o)	44.3
Propylene	51.6
Styrene	2.14
Tetrachloroethene	11
Tetrahydrofuran	4.16
Toluene	102
Trichloroethene	2.43
Trichlorofluoromethane	663
Vinyl Chloride	0.22

SV3 - 10/23/2017	
1,1,1-Trichloroethane	1.28
1,2,4-Trimethylbenzene	25.1
1,3,5-Trimethylbenzene	9.43
4-Ethyltoluene	6.68
4-Isopropyltoluene	1.36
4-Methyl-2-pentanone	5.94
Acetone	146
Benzene	12.1
Carbon Disulfide	13.1
Carbon Tetrachloride	1.26
Chloroform	38.2
Cyclohexane	30.7
Dichlorodifluromethane	4.78
Ethanol	190
Ethyl Acetate	2.25
Ethylbenzene	26.4
Heptane	11.4
Hexane	19.7
Isopropylalcohol	137
Isopropylbenzene	4.72
Xylene (m&p)	97.2
Methyl Ethyl Ketone	7.63
Methylene Chloride	3.61
n-Butylbenzene	2.35
Xylene (o)	44.7
Propylene	90.3
Styrene	2.49
Tetrachloroethene	4.11
Tetrahydrofuran	5.63
Toluene	101
Trichloroethene	0.26
Trichlorofluoromethane	6,010

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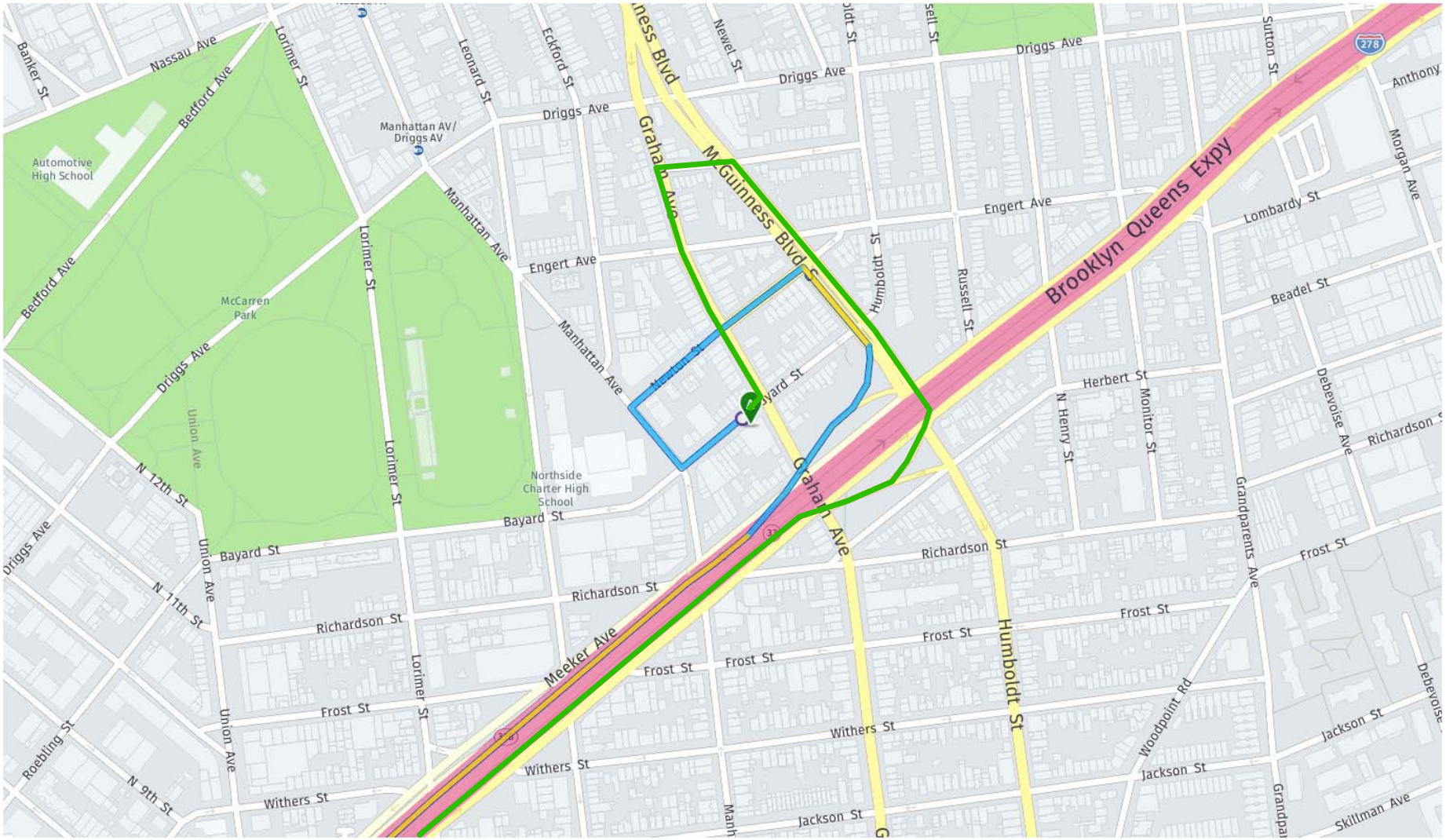
Figure No. 9

Site Name: 146 BAYARD STREET
Site Address: 146-150 Bayard Street, Brooklyn, NY
Drawing Title: POSTED SOIL VAPOR RESULTS



KEY:

Site Location

Truck Route From Site

Truck Route To Site

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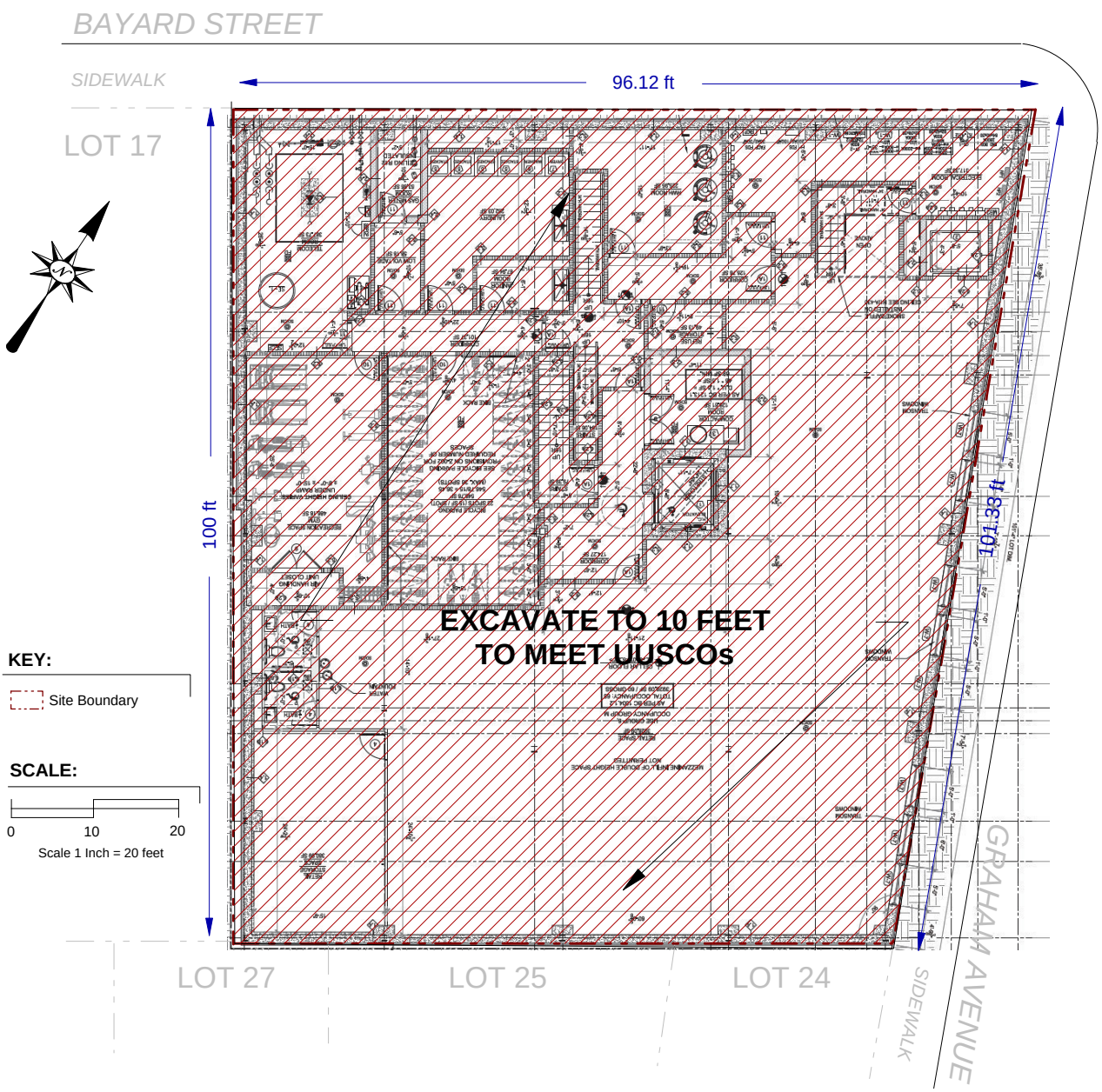
Figure No. **10**

Site Name: 146 BAYARD

Site Address: 146-150 BAYARD STREET, BROOKLYN, NY

Drawing Title: TRUCK ROUTE MAP



AMC Engineeting, PLLC
18-36 42nd Street
Astoria, NY 11105

Figure No.
11
5/26/2020

Site Name: 146 Bayard
Site Address: 146-150 Bayard Street, Brooklyn, NY
Drawing Title: Excavation Plan

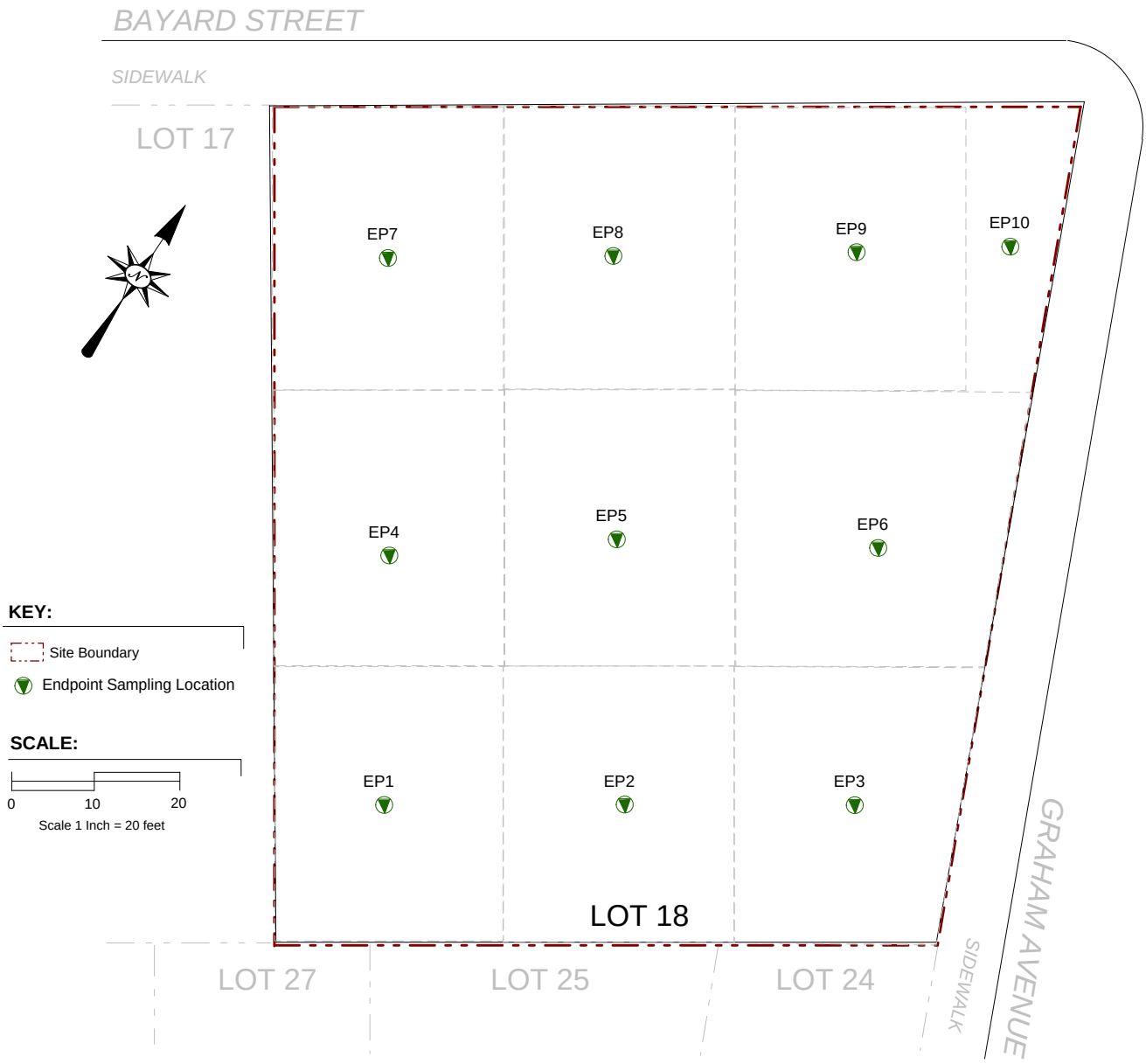


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Figure No. 12

5/26/2020

Site Name: 146 Bayard

Site Address: 146-150 Bayard Street, Brooklyn, NY

Drawing Title: Endpoint Sampling Plan

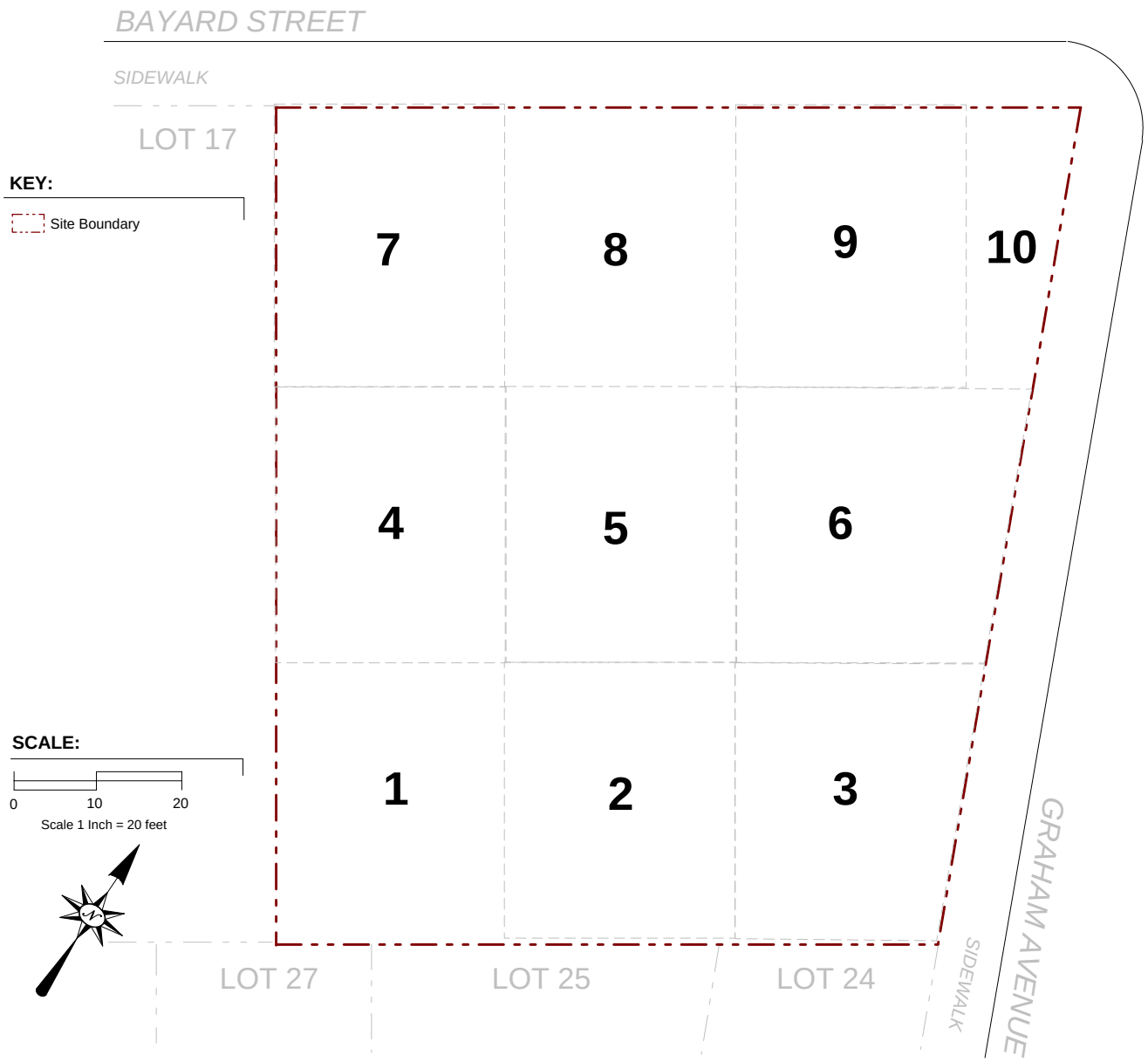

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Figure No. 13

5/26/2020

Site Name: 146 BAYARD

Site Address: 146-150 BAYARD STREET, BROOKLYN, NY

Drawing Title: ALPHA NUMERIC MAP

ATTACHMENT A
Metes and Bounds Description of Property

EXHIBIT "III"

ZONING LOT DESCRIPTION AND OWNERSHIP STATEMENT BY BUILDING DEPARTMENT PERMIT APPLICANT AND TO BE RECORDED IN THE COUNTY CLERK'S OFFICE

Bayard Holdings LLC, with an address of 390 Berry Street, Suite 200, Brooklyn, NY 11249, an applicant for present or future permits pursuant to Zoning resolution of the city of New York, effective as of December 15, 1961 and as subsequently amended, states that the Lot to which the aforementioned permit or permits pertain are shown on the Tax map of the City of New York, County of Kings as Lot. 18 in Block 2274 and is more particularly bounded and described as follows:

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

BEGINNING at the corner formed by the intersection of the southerly side of Bayard Street with the westerly side of Graham Avenue;

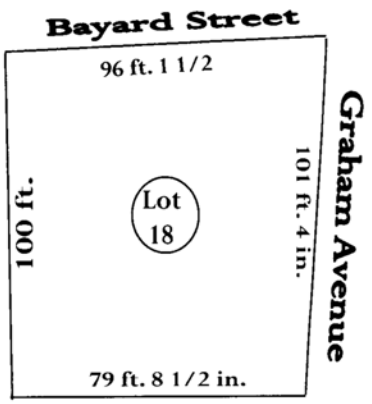
RUNNING THENCE westerly along the southerly side of Bayard Street, 96 feet 1 ½ inches;

THENCE southerly at right angles to Bayard Street, and part of the distance through a party wall, 100 feet;

THENCE easterly and parallel with Bayard Street 79 feet 8 ½ inches to the westerly side of Graham Avenue; and

THENCE northerly along the westerly side of Graham Avenue, 101 feet 4 inches to the point or place of BEGINNING.

SAID PREMISES being known as and by street no. 146 Bayard Street, Brooklyn, NY, Block 2724, Lot. 18, as shown on the following diagram.



ATTACHMENT B
Health and Safety Plan

146 BAYARD STREET SITE

146 BAYARD STREET
BROOKLYN, NEW YORK 11222
Block 2724, Lot 18

CONSTRUCTION HEALTH AND SAFETY PLAN

JUNE 2020

Prepared for:
Bayard Holdings, LLC
670 Myrtle Ave Suite 370
Brooklyn, NY 11211

Prepared by:

EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
1808 Middle Country Road
Ridge, NY 11961

TABLE OF CONTENTS
CONSTRUCTION HEALTH AND SAFETY PLAN
146 Bayard Street
146 Bayard Street, Brooklyn, New York

STATEMENT OF COMMITMENT

This Construction Health and Safety Plan (CHASP) has been prepared to ensure that workers are not exposed to risks from hazardous materials during the Remedial Actions at 146 Bayard Street, Brooklyn, NY

This CHASP, which applies to persons present at the site actually or potentially exposed to hazardous materials, describes emergency response procedures for actual and potential chemical hazards. This CHASP is also intended to inform and guide personnel entering the work area or exclusion zone. Persons are to acknowledge that they understand the potential hazards and the contents of this Health and Safety policy by signing off on receipt of their individual copy of the document. Contractors and suppliers are retained as independent contractors and are responsible for ensuring the health and safety of their own employees.

1.0 INTRODUCTION AND SITE ENTRY REQUIREMENTS

This document describes the health and safety guidelines developed by Environmental Business Consultants (EBC) for the planned Remedial Action at 146 Bayard Street, Brooklyn, New York to protect on-site personnel, visitors, and the public from physical harm and exposure to hazardous materials or wastes during remedial activities. In accordance with the Occupational Safety and Health Administration (OSHA) 29 CFR Part 1910.120 Hazardous Waste Operations and Emergency Response Final rule, this CHASP, including the attachments, addresses safety and health hazards related to excavation, loading and other soil disturbance activities and is based on the best information available. The CHASP may be revised by EBC at the request of the owner and/or a regulatory agency upon receipt of new information regarding site conditions. Changes will be documented by written amendments signed by EBC's project manager, site safety officer and/or the EBC health and safety consultant.

Work performed under the remedial action will not involve confined space entry since the excavations will be large and sloped back in accordance with NYCDOB shoring requirements and will not have a limited or restricted means for entry or exit.

1.1 Training Requirements

Personnel entering the exclusion zone or decontamination zone are required to be certified in health and safety practices for hazardous waste site operations as specified in the Federal OSHA Regulations CFR 1910.120e (revised 3/6/90).

Paragraph (e - 3) of the above referenced regulations requires that all on-site management personnel directly responsible for or who supervise employees engaged in hazardous waste operations, must initially receive 8 hours of supervisor training related to managing hazardous waste work.

Paragraph (e - 8) of the above referenced regulations requires that workers and supervisors receive 8 hours of refresher training annually on the items specified in Paragraph (e-1) and/or (e-3).

Additionally, all on-site personnel must receive adequate site-specific training in the form of an on-site Health and Safety briefing prior to participating in field work with emphasis on the following:

- Protection of the adjacent community from hazardous vapors and / or dust which may be released during intrusive activities.
- Identification of chemicals known or suspected to be present on-site and the health effects and hazards of those substances.
- The need for vigilance in personnel protection, and the importance of attention to proper use, fit and care of personnel protective equipment.
- Decontamination procedures.
- Site control including work zones, access and security.
- Hazards and protection against heat or cold.
- The proper observance of daily health and safety practices, such as entry and exit of work zones and site. Proper hygiene during lunch, break, etc.

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- Emergency procedures to be followed in case of fire, explosion and sudden release of hazardous gases.

Health and Safety meetings will be conducted on a daily basis and will cover protective clothing and other equipment to be used that day, potential and chemical and physical hazards, emergency procedures, and conditions and activities from the previous day.

1.2 Medical Monitoring Requirements

Field personnel and visitors entering the exclusion zone or decontamination zone must have completed appropriate medical monitoring required under OSHA 29 CFR 1910.120(f) if respirators or other breathing related PPE is needed. Medical monitoring enables a physician to monitor each employee's health, physical condition, and his fitness to wear respiratory protective equipment and carry out on-site tasks.

1.3 Site Safety Plan Acceptance, Acknowledgment and Amendments

The project superintendent and the site safety officer are responsible for informing personnel (EBC employees and/or owner or owners representatives) entering the work area of the contents of this plan and ensuring that each person signs the safety plan acknowledging the on-site hazards and procedures required to minimize exposure to adverse effects of these hazards. A copy of the Acknowledgement Form is included in **Appendix A**.

Site conditions may warrant an amendment to the CHASP. Amendments to the CHASP are acknowledged by completing forms included in **Appendix B**.

1.4 Key Personnel - Roles and Responsibilities

Personnel responsible for implementing this Health and Safety Plan are:

Name	Title	Address	Contact Numbers
Mr. Keith Butler	Project Manager	1808 Middle Country Rd Ridge, NY 11961	(516) 776-6629
Mr. Charlie Sosik	Site Safety Coordinator	1808 Middle Country Rd Ridge, NY 11961	(631) 357-4927
Mr. Thomas Gallo	Site Safety Officer	1808 Middle Country Rd Ridge, NY 11961	(516) 972-5354

The project manager is responsible for overall project administration and, with guidance from the site safety officer, for supervising the implementation of this CHASP. The site safety officer will conduct daily (tail gate or tool box) safety meetings at the project site and oversee daily safety issues. Each subcontractor and supplier (defined as an OSHA employer) is also responsible for the health and safety of its employees. If there is any dispute about health and safety or project activities, on-site personnel will attempt to resolve the issue. If the issue cannot be resolved at the site, then the project manager will be consulted.

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The site safety officer is also responsible for coordinating health and safety activities related to hazardous material exposure on-site. The site safety officer is responsible for the following:

1. Educating personnel about information in this CHASP and other safety requirements to be observed during site operations, including, but not limited to, decontamination procedures, designation of work zones and levels of protection, air monitoring, fit testing, and emergency procedures dealing with fire and first aid.

2. Coordinating site safety decisions with the project manager.

3. Designating exclusion, decontamination and support zones on a daily basis.

4. Monitoring the condition and status of known on-site hazards and maintaining and implementing the air quality monitoring program specified in this CHASP.

5. Maintaining the work zone entry/exit log and site entry/exit log.

6. Maintaining records of safety problems, corrective measures and documentation of chemical exposures or physical injuries (the site safety officer will document these conditions in a bound notebook and maintain a copy of the notebook on-site).

The person who observes safety concerns and potential hazards that have not been addressed in the daily safety meetings should immediately report their observations/concerns to the site safety officer or appropriate key personnel.

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2.0 SITE BACKGROUND AND SCOPE OF WORK

The street addresses for the Site are 146 Bayard Street and 481 Graham Avenue, Brooklyn, New York 11222 (Figure 1). The Site is located in the City of New York in the Greenpoint neighborhood of the Borough of Brooklyn, and is identified as Block 2724 and Lot 18 on the New York City Tax Map. The Site is located on the southern corner of the intersection of Bayard Street and Graham Avenue. The Site consists of 96.12 feet of street frontage on Bayard Street and 101.33 feet of street frontage on Graham Avenue for a total area of approximately 8,800 ft^2.

2.1 Previous Investigations

Environmental investigations performed at the Site include the following:

- Remedial Investigation Report - EBC (March 2018)

The findings are summarized below:

1. The elevation of the Site is approximately 17 feet above mean sea level.
2. Depth to groundwater is approximately 7.5-9.5 feet below sidewalk grade.
3. Regional groundwater flow direction is generally towards the southeast.
4. Depth to bedrock at the Site is greater than 100 feet.
5. The stratigraphy of the Site from the surface down consists of historic fill material to depths as great as 6 feet, underlain by dark brown silt, brown clayey silt, or tan silt.
6. Soil/fill sample results for the soil samples collected during the Remedial Investigation performed by EBC in October 2017 and the Remedial Investigation performed by EBC in January 2018 were compared to the New York State Department of Environmental Conservation NYSDEC) 6NYCRR Part 375 Section 6.8 Unrestricted Use and Restricted Residential Use Soil Cleanup Objectives (SCOs). Soil/fill samples showed no PCBs above Unrestricted Use SCOs in any of the samples. The VOCs acetone (maximum [max.] of 380 micrograms per kilogram [µg/kg]), m&p-xylenes (max. of 470 µg/kg) and o-xylene (max of 140 µg/kg) were detected above Unrestricted Use SCOs Several SVOCs including benz(a)anthracene (max. of 40,000 µg/kg), benzo(a)pyrene (max. of 29,000 µg/kg), benzo(b)fluoranthene (max. of 30,000 µg/kg), benzo(k)fluoranthene (max of 29,000 µg/kg), chrysene (max. of 42,000 µg/kg), dibenz(a,h)anthracene (max. of 5,100 µg/kg), and indeno(1,2,3-cd)pyrene (max. of 19,000 µg/kg) were detected above Restricted Residential Use SCOs within ten of the soil samples collected. SVOCs exceeded Restricted Residential SCOs in shallow and deep samples with the highest concentration being found in SB7 (0-2') at a total SVOC concentration of 542,800 µg/kg. Several pesticides including, 4,4'-DDD (max. of 34 µg/kg), 4,4'-DDE (max. of 60µg/kg), 4,4'-DDT (max. of 150 µg/kg), and chlordane (110 µg/kg) were detected above Unrestricted Use SCOs within eleven of the soil samples collected. Several metals including barium (max. of 1,770 milligrams per kilogram [mg/kg]), lead (max. of 1,340 mg/kg), and mercury (max. of 2.54 mg/Kg) exceeded Restricted Residential SCOs within shallow and deeper samples collected from the historic fill material layer. In addition, the metals arsenic (max. of 14.7 mg/kg), chromium (max. of 36.8 mg/kg), copper (max. of 183 mg/kg), nickel (max. of 57.2 mg/kg), and zinc (max. of 941 mg/kg) were detected above Unrestricted Use SCOs. Overall, soil chemistry is similar to sites with historic urban fill material in New York City.
7. Groundwater samples results collected during the Remedial Investigation performed in October 2017 and March 2018 were compared to New York State 6NYCRR Part 703.5

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Class GA Groundwater Quality Standards (GQS). Groundwater samples showed no PCBs or pesticides at detectable concentrations. One VOC, methyl t-butyl ether (MTBE) (max. of 230 micrograms per liter [µg/L]), was detected within three of the groundwater samples (GW2, GW3 and GW4) exceeding its respective GQS. SVOCs detected above GQS included benz(a)anthracene (max. of 0.34 µg/L), benzo(b)fluoranthene (max. of 0.24 µg/L), benzo(k)fluoranthene (max. of 0.24 µg/L), chrysene (max. of 0.3 µg/L), and indeno(1,2,3-cd)pyrene (max. of 0.16 µg/L). Metals detected above GQS included aluminum (max. 53.9 mg/L), arsenic (max. of 0.064 mg/L), barium (1.69 mg/L), beryllium (0.005 mg/L), cadmium (max. of 0.007 mg/L), chromium (0.124 mg/L), copper (max. of 0.344 mg/L), iron (max. of 72.8 mg/L), lead (max. of 4.02 mg/L), magnesium (68.4 mg/L), manganese (max. of 6.42 mg/L), mercury (max. of 0.0016 mg/L), sodium (max. of 286 mg/L) and zinc (2.22 mg/L). Dissolved metals detected above GQS included aluminum (max. of 0.16 mg/L), arsenic (max. of 0.029 mg/L), magnesium (max. of 65.2 mg/L), manganese (max. of 5.36 mg/L) and sodium (max. of 265 mg/L). The RI indicates that groundwater is not impacted by site conditions and did not reveal any sources of contamination.

8. Soil vapor and sub-slab soil gas samples collected during the Remedial Investigation performed in October 2017 were compared to the New York State Department of Health (NYSDOH) Final Guidance on Soil Vapor Intrusion (October 2006) Matrix 1 and Matrix 2 values. All five sub-slab soil gas samples collected showed moderate levels of petroleum-related VOCs. The total concentration of petroleum-related VOCs (BTEX) ranged from 215.54 µg/m3 to 309.80 µg/m3. Tetrachloroethene (PCE) was detected in all five of the sub-slab soil gas sampled collected at a max. of 11 µg/m3. The chlorinated VOC trichloroethylene (TCE) was detected in four of the five soil vapor samples (max. of 2.43 µg/m3) collected. Carbon tetrachloride was detected in the five soil vapor samples at a max. of 0.62 µg/m3. 1,1,1-trichloroethane was detected in two of the five soil vapor samples at a max. of 3.17 µg/m3. The chlorinated VOC cis-1,2-dichloroethene was detected in two of the five soil vapor samples at a max. of 1.79 µg/m3. Vinyl chloride was detected in one of the five soil vapor samples at 0.22 µg/m3. Methylene chloride was detected in one sample at a concentration of 3.61 µg/m3. The chlorinated VOC 1,1-dicloroethene was not detected in any of the sub-slab soil gas or soil vapor samples. All chlorinated VOCs were below the monitoring level ranges established within the NYSDOH soil vapor guidance matrix.

2.2 Redevelopment Plans

The redevelopment project consists of the construction of a new 6-story mixed-use (commercial/residential) building with a cellar that will cover the entirety of the Site. The cellar level will consist of a 3,928 ft^2 retail space, a bicycle storage room, a recreational space for building occupants, and the building's utility meter rooms. The first floor / ground level will consist of the commercial lobby for the cellar level retail space, residential apartments, and a 4,670 ft^2 parking garage. The proposed development is compatible with the existing M1-2/R6A zoning. The cellar level of the new building will require excavation of the entire Site to a depth of 10 feet below grade. It is estimated that a total of 3,300 cubic yards (5,000 tons) of soil/fill will require excavation and off-Site disposal. Groundwater was found at the Site at depths ranging between 7.50 to 9.5 feet below grade. Therefore, dewatering will be required during construction of the building's foundation.

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2.3 Description of Remedial Action

Site activities included within the Remedial Action that are included within the scope of this CHASP include the following:

1. Excavation of soil/fill exceeding Track 1 Unrestricted Use SCOs as listed in **Table 1** to a minimum depth of 6 feet across the Site with additional excavation as needed to meet Track 1 Unrestricted Use SCOs;
2. Screening for indications of contamination (by visual means, odor, and monitoring with PID) of all excavated soil during any intrusive Site work;
3. Collection and analysis of end-point samples to evaluate the performance of the remedy with respect to attainment of Track 1 Unrestricted Use SCOs;
4. Appropriate off-Site disposal of all material removed from the Site in accordance with all Federal, State and local rules and regulations for handling, transport, and disposal;
5. Dewatering and treatment of VOC impacted groundwater before discharging to the NYC sewer system under a NYCDEP sewer discharge permit;
6. Import of materials to be used for backfill and cover in compliance with: (1) chemical limits and other specifications included in Table 1, (2) all Federal, State and local rules and regulations for handling and transport of material;
7. If Track 1 Unrestricted Use SCOs are not achieved, a composite cover system consisting of the concrete building slab will be constructed.
8. If Track 1 cleanup is not achieved, implementation of a Site Management Plan (SMP) for long term maintenance of the Engineering Controls.
9. If Track 1 cleanup is not achieved, an Environmental Easement will be filed against the Site to ensure implementation of the SMP.

Although the goal of the remedy will be to remove all soil exceeding the Track 1 SCOs, if Track 1 SCOs cannot be achieved then a Track 2 remedy may result. All responsibilities associated with the Remedial Action, including permitting requirements and pretreatment requirements, will be addressed in accordance with all applicable Federal, State and local rules and regulations. Remedial activities will be performed at the Site in accordance with this NYSDEC-approved RAWP. Any anticipated deviations to the RAWP shall be submitted to the NYSDEC for review.

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3.0 HAZARD ASSESSMENT

This section identifies the hazards associated with the proposed scope of work, general physical hazards that can be expected at most sites; and presents a summary of documented or potential chemical hazards at the site. Every effort must be made to reduce or eliminate these hazards. Those that cannot be eliminated must be guarded against using engineering controls and/or personal protective equipment.

3.1 Physical Hazards

3.1.1 Tripping Hazards

An area of risk associated with on-site activities are presented by uneven ground, concrete, curbstones or equipment which may be present at the site thereby creating a potential tripping hazard. During intrusive work, care should be taken to mark or remove any obstacles within the exclusion zone.

3.1.2 Climbing Hazards

During site activities, workers may have to work on excavating equipment by climbing. The excavating contractor will conform with any applicable NIOSH and OSHA requirements or climbing activities.

3.1.3 Cuts and Lacerations

Field activities that involve excavating activities usually involve contact with various types of machinery. A first aid kit approved by the American Red Cross will be available during all intrusive activities.

3.1.4 Lifting Hazards

Improper lifting by workers is one of the leading causes of industrial injuries. Field workers in the excavation program may be required to lift heavy objects. Therefore, all members of the field crew should be trained in the proper methods of lifting heavy objects. All workers should be cautioned against lifting objects too heavy for one person.

3.1.5 Utility Hazards

Before conducting any excavation, the excavation contractor will be responsible for locating and verifying all existing utilities at each excavation.

3.1.6 Traffic Hazards

All traffic, vehicular and pedestrian, shall be maintained and protected at all times consistent with local, state and federal agency regulations regarding such traffic and in accordance with NYCDOT guidelines. The excavation contractor shall carry on his operations without undue interference or delays to traffic. The excavation contractor shall furnish all labor, materials, guards, barricades, signs, lights, and anything else necessary to maintain traffic and to protect his work and the public, during operations.

3.2 Work in Extreme Temperatures

Work under extremely hot or cold weather conditions requires special protocols to minimize the chance that employees will be affected by heat or cold stress.

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3.2.1 Heat Stress

The combination of high ambient temperature, high humidity, physical exertion, and personal protective apparel, which limits the dissipation of body heat and moisture, can cause heat stress.

The following prevention, recognition and treatment strategies will be implemented to protect personnel from heat stress. Personnel will be trained to recognize the symptoms of heat stress and to apply the appropriate treatment.

1. Prevention
    a. Provide plenty of fluids. Available in the support zone will be a 50% solution of fruit punch and water or plain water.
    b. Work in Pairs. Individuals should avoid undertaking any activity alone.
    c. Provide cooling devices. A spray hose and a source of water will be provided to reduce body temperature, cool protective clothing and/or act as a quick-drench shower in case of an exposure incident.
    d. Adjustment of the work schedule. As is practical, the most labor-intensive tasks should be carried out during the coolest part of the day.

2. Recognition and Treatment
    a Heat Rash (or prickly heat):
        Cause: Continuous exposure to hot and humid air, aggravated by chafing clothing.
        Symptoms: Eruption of red pimples around sweat ducts accompanied by intense itching and tingling.
        Treatment: Remove source or irritation and cool skin with water or wet cloths.

    b. Heat Cramps (or heat prostration)
        Cause: Profuse perspiration accompanied by inadequate replenishment of body water and electrolytes.
        Symptoms: Muscular weakness, staggering gait, nausea, dizziness, shallow breathing, pale and clammy skin, approximately normal body temperature.
        Treatment: Perform the following while making arrangement for transport to a medical facility. Remove the worker to a contamination reduction zone. Remove protective clothing. Lie worker down on back in a cool place and raise feet 6 to 12 inches. Keep warm, but loosen all clothing. If conscious, provide sips of salt-water solution, using one teaspoon of salt in 12 ounces of water. Transport to a medical facility.
    c. Heat Stroke
        Cause: Same as heat exhaustion. This is also an extremely serious condition.
        Symptoms: Dry hot skin, dry mouth, dizziness, nausea, headache, rapid pulse.
        Treatment: Cool worker immediately by immersing or spraying with cool water or sponge bare skin after removing protective clothing. Transport to hospital.

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3.2.2 Cold Exposure

Exposure to cold weather, wet conditions and extreme wind-chill factors may result in excessive loss of body heat (hypothermia) and /or frostbite. To guard against cold exposure and to prevent cold injuries, appropriate warm clothing should be worn, warm shelter must be readily available, rest periods should be adjusted as needed, and the physical conditions of on-site field personnel should be closely monitored. Personnel and supervisors working on-site will be made aware of the signs and symptoms of frost bite and hypothermia such as:

- Shivering;
- reduced blood pressure;
- reduced coordination;
- drowsiness;
- impaired judgment;
- fatigue;
- pupils dilated but reactive to light; and,
- numbing of the toes and fingers.

3.3 Chemical Hazards

"Urban fill" materials, present throughout the New York City area typically contain elevated levels of semi-volatile organic compounds and metals. These "contaminants" are not related to a chemical release occurring on the site, but are inherent in the reworked fill material in the area which contains ash and bits of tar and asphalt. Considering the previous sampling results and the past and present use of the site, the following compounds are considered for the site as potential contaminants: volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and heavy metals such as arsenic, chromium, lead and mercury.

Based on the findings of the Remedial Investigation and the inherent properties of urban fill, the following compounds are considered for the site as potential contaminants: volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, and heavy metals.

Volatile organic compounds reported to be present in soil, soil gas and/or groundwater include the following:

Acetone	m&p-Xylenes	o-Xylene	MtBE

Semi-Volatile organic compounds reported to be present in soil and / or fill materials include the following:

Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(k)fluoranthene
Chrysene	Dibenz(a,h)anthracene	Indeno(1,2,3-cd)pyrene	

Pesticides reported to be present in soil, soil gas and/or groundwater include the following:

4,4'-DDD	4,4'-DDE	4,4'-DDT	Chlordane

Metals reported to be present in fill materials include the following:

Arsenic	Barium	Chromium	Copper
Lead	Mercury	Nickel	Zinc

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The primary routes of exposure to these contaminants are inhalation, ingestion and absorption. **Appendix C** includes information sheets for suspected chemicals that may be encountered at the site.

3.3.1 Respirable Dust

Dust may be generated from vehicular traffic and/or excavation activities. If visible observation detects elevated levels of dust, a program of wetting will be employed by the site safety officer. If elevated dust levels persist, the site safety office will employ dust monitoring using a particulate monitor (Miniram or equivalent). If monitoring detects concentrations greater than 150 µg/m3 over daily background, the site safety officer will take corrective actions as defined herein, including the use of water for dust suppression and if this is not effective, requiring workers to wear APRs with efficiency particulate air (HEPA) cartridges.

Absorption pathways for dust and direct contact with soils or groundwater will be mitigated with the implementation of latex gloves, hand washing and decontamination exercises when necessary.

3.3.2 Dust Control and Monitoring During Earthwork

Dust generated during excavation activities or other earthwork may contain contaminants identified in soils at the site. Dust will be controlled by wetting the working surface with water. Calcium chloride may be used if the problem cannot be controlled with water. Air monitoring and dust control techniques are specified in a site specific Dust Control Plan (if applicable). Site workers will not be required to wear APR's unless dust concentrations are consistently over 150 $\mu g/m^3$ over site-specific background in the breathing zone as measured by a dust monitor unless the site safety officer directs workers to wear APRs. The site safety officer will use visible dust as an indicator to implement the dust control plan.

3.3.3 Organic Vapors

Elevated levels of chlorinated VOCs were detected in soil, soil gas and groundwater samples collected during previous investigations at the site. Therefore, excavation activities may cause the release of organic vapors to the atmosphere. The site safety officer will periodically monitor organic vapors with a Photoionization Detector (PID) during excavation activities to determine whether organic vapor concentrations exceed action levels shown in Section 5 and/or the Community Air Monitoring Plan.

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4.0 PERSONAL PROTECTIVE EQUIPMENT

Personal protective equipment (PPE) shall be selected in accordance with the site air monitoring program, OSHA 29 CFR 1910.120(c), (g), and 1910.132. Protective equipment shall be NIOSH approved and respiratory protection shall conform to OSHA 29 CFR Part 1910.133 and 1910.134 specifications; head protection shall conform to 1910.135; eye and face protection shall conform to 1910.133; and foot protection shall conform to 1910.136. The only true difference among the levels of protection from D thru B is the addition of the type of respiratory protection. **It is anticipated that work will be performed in Level D PPE.**

4.1 Level D

Level D PPE shall be donned when the atmosphere contains no known hazards and work functions preclude splashes, immersion, or the potential for inhalation of, or contact with, hazardous concentrations of harmful chemicals. Level D PPE consists of:

- standard work uniform, coveralls, or tyvek, as needed;
- steel toe and steel shank work boots;
- hard hat;
- gloves, as needed;
- safety glasses;
- hearing protection;
- equipment replacements are available as needed.

4.2 Level C

Level C PPE shall be donned when the concentrations of measured total organic vapors in the breathing zone exceed background concentrations (using a portable OVA, or equivalent), but are less than 5 ppm. The specifications on the APR filters used must be appropriate for contaminants identified or expected to be encountered. Level C PPE shall be donned when the identified contaminants have adequate warning properties and criteria for using APR have been met. Level C PPE consists of:

- chemical resistant or coated tyvek coveralls;
- steel-toe and steel-shank workboots;
- chemical resistant overboots or disposable boot covers;
- disposable inner gloves (surgical gloves);
- disposable outer gloves;
- full face APR fitted with organic vapor/dust and mist filters or filters appropriate for the identified or expected contaminants;
- hard hat;
- splash shield, as needed; and,
- ankles/wrists taped with duct tape.

The site safety officer will verify if Level C is appropriate by checking organic vapor concentrations using compound and/or class-specific detector tubes.

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- chemical resistant coveralls;
- steel-toe and steel-shank workboots;
- chemical resistant overboots or disposable boot covers;
- disposable inner gloves;
- disposable outer gloves;
- hard hat; and,
- ankles/wrists taped.

The exact PPE ensemble is decided on a site-by-site basis by the Site Safety Officer with the intent to provide the most protective and efficient worker PPE.

4.3 Activity-Specific Levels of Personal Protection

The required level of PPE is activity-specific and is based on air monitoring results (Section 4.0) and properties of identified or expected contaminants. **It is expected that site work will be performed in Level D.** If air monitoring results indicate the necessity to upgrade the level of protection engineering controls (i.e. Facing equipment away from the wind and placing site personnel upwind of drilling locations, active venting, etc.) will be implemented before requiring the use of respiratory protection.

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5.0 AIR MONITORING AND ACTION LEVELS

29 CFR 1910.120(h) specifies that monitoring shall be performed where there may be a question of employee exposure to hazardous concentrations of hazardous substances in order to assure proper selection of engineering controls, work practices and personal protective equipment so that employees are not exposed to levels which exceed permissible exposure limits, or published exposure levels if there are no permissible exposure limits, for hazardous substances.

5.1 Air Monitoring Requirements

If excavation work is performed, air will be monitored for VOCs with a portable ION Science 3000EX photoionization detector, or the equivalent. If necessary, Lower Explosive Limit (LEL) and oxygen will be monitored with a Combustible Gas Indicator (CGI). If appropriate, fugitive dust will be monitored using a MiniRam Model PDM-3 aerosol monitor. Air will be monitored when any of the following conditions apply:

- initial site entry;
- during any work where a potential IDLH condition or flammable atmosphere could develop;
- excavation work begins on another portion of the site;
- contaminants, other than those previously identified, have been discovered;
- each time a different task or activity is initiated;
- during trenching and/or excavation work.

The designated site safety officer will record air monitoring data and ensure that air monitoring instruments are calibrated and maintained in accordance with manufacturer's specifications. Instruments will be zeroed daily and checked for accuracy. Monitoring results will be recorded in a field notebook and will be transferred to instrument reading logs.

5.2 Work Stoppage Responses

The following responses will be initiated whenever one or more of the action levels necessitating a work stoppage are exceeded:

1 The SSO will be consulted immediately
2 All personnel (except as necessary for continued monitoring and contaminant migration, if applicable) will be cleared from the work area (eg from the exclusion zone).
3 Monitoring will be continued until intrusive work resumes.

5.3 Action Levels During Excavation Activities

Instrument readings will be taken in the breathing zone above the excavation pit unless otherwise noted. Each action level is independent of all other action levels in determining responses.

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Organic Vapors (PID)	LEL %	Responses
0-1 ppm above background	0%	• Continue excavating • Level D protection • Continue monitoring every 10 minutes
1-5 ppm Above Background, Sustained Reading	1-10%	• Continue excavating • Go to Level C protection or employ engineering controls • Continue monitoring every 10 minutes
5-25 ppm Above Background, Sustained Reading	10-20%	• Discontinue excavating, unless PID is only action level exceeded. • Level C protection or employ engineering controls • Continue monitoring for organic vapors 200 ft downwind • Continuous monitoring for LEL at excavation pit
>25 ppm Above Background, Sustained Reading	>20%	• Discontinue excavating • Withdraw from area, shut off all engine ignition sources. • Allow pit to vent • Continuous monitoring for organic vapors 200 ft downwind.

Notes: Air monitoring will occur in the breathing zone 30 inches above the excavation pit. Readings may also be taken in the excavation pit but will not be used for action levels.

If action levels for any one of the monitoring parameters are exceeded, the appropriate responses listed in the right hand column should be taken. If instrument readings do not return to acceptable levels after the excavation pit has been vented for a period of greater than one-half hour, a decision will then be made whether or not to seal the pit with suppressant foam.

If, during excavation activities, downwind monitoring PID readings are greater than 5 ppm above background for more than one-half hour, excavation will stop until sustained levels are less then 5 ppm (see Community Air Monitoring Plan).

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

6.0 SITE CONTROL

6.1 Work Zones

The primary purpose of site controls is to establish the perimeter of a hazardous area, to reduce the migration of contaminants into clean areas, and to prevent access or exposure to hazardous materials by unauthorized persons. When operations are to take place involving hazardous materials, the site safety officer will establish an exclusion zone, a decontamination zone, and a support zone. These zones "float" (move around the site) depending on the tasks being performed on any given day. The site safety officer will outline these locations before work begins and when zones change. The site safety officer records this information in the site log book. **It is expected that the entire fenced in area of the Site will be the exclusion zone, with the decontamination zone the Site entrance.** The support zone will be the office trailer.

Tasks requiring OSHA 40-hour Hazardous Waste Operations and Emergency Response Operations training are carried out in the exclusion zone. The exclusion zone is defined by the site safety officer but will typically be a 50-foot area around work activities. Gross decontamination (as determined by the site Health and Safety Officer) is conducted in the exclusion zone; all other decontamination is performed in the decontamination zone or trailer.

Protective equipment is removed in the decontamination zone. Disposable protective equipment is stored in receptacles staged in the decontamination zone, and non-disposable equipment is decontaminated. All personnel and equipment exit the exclusion zone through the decontamination zone. If a decontamination trailer is provided the first aid equipment, an eye wash unit, and drinking water are kept in the decontamination trailer.

The support zone is used for vehicle parking, daily safety meetings, and supply storage. Eating, drinking, and smoking are permitted only in the support zone. When a decontamination trailer is not provided, the eye wash unit, first aid equipment, and drinking water are kept at a central location designated by the site safety officer.

6.2 General Site Work

An excavation contractor with appropriate experience, personnel and training (40 hr OSHA Hazardous Waste Operations and Emergency Response Operations - HAZWOPER) is required to perform the removal of the CVOC and naphthalene impacted soil. After this material is removed the contractor will remove historic fill and uncontaminated soil. The excavation contractor's on-site personnel engaged in historic fill and native soil removal will have a minimum of 24 hour HAZWOPER training.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

7.0 CONTINGENCY PLAN/EMERGENCY RESPONSE PLAN

Site personnel must be prepared in the event of an emergency. Emergencies can take many forms: illnesses, injuries, chemical exposure, fires, explosions, spills, leaks, releases of harmful contaminants, or sudden changes in the weather.

Emergency telephone numbers and a map to the hospital will be posted in the command post. Site personnel should be familiar with the emergency procedures, and the locations of site safety, first aid, and communication equipment.

7.1 Emergency Equipment On-site

Private telephones:	Site personnel.
Two-way radios:	Site personnel where necessary.
Emergency Alarms:	On-site vehicle horns*.
First aid kits:	On-site, in vehicles or office.
Fire extinguisher:	On-site, in office or on equipment.

* Horns: Air horns will be supplied to personnel at the discretion of the project superintendent or site safety officer.

7.2 Emergency Telephone Numbers

General Emergencies	911
New York City Police	911
NYC Health and Hospitals, Woodhull	1-718-963-8000
NYSDEC Spills Division	1-800-457-7362
NYSDEC Division of Env. Remediation	1-718-482-4065
NYCDEP	1-718-699-9811
NYC Department of Health	1-212-676-2400
NYC Fire Department	911
National Response Center	1-800-424-8802
Poison Control	1-212-340-4494
Site Safety Officer	1-631-504-6000
Alternate Site Safety Officer	1-631-504-6000

7.3 Personnel Responsibilities During an Emergency

The project manager is primarily responsible for responding to and correcting any emergency situations. However, in the absence of the project manager, the site safety officer shall act as the project manager's on-site designee and perform the following tasks:

- Take appropriate measures to protect personnel including: withdrawal from the exclusion zone, evacuate and secure the site, or upgrade/downgrade the level of protective clothing and respiratory protection;

- Ensure that appropriate federal, state, and local agencies are informed and emergency response plans are coordinated. In the event of fire or explosion, the local fire department

should be summoned immediately. If toxic materials are released to the air, the local authorities should be informed in order to assess the need for evacuation;

- Ensure appropriate decontamination, treatment, or testing for exposed or injured personnel;
- Determine the cause of incidents and make recommendations to prevent recurrence; and,
- Ensure that all required reports have been prepared.

The following key personnel are planned for this project:

- Project Manager — Keith Butler (631) 504-6000
- Construction Superintendent — Kivi Weinberger (917) 588-2605
- Site Safety Officer — Thomas Gallo (631) 504-6000
- NYSDEC Project Manager — Chris Allan (718) 482-4065)
- NYSDOH Project Manager — Christine Vooris (518) 402-7860

7.4 Medical Emergencies

A person who becomes ill or injured in the exclusion zone will be decontaminated to the maximum extent possible. If the injury or illness is minor, full decontamination will be completed and first aid administered prior to transport. First aid will be administered while waiting for an ambulance or paramedics. A Field Accident Report (**Appendix D**) must be filled out for any injury.

A person transporting an injured/exposed person to a clinic or hospital for treatment will take the directions to the hospital (**Appendix D**).and information on the chemical(s) to which they may have been exposed (**Appendix C**).

7.5 Fire or Explosion

In the event of a fire or explosion, the local fire department will be summoned immediately. The site safety officer or his designated alternate will advise the fire commander of the location, nature and identification of the hazardous materials on-site. If it is safe to do so, site personnel may:

- use fire fighting equipment available on site; or,
- remove or isolate flammable or other hazardous materials that may contribute to the fire.

7.6 Evacuation Routes

Evacuation routes established by work area locations for each site will be reviewed prior to commencing site operations. As the work areas change, the evacuation routes will be altered accordingly, and the new route will be reviewed.

Under extreme emergency conditions, evacuation is to be immediate without regard for equipment. The evacuation signal will be a continuous blast of a vehicle horn, if possible, and/or

by verbal/radio communication. When evacuating the site, personnel will follow these instructions:

- Keep upwind of smoke, vapors, or spill location.
- Exit through the decontamination corridor if possible.
- If evacuation through the decontamination corridor is not possible, personnel should remove contaminated clothing once they are in a safe location and leave it near the exclusion zone or in a safe place.
- The site safety officer will conduct a head count to ensure that all personnel have been evacuated safely. The head count will be correlated to the site and/or exclusion zone entry/exit log.
- If emergency site evacuation is necessary, all personnel are to escape the emergency situation and decontaminate to the maximum extent practical.

7.7 Spill Control Procedures

Spills associated with site activities may be attributed to project equipment and include gasoline, diesel and hydraulic oil. In the event of a leak or a release, site personnel will inform their supervisor immediately, locate the source of spillage and stop the flow if it can be done safely. A spill containment kit including absorbent pads, booms and/or granulated speedy dry absorbent material will be available to site personnel to facilitate the immediate recovery of the spilled material. Daily inspections of site equipment components including hydraulic lines, fuel tanks, etc. will be performed by their respective operators as a preventative measure for equipment leaks and to ensure equipment soundness. In the event of a spill, site personnel will immediately notify the NYSDEC (1-800-457-7362), and a spill number will be generated.

7.8 Vapor Release Plan

If work zone organic vapor (excluding methane) exceeds 5 ppm, then a downwind reading will be made either 200 feet from the work zone or at the property line, whichever is closer. If readings at this location exceed 5 ppm over background, the work will be stopped.

If 5 ppm of VOCs are recorded over background on a PID at the property line, then an off-site reading will be taken within 20 feet of the nearest residential or commercial property, whichever is closer. If efforts to mitigate the emission source are unsuccessful for 30 minutes, then the designated site safety officer will:

- contact the local police;
- continue to monitor air every 30 minutes, 20 feet from the closest off-site property. If two successive readings are below 5 ppm (non-methane), off-site air monitoring will be halted.
- All property line and off site air monitoring locations and results associated with vapor releases will be recorded in the site safety log book.

APPENDIX A

SITE SAFETY ACKNOWLEDGEMENT FORM

DAILY BREIFING SIGN-IN SHEET

Date:_____ Person Conducting Briefing:_____

Project Name and Location:_____

1. AWARENESS (topics discussed, special safety concerns, recent incidents, etc…):

_____

_____

_____

_____

2. OTHER ISSUES (HASP changes, attendee comments, etc…):

_____

_____

_____

3. ATTENDEES (Print Name):

1.	11.
2.	12.
3.	13.
4.	14.
5.	15.
6.	16.
7.	17.
8.	18.
9.	19.
10.	20.

APPENDIX B

SITE SAFETY PLAN AMENDMENTS

SITE SAFETY PLAN AMENDMENT FORM

Site Safety Plan Amendment #: _____

Site Name: _____

Reason for Amendment: _____

_____

_____

_____

Alternative Procedures: _____

_____

_____

_____

Required Changes in PPE: _____

_____

_____

_____

_____ _____

Project Superintendent (signature) **Date**

_____ _____

Health and Safety Consultant (signature) **Date**

_____ _____

Site Safety Officer (signature) **Date**

APPENDIX C

CHEMICAL HAZARDS

CHEMICAL HAZARDS

The attached International Chemical Safety Cards are provided for contaminants of concern that have been identified in soils and/or groundwater at the site.

International Chemical Safety Cards

ACETONE

ICSC: 0087

2-Propanone
Dimethyl ketone
Methyl ketone
C_3H_6O / CH_3COCH_3
Molecular mass: 58.1

ICSC # 0087
CAS # 67-64-1
RTECS # AL3150000
UN # 1090
EC # 606-001-00-8
April 22, 1994 Validated
Fi, review at IHE: 10/09/89

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Highly flammable.	NO open flames, NO sparks, and NO smoking.	Powder, alcohol-resistant foam, water in large amounts, carbon dioxide.
EXPLOSION	Vapour/air mixtures are explosive.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Do NOT use compressed air for filling, discharging, or handling.	In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE			
•INHALATION	Sore throat. Cough. Confusion. Headache. Dizziness. Drowsiness. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN	Dry skin.	Protective gloves.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
•EYES	Redness. Pain. Blurred vision. Possible corneal damage.	Safety spectacles or face shield . Contact lenses should not be worn.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Nausea. Vomiting. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Personal protection: self-contained breathing apparatus. Ventilation. Collect leaking liquid in sealable containers. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Then wash away with plenty of water.	Fireproof. Separated from strong oxidants. Store in an area without drain or sewer access.	F symbol Xi symbol R: 11-36-66-67 S: 2-9-16-26 UN Hazard Class: 3 UN Packing Group: II

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0087

International Chemical Safety Cards

ACETONE

ICSC: 0087

I M P O R T A N T D A T A

PHYSICAL STATE; APPEARANCE:
COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS:
The vapour is heavier than air and may travel along the ground; distant ignition possible.

CHEMICAL DANGERS:
The substance can form explosive peroxides on contact with strong oxidants such as acetic acid, nitric acid, hydrogen peroxide. Reacts with chloroform and bromoform under basic conditions, causing fire and explosion hazard. Attacks plastic.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 500 ppm as TWA, 750 ppm as STEL; A4 (not classifiable as a human carcinogen); BEI issued; (ACGIH 2004).
MAK: 500 ppm 1200 mg/m³
Peak limitation category: I(2); Pregnancy risk group: D; (DFG 2006).
OSHA PEL†: TWA 1000 ppm (2400 mg/m^3)
NIOSH REL: TWA 250 ppm (590 mg/m^3)
NIOSH IDLH: 2500 ppm 10%LEL See: 67641

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation and through the skin.

INHALATION RISK:
A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20°C; on spraying or dispersing, however, much faster.

EFFECTS OF SHORT-TERM EXPOSURE:
The vapour irritates the eyes and the respiratory tract. The substance may cause effects on the central nervous system , liver , kidneys and gastrointestinal tract .

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the blood and bone marrow .

PHYSICAL PROPERTIES

Boiling point: 56°C
Melting point: -95°C
Relative density (water = 1): 0.8
Solubility in water:
miscible
Vapour pressure, kPa at 20°C: 24

Relative vapour density (air = 1): 2.0
Relative density of the vapour/air-mixture at 20°C (air = 1): 1.2
Flash point: -18°C c.c.
Auto-ignition temperature: 465°C
Explosive limits, vol% in air: 2.2-13
Octanol/water partition coefficient as log Pow: -0.24

ENVIRONMENTAL DATA

N O T E S

Use of alcoholic beverages enhances the harmful effect.

Transport Emergency Card: TEC (R)-30S1090

NFPA Code: H 1; F 3; R 0;
Card has been partially updated in July 2007: see Occupational Exposure Limits.
Card has been partially updated in January 2008: see Storage.

ADDITIONAL INFORMATION

International Chemical Safety Cards

m-XYLENE

ICSC: 0085

meta-Xylene
1,3-Dimethylbenzene
m-Xylol
$C_6H_4(CH_3)_2$ / C_8H_{10}
Molecular mass: 106.2

ICSC # 0085
CAS # 108-38-3
RTECS # ZE2275000
UN # 1307
EC # 601-022-00-9
August 03, 2002 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Flammable.	NO open flames, NO sparks, and NO smoking.	Powder, water spray, foam, carbon dioxide.
EXPLOSION	Above 27°C explosive vapour/air mixtures may be formed.	Above 27°C use a closed system, ventilation, and explosion-proof electrical equipment. Prevent build-up of electrostatic charges (e.g., by grounding).	In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE		STRICT HYGIENE!	
•INHALATION	Dizziness. Drowsiness. Headache. Nausea.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN	Dry skin. Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES	Redness. Pain.	Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Burning sensation. Abdominal pain. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Ventilation. Remove all ignition sources. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. (Extra personal protection: filter respirator for organic gases and vapours.)	Fireproof. Separated from strong oxidants strong acids	Note: C Xn symbol R: 10-20/21-38 S: 2-25 UN Hazard Class: 3 UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0085

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

m-XYLENE

ICSC: 0085

I M P O R T A N T D A T A

PHYSICAL STATE; APPEARANCE:
COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS:
As a result of flow, agitation, etc., electrostatic charges can be generated.

CHEMICAL DANGERS:
Reacts with strong acids strong oxidants

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 100 ppm as TWA 150 ppm as STEL A4 (ACGIH 2001). BEI (ACGIH 2001).
MAK: 100 ppm 440 mg/m³
Peak limitation category: II(2)
skin absorption (H);
Pregnancy risk group: D
(DFG 2005).
EU OEL: 50 ppm as TWA 100 ppm as STEL (skin) (EU 2000).
OSHA PEL†: TWA 100 ppm (435 mg/m^3)
NIOSH REL: TWA 100 ppm (435 mg/m^3) ST 150 ppm (655 mg/m^3)
NIOSH IDLH: 900 ppm See: 95476

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation, through the skin and by ingestion.

INHALATION RISK:
A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance is irritating to the eyes and the skin The substance may cause effects on the central nervous system If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
The liquid defats the skin. The substance may have effects on the central nervous system Animal tests show that this substance possibly causes toxicity to human reproduction or development.

PHYSICAL PROPERTIES

Boiling point: 139°C
Melting point: -48°C
Relative density (water = 1): 0.86
Solubility in water:
none
Vapour pressure, kPa at 20°C: 0.8

Relative vapour density (air = 1): 3.7
Relative density of the vapour/air-mixture at 20°C (air = 1): 1.02
Flash point: 27°C c.c.
Auto-ignition temperature: 527°C
Explosive limits, vol% in air: 1.1-7.0
Octanol/water partition coefficient as log Pow: 3.20

ENVIRONMENTAL DATA

The substance is toxic to aquatic organisms.

N O T E S

Depending on the degree of exposure, periodic medical examination is indicated. The recommendations on this Card also apply to technical xylene. See ICSC 0084 o-Xylene and 0086 p-Xylene.

NFPA Code: H 2; F 3; R 0;
Transport Emergency Card: TEC (R)-30S1307-III

ADDITIONAL INFORMATION

ICSC: 0085 **m-XYLENE**

International Chemical Safety Cards

p-XYLENE

ICSC: 0086

para-Xylene
1,4-Dimethylbenzene
p-Xylol
$C_6H_4(CH_3)_2$ / C_8H_{10}
Molecular mass: 106.2

ICSC # 0086
CAS # 106-42-3
RTECS # ZE2625000
UN # 1307
EC # 601-022-00-9
August 03, 2002 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Flammable.	NO open flames, NO sparks, and NO smoking.	Powder, water spray, foam, carbon dioxide.
EXPLOSION	Above 27°C explosive vapour/air mixtures may be formed.	Above 27°C use a closed system, ventilation, and explosion-proof electrical equipment. Prevent build-up of electrostatic charges (e.g., by grounding).	In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE		STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
•INHALATION	Dizziness. Drowsiness. Headache. Nausea.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN	Dry skin. Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES	Redness. Pain.	Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Burning sensation. Abdominal pain. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Ventilation. Remove all ignition sources. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. (Extra personal protection: filter respirator for organic gases and vapours.)	Fireproof. Separated from strong oxidants, strong acids	Note: C Xn symbol R: 10-20/21-38 S: 2-25 UN Hazard Class: 3 UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0086

International Chemical Safety Cards

p-XYLENE

ICSC: 0086

I M P O R T A N T D A T A	**PHYSICAL STATE; APPEARANCE:** COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR. **PHYSICAL DANGERS:** As a result of flow, agitation, etc., electrostatic charges can be generated. **CHEMICAL DANGERS:** Reacts with strong acids strong oxidants **OCCUPATIONAL EXPOSURE LIMITS:** TLV: 100 ppm as TWA 150 ppm as STEL A4 (ACGIH 2001). BEI (ACGIH 2001). MAK: 100 ppm 440 mg/m³ Peak limitation category: II(2) skin absorption (H); Pregnancy risk group: D (DFG 2005). EU OEL: 50 ppm as TWA 100 ppm as STEL (skin) (EU 2000). OSHA PEL†: TWA 100 ppm (435 mg/m^3) NIOSH REL: TWA 100 ppm (435 mg/m^3) ST 150 ppm (655 mg/m^3) NIOSH IDLH: 900 ppm See: 95476 **ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation, through the skin and by ingestion. **INHALATION RISK:** A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C. **EFFECTS OF SHORT-TERM EXPOSURE:** The substance is irritating to the eyes and the skin The substance may cause effects on the central nervous system If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis. **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** The liquid defats the skin. The substance may have effects on the central nervous system. Animal tests show that this substance possibly causes toxicity to human reproduction or development.
PHYSICAL PROPERTIES	Boiling point: 138°C Melting point: 13°C Relative density (water = 1): 0.86 Solubility in water: none Vapour pressure, kPa at 20°C: 0.9 Relative vapour density (air = 1): 3.7 Relative density of the vapour/air-mixture at 20°C (air = 1): 1.02 Flash point: 27°C c.c. Auto-ignition temperature: 528°C Explosive limits, vol% in air: 1.1-7.0 Octanol/water partition coefficient as log Pow: 3.15
ENVIRONMENTAL DATA	The substance is toxic to aquatic organisms. 

N O T E S

Depending on the degree of exposure, periodic medical examination is indicated. The recommendations on this Card also apply to technical xylene. See ICSC 0084 o-Xylene and 0085 m-Xylene.

Transport Emergency Card: TEC (R)-30S1307-III
NFPA Code: H 2; F 3; R 0;

ADDITIONAL INFORMATION

ICSC: 0086 **p-XYLENE**

International Chemical Safety Cards

o-XYLENE

ICSC: 0084

ortho-Xylene
1,2-Dimethylbenzene
o-Xylol
$C_6H_4(CH_3)_2$ / C_8H_{10}
Molecular mass: 106.2

ICSC # 0084
CAS # 95-47-6
RTECS # ZE2450000
UN # 1307
EC # 601-022-00-9
August 03, 2002 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Flammable.	NO open flames, NO sparks, and NO smoking.	Powder, water spray, foam, carbon dioxide.
EXPLOSION	Above 32°C explosive vapour/air mixtures may be formed.	Above 32°C use a closed system, ventilation, and explosion-proof electrical equipment. Prevent build-up of electrostatic charges (e.g., by grounding).	In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE		STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
•INHALATION	Dizziness. Drowsiness. Headache. Nausea.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN	Dry skin. Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES	Redness. Pain.	Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Burning sensation. Abdominal pain. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Ventilation. Remove all ignition sources. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. (Extra personal protection: filter respirator for organic gases and vapours.)	Fireproof. Separated from strong oxidants strong acids	Note: C Xn symbol R: 10-20/21-38 S: 2-25 UN Hazard Class: 3 UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0084

International Chemical Safety Cards

o-XYLENE

ICSC: 0084

I M P O R T A N T D A T A	**PHYSICAL STATE; APPEARANCE:** COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR. **PHYSICAL DANGERS:** As a result of flow, agitation, etc., electrostatic charges can be generated. **CHEMICAL DANGERS:** Reacts with strong acids strong oxidants **OCCUPATIONAL EXPOSURE LIMITS:** TLV: 100 ppm as TWA 150 ppm as STEL A4 (ACGIH 2001). BEI (ACGIH 2001). MAK: 100 ppm 440 mg/m³ Peak limitation category: II(2) skin absorption (H); Pregnancy risk group: D (DFG 2005). EU OEL: 50 ppm as TWA 100 ppm as STEL (skin) (EU 2000). OSHA PEL†: TWA 100 ppm (435 mg/m^3) NIOSH REL: TWA 100 ppm (435 mg/m^3) ST 150 ppm (655 mg/m^3) NIOSH IDLH: 900 ppm See: 95476 **ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation, through the skin and by ingestion. **INHALATION RISK:** A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C. **EFFECTS OF SHORT-TERM EXPOSURE:** The substance is irritating to the eyes and the skin The substance may cause effects on the central nervous system If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis. **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** The liquid defats the skin. The substance may have effects on the central nervous system. Exposure to the substance may enhance hearing damage caused by exposure to noise. Animal tests show that this substance possibly causes toxicity to human reproduction or development.
PHYSICAL PROPERTIES	Boiling point: 144°C Melting point: -25°C Relative density (water = 1): 0.88 Solubility in water: none Vapour pressure, kPa at 20°C: 0.7 Relative vapour density (air = 1): 3.7 Relative density of the vapour/air-mixture at 20°C (air = 1): 1.02 Flash point: 32°C c.c. Auto-ignition temperature: 463°C Explosive limits, vol% in air: 0.9-6.7 Octanol/water partition coefficient as log Pow: 3.12
ENVIRONMENTAL DATA	The substance is toxic to aquatic organisms. 

N O T E S

Depending on the degree of exposure, periodic medical examination is indicated. The recommendations on this Card also apply to technical xylene. See ICSC 0086 p-Xylene and 0085 m-Xylene.

Transport Emergency Card: TEC (R)-30S1307-III
NFPA Code: H 2; F 3; R 0;

ADDITIONAL INFORMATION

ICSC: 0084 **o-XYLENE**

International Chemical Safety Cards

INDENO(1,2,3-cd)PYRENE

ICSC: 0730

o-Phenylenepyrene
2,3-Phenylenepyrene
$C_{22}H_{12}$
Molecular mass: 276.3

ICSC # 0730
CAS # 193-39-5
RTECS # NK9300000
March 25, 1999 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE			In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION			
EXPOSURE		AVOID ALL CONTACT!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES		Safety spectacles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into covered containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.	Provision to contain effluent from fire extinguishing. Well closed.	R: S:

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0730

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

INDENO(1,2,3-cd)PYRENE

ICSC: 0730

I **M** **P**	**PHYSICAL STATE; APPEARANCE:** YELLOW CRYSTALS **PHYSICAL DANGERS:**	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation of its aerosol and through the skin. **INHALATION RISK:**

O R T A N T D A T A	**CHEMICAL DANGERS:** Upon heating, toxic fumes are formed. **OCCUPATIONAL EXPOSURE LIMITS:** TLV not established. MAK: Carcinogen category: 2; (DFG 2004).	Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly. **EFFECTS OF SHORT-TERM EXPOSURE:** **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** This substance is possibly carcinogenic to humans.
PHYSICAL PROPERTIES	Boiling point: 536°C Melting point: 164°C Solubility in water: none	Octanol/water partition coefficient as log Pow: 6.58
ENVIRONMENTAL DATA	This substance may be hazardous to the environment; special attention should be given to air quality and water quality. Bioaccumulation of this chemical may occur in fish. 	

N O T E S

Indeno(1,2,3-cd)pyrene is present as a component of polycyclic aromatic hydrocarbons (PAH) content in the environment usually resulting from the incomplete combustion or pyrolysis of organic matters, especially fossil fuels and tobacco.ACGIH recommends environment containing Indeno(1,2,3-c,d)pyrene should be evaluated in terms of the TLV-TWA for coal tar pitch volatile, as benzene soluble 0.2 mg/m^3. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken.

ADDITIONAL INFORMATION

ICSC: 0730 **INDENO(1,2,3-cd)PYRENE**

International Chemical Safety Cards

DIBENZO(a,h)ANTHRACENE

ICSC: 0431

1,25,6-Dibenzanthracene
$C_{22}H_{14}$
Molecular mass: 278.4

ICSC # 0431
CAS # 53-70-3
RTECS # HN2625000
EC # 601-041-00-2
October 23, 1995 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Water spray, powder.
EXPLOSION			
EXPOSURE		AVOID ALL CONTACT!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN	Redness. Swelling. Itching.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES	Redness.	Face shield or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Personal protection: P3 filter respirator for toxic particles.	Well closed.	T symbol N symbol R: 45-50/53 S: 53-45-60-61

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0431

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

DIBENZO(a,h)ANTHRACENE

ICSC: 0431

I

M

P

O

PHYSICAL STATE; APPEARANCE:
COLOURLESS CRYSTALLINE POWDER.

PHYSICAL DANGERS:

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation, through the skin and by ingestion.

INHALATION RISK:
Evaporation at 20°C is negligible; a harmful concentration

R T A N T D A T A	**CHEMICAL DANGERS:** **OCCUPATIONAL EXPOSURE LIMITS:** TLV not established.	of airborne particles can, however, be reached quickly. **EFFECTS OF SHORT-TERM EXPOSURE:** **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** The substance may have effects on the skin , resulting in photosensitization. This substance is probably carcinogenic to humans.
PHYSICAL PROPERTIES	Boiling point: 524°C Melting point: 267°C Relative density (water = 1): 1.28	Solubility in water: none Octanol/water partition coefficient as log Pow: 6.5
ENVIRONMENTAL DATA	Bioaccumulation of this chemical may occur in seafood. 	

N O T E S

This is one of many polycyclic aromatic hydrocarbons - standards are usually established for them as mixtures, e.g., coal tar pitch volatiles. However, it may be encountered as a laboratory chemical in its pure form. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken. Do NOT take working clothes home. DBA is a commonly used name. This substance is one of many polycyclic aromatic hydrocarbons (PAH).

ADDITIONAL INFORMATION

ICSC: 0431 **DIBENZO(a,h)ANTHRACENE**

International Chemical Safety Cards

CHRYSENE

ICSC: 1672

Benzoaphenanthrene
1,2-Benzophenanthrene
1,2,5,6-Dibenzonaphthalene
$C_{18}H_{12}$
Molecular mass: 228.3

ICSC # 1672
CAS # 218-01-9
RTECS # GC0700000
UN # 3077
EC # 601-048-00-0
October 12, 2006 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Water spray. Dry powder. Foam. Carbon dioxide.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE	See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE.	AVOID ALL CONTACT!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES		Safety goggles	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Personal protection: P3 filter respirator for toxic particles. Do NOT let this chemical enter the environment. Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place.	Separated from strong oxidants, Provision to contain effluent from fire extinguishing. Store in an area without drain or sewer access.	T symbol N symbol R: 45-68-50/53 S: 53-45-60-61 UN Hazard Class: 9 UN Packing Group: III Signal: Warning Aqua-Cancer Suspected of causing cancer Very toxic to aquatic life with long lasting effects Very toxic to aquatic life

SEE IMPORTANT INFORMATION ON BACK

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European

International Chemical Safety Cards

CHRYSENE

ICSC: 1672

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
COLOURLESS TO BEIGE CRYSTALS OR POWDER

PHYSICAL DANGERS:
Dust explosion possible if in powder or granular form, mixed with air.

CHEMICAL DANGERS:
The substance decomposes on burning producing toxic fumes Reacts violently with strong oxidants

OCCUPATIONAL EXPOSURE LIMITS:
TLV: A3 (confirmed animal carcinogen with unknown relevance to humans); (ACGIH 2006).
MAK not established.

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation of its aerosol, through the skin and by ingestion.

INHALATION RISK:
A harmful concentration of airborne particles can be reached quickly when dispersed

EFFECTS OF SHORT-TERM EXPOSURE:

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
This substance is possibly carcinogenic to humans.

PHYSICAL PROPERTIES

Boiling point: 448°C
Melting point: 254 - 256°C
Density: 1.3 g/cm³

Solubility in water:
very poor
Octanol/water partition coefficient as log Pow: 5.9

ENVIRONMENTAL DATA

The substance is very toxic to aquatic organisms. Bioaccumulation of this chemical may occur in seafood. It is strongly advised that this substance does not enter the environment.

NOTES

Depending on the degree of exposure, periodic medical examination is suggested. Do NOT take working clothes home. This substance does not usually occur as a pure substance but as a component of polyaromatic hydrocarbon (PAH) mixtures. Human population studies have associated PAH's exposure with cancer and cardiovascular diseases.

Transport Emergency Card: TEC (R)-90GM7-III

ADDITIONAL INFORMATION

International Chemical Safety Cards

BENZO(k)FLUORANTHENE

ICSC: 0721

Dibenzo(b,jk)fluorene
8,9-Benzofluoranthene
11,12-Benzofluoranthene
$C_{20}H_{12}$
Molecular mass: 252.3

ICSC # 0721
CAS # 207-08-9
RTECS # DF6350000
EC # 601-036-00-5
March 25, 1999 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE			In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION			
EXPOSURE		AVOID ALL CONTACT!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES		Safety spectacles or eye protection in combination with breathing protection if powder.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into covered containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.	Provision to contain effluent from fire extinguishing. Well closed.	T symbol N symbol R: 45-50/53 S: 53-45-60-61

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0721

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

BENZO(k)FLUORANTHENE

ICSC: 0721

I **M**	**PHYSICAL STATE; APPEARANCE:** YELLOW CRYSTALS	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation of its aerosol and through the skin.

P O R T A N T D A T A	**PHYSICAL DANGERS:** **CHEMICAL DANGERS:** Upon heating, toxic fumes are formed. **OCCUPATIONAL EXPOSURE LIMITS:** TLV not established. MAK: Carcinogen category: 2; (DFG 2004). **INHALATION RISK:** Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly. **EFFECTS OF SHORT-TERM EXPOSURE:** **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** This substance is possibly carcinogenic to humans.
PHYSICAL PROPERTIES	Boiling point: 480°C Melting point: 217°C Solubility in water: none Octanol/water partition coefficient as log Pow: 6.84
ENVIRONMENTAL DATA	This substance may be hazardous to the environment; special attention should be given to air quality and water quality. Bioaccumulation of this chemical may occur in crustacea and in fish. 

N O T E S

Benzo(k)fluoranthene is present as a component of polycyclic aromatic hydrocarbons (PAH) content in the environment usually resulting from the incomplete combustion or pyrolysis of organic matters, especially fossil fuels and tobacco.ACGIH recommends environment containing benzo(k)fluoranthene should be evaluated in terms of the TLV-TWA for coal tar pitch volatile, as benzene soluble 0.2 mg/m^3. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken.

ADDITIONAL INFORMATION

ICSC: 0721 **BENZO(k)FLUORANTHENE**

International Chemical Safety Cards

BENZO(g,h,i)FLUORANTHENE

ICSC: 0527

2,13-Benzofluoranthene
Benzo(mno)fluoranthene
$C_{18}H_{10}$
Molecular mass: 226.3

ICSC # 0527
CAS # 203-12-3
RTECS # DF6140000
March 25, 1998 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Water spray, powder.
EXPLOSION			
EXPOSURE		PREVENT DISPERSION OF DUST!	
•INHALATION		Local exhaust or breathing protection.	
•SKIN	MAY BE ABSORBED!	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention. Wear protective gloves when administering first aid.
•EYES		Safety goggles, face shield, or eye protection in combination with breathing protection if powder.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.	Well closed.	R: S:

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0527

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

BENZO(g,h,i)FLUORANTHENE

ICSC: 0527

I **M** **P**	**PHYSICAL STATE; APPEARANCE:** YELLOW CRYSTALS **PHYSICAL DANGERS:**	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation of its aerosol and through the skin.

O R T A N T D A T A	**CHEMICAL DANGERS:** The substance decomposes on heating producing toxic fumes. **OCCUPATIONAL EXPOSURE LIMITS:** TLV not established.	**INHALATION RISK:** **EFFECTS OF SHORT-TERM EXPOSURE:** **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** See Notes.
PHYSICAL PROPERTIES	Melting point: 149°C Solubility in water: none Vapour pressure, Pa at 20°C: <10	Relative vapour density (air = 1): 7.8 Relative density of the vapour/air-mixture at 20°C (air = 1): 1.0 Octanol/water partition coefficient as log Pow: 7.23
ENVIRONMENTAL DATA	This substance may be hazardous to the environment; special attention should be given to the total environment. In the food chain important to humans, bioaccumulation takes place, specifically in oils and fats. 	

N O T E S

Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken. Also consult ICSC #0720 and 0721.

ADDITIONAL INFORMATION

ICSC: 0527 **BENZO(g,h,i)FLUORANTHENE**

International Chemical Safety Cards

BENZO(b)FLUORANTHENE

ICSC: 0720

Benz(e)acephenanthrylene
2,3-Benzofluoroanthene
Benzo(e)fluoranthene
3,4-Benzofluoranthene
$C_{20}H_{12}$
Molecular mass: 252.3

ICSC # 0720
CAS # 205-99-2
RTECS # CU1400000
EC # 601-034-00-4
March 25, 1999 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE			In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION			
EXPOSURE		AVOID ALL CONTACT!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES		Safety spectacles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into covered containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.	Provision to contain effluent from fire extinguishing. Well closed.	T symbol N symbol R: 45-50/53 S: 53-45-60-61

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0720

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

BENZO(b)FLUORANTHENE

ICSC: 0720

I	**PHYSICAL STATE; APPEARANCE:** COLOURLESS CRYSTALS	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation

IMPORTANT DATA	**PHYSICAL DANGERS:** **CHEMICAL DANGERS:** Upon heating, toxic fumes are formed. **OCCUPATIONAL EXPOSURE LIMITS:** TLV: A2 (suspected human carcinogen); (ACGIH 2004). MAK: Carcinogen category: 2; (DFG 2004). of its aerosol and through the skin. **INHALATION RISK:** Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly. **EFFECTS OF SHORT-TERM EXPOSURE:** **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** This substance is possibly carcinogenic to humans. May cause genetic damage in humans.
PHYSICAL PROPERTIES	Boiling point: 481°C Melting point: 168°C Solubility in water: none Octanol/water partition coefficient as log Pow: 6.12
ENVIRONMENTAL DATA	This substance may be hazardous to the environment; special attention should be given to air quality and water quality. 

N O T E S

Benzo(b)fluoranthene is present as a component of polycyclic aromatic hydrocarbons (PAH) content in the environment usually resulting from the incomplete combustion or pyrolysis of organic matters, especially fossil fuels and tobacco.ACGIH recommends environment containing benzo(b)fluoranthene should be evaluated in terms of the TLV-TWA for coal tar pitch volatile, as benzene soluble 0.2 mg/m^3. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken.

ADDITIONAL INFORMATION

ICSC: 0720 **BENZO(b)FLUORANTHENE**

International Chemical Safety Cards

BENZO(a)PYRENE

ICSC: 0104

Benz(a)pyrene
3,4-Benzopyrene
Benzo(d,e,f)chrysene
$C_{20}H_{12}$
Molecular mass: 252.3

ICSC # 0104
CAS # 50-32-8
RTECS # DJ3675000
EC # 601-032-00-3
October 17, 2005 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Water spray, foam, powder, carbon dioxide.
EXPLOSION			
EXPOSURE	See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE.	AVOID ALL CONTACT! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN	MAY BE ABSORBED!	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES		Safety goggles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area! Personal protection: complete protective clothing including self-contained breathing apparatus. Do NOT let this chemical enter the environment. Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place.	Separated from strong oxidants.	T symbol N symbol R: 45-46-60-61-43-50/53 S: 53-45-60-61

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0104

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

BENZO(a)PYRENE

ICSC: 0104

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
PALE-YELLOW CRYSTALS

PHYSICAL DANGERS:

CHEMICAL DANGERS:
Reacts with strong oxidants causing fire and explosion hazard.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: Exposure by all routes should be carefully controlled to levels as low as possible A2 (suspected human carcinogen); (ACGIH 2005).
MAK:
Carcinogen category: 2; Germ cell mutagen group: 2; (DFG 2005).

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation of its aerosol, through the skin and by ingestion.

INHALATION RISK:
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.

EFFECTS OF SHORT-TERM EXPOSURE:

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
This substance is carcinogenic to humans. May cause heritable genetic damage to human germ cells. Animal tests show that this substance possibly causes toxicity to human reproduction or development.

PHYSICAL PROPERTIES

Boiling point: 496°C
Melting point: 178.1°C
Density: 1.4
g/cm³

Solubility in water: none (<0.1 g/100 ml)
Vapour pressure :
negligible
Octanol/water partition coefficient as log Pow: 6.04

ENVIRONMENTAL DATA

The substance is very toxic to aquatic organisms. Bioaccumulation of this chemical may occur in fish, in plants and in molluscs. The substance may cause long-term effects in the aquatic environment.

NOTES

Do NOT take working clothes home. Benzo(a)pyrene is present as a component of polycyclic aromatic hydrocarbons (PAHs) in the environment, usually resulting from the incomplete combustion or pyrolysis of organic matters, especially fossil fuels and tobacco.

ADDITIONAL INFORMATION

International Chemical Safety Cards

BENZ(a)ANTHRACENE

ICSC: 0385

1,2-Benzoanthracene
Benzo(a)anthracene
2,3-Benzphenanthrene
Naphthanthracene
$C_{18}H_{12}$
Molecular mass: 228.3

ICSC # 0385
CAS # 56-55-3
RTECS # CV9275000
EC # 601-033-00-9
October 23, 1995 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.		Water spray, powder. In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		AVOID ALL CONTACT!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES		Safety goggles face shield or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Personal protection: complete protective clothing including self-contained breathing apparatus.	Well closed.	T symbol N symbol R: 45-50/53 S: 53-45-60-61

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0385

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

ICSC: 0385

BENZ(a)ANTHRACENE

I M P O R T A N T D A T A

PHYSICAL STATE; APPEARANCE:
COLOURLESS TO YELLOW BROWN FLUORESCENT FLAKES OR POWDER.

PHYSICAL DANGERS:
Dust explosion possible if in powder or granular form, mixed with air.

CHEMICAL DANGERS:

OCCUPATIONAL EXPOSURE LIMITS:
TLV: A2 (suspected human carcinogen); (ACGIH 2004).
MAK:
Carcinogen category: 2 (as pyrolysis product of organic materials)
(DFG 2005).

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation, through the skin and by ingestion.

INHALATION RISK:
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.

EFFECTS OF SHORT-TERM EXPOSURE:

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
This substance is probably carcinogenic to humans.

PHYSICAL PROPERTIES

Sublimation point: 435°C
Melting point: 162°C
Relative density (water = 1): 1.274
Solubility in water:
none

Vapour pressure, Pa at 20°C: 292
Octanol/water partition coefficient as log Pow: 5.61

ENVIRONMENTAL DATA

Bioaccumulation of this chemical may occur in seafood.

N O T E S

This substance is one of many polycyclic aromatic hydrocarbons - standards are usually established for them as mixtures, e.g., coal tar pitch volatiles. However, it may be encountered as a laboratory chemical in its pure form. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken. Do NOT take working clothes home. Tetraphene is a common name. Card has been partly updated in October 2005 and August 2006: see sections Occupational Exposure Limits, EU classification.

ADDITIONAL INFORMATION

ICSC: 0385 **BENZ(a)ANTHRACENE**

International Chemical Safety Cards

CHLORDANE (TECHNICAL PRODUCT)

ICSC: 0740

1,2,4,5,6,7,8,8-Octachloro-2,3,3a,4,7,7a-hexahydro-4,7-methanoindene
1,2,4,5,6,7,8,8-Octachloro-2,3,3a,4,7,7a-hexahydro-4,7-methano-1H-indene
$C_{10}H_6Cl_8$
Molecular mass: 409.8

ICSC # 0740
CAS # 57-74-9
RTECS #
UN # 2996
EC # 602-047-00-8
March 26, 1998 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Liquid formulations containing organic solvents may be flammable. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames.	Alcohol-resistant foam, powder, carbon dioxide.
EXPLOSION			
EXPOSURE		PREVENT GENERATION OF MISTS! STRICT HYGIENE! AVOID EXPOSURE OF ADOLESCENTS AND CHILDREN!	IN ALL CASES CONSULT A DOCTOR!
•INHALATION	(See Ingestion).	Breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN	MAY BE ABSORBED!	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES	Redness. Pain.	Safety goggles face shield or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Confusion. Convulsions. Nausea. Vomiting.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rest. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Personal protection: chemical protection suit including self-contained breathing apparatus.	Provision to contain effluent from fire extinguishing. Separated from food and feedstuffs bases and incompatible materials See Chemical Dangers. Well closed. Keep in a well-ventilated room.	Do not transport with food and feedstuffs. Severe marine pollutant. Xn symbol N symbol R: 21/22-40-50/53 S: 2-36/37-60-61 UN Hazard Class: 6.1 UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

International Chemical Safety Cards

CHLORDANE (TECHNICAL PRODUCT)

ICSC: 0740

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
TECHNICAL: LIGHT YELLOW TO AMBER VISCOUS LIQUID

PHYSICAL DANGERS:

CHEMICAL DANGERS:
The substance decomposes on burning, on contact with bases producing toxic fumes including phosgene hydrogen chloride Attacks iron, zinc, plastic, rubber and coatings.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 0.5 mg/m³ as TWA (skin) A3 (confirmed animal carcinogen with unknown relevance to humans); (ACGIH 2004).
MAK: (Inhalable fraction) 0.5 mg/m³
Peak limitation category: II(8);
skin absorption (H);
Carcinogen category: 3B;
(DFG 2004).
OSHA PEL: TWA 0.5 mg/m^3 skin
NIOSH REL: Ca TWA 0.5 mg/m^3 skin See Appendix A
NIOSH IDLH: Ca 100 mg/m^3 See: 57749

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation, through the skin and by ingestion.

INHALATION RISK:
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly on spraying.

EFFECTS OF SHORT-TERM EXPOSURE:
Exposure at high levels may result in disorientation, tremors, convulsions, respiratory failure and death. Medical observation is indicated.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
The substance may have effects on the liver immune system , resulting in tissue lesions and liver impairment. This substance is possibly carcinogenic to humans.

PHYSICAL PROPERTIES

Boiling point at 0.27kPa: 175°C
Relative density (water = 1): 1.59-1.63
Solubility in water:
none

Vapour pressure, Pa at 25°C: 0.0013
Octanol/water partition coefficient as log Pow: 2.78

ENVIRONMENTAL DATA

The substance is very toxic to aquatic organisms. This substance may be hazardous to the environment; special attention should be given to soil organisms, honey bees. It is strongly advised that this substance does not enter the environment. The substance may cause long-term effects in the aquatic environment.

NOTES

If the substance is formulated with solvents also consult the ICSCs of these materials. Carrier solvents used in commercial formulations may change physical and toxicological properties. Belt, Chlor Kil, Chlortox, Corodan, Gold Crest, Intox, Kypchlor, Niran, Octachlor, Sydane, Synklor, Termi-Ded, Topiclor, and Toxichlor are trade names. Also consult ICSC 0743 Heptachlor.

Transport Emergency Card: TEC (R)-61GT6-III

ADDITIONAL INFORMATION

ICSC: 0740 **CHLORDANE (TECHNICAL PRODUCT)**

IMPORTANT LEGAL NOTICE:

International Chemical Safety Cards

DDT

ICSC: 0034

Dichlorodiphenyltrichloroethane
1,1,1-Trichloro-2,2-bis(p-chlorophenyl)ethane
2,2-bis(p-Chlorophenyl)-1,1,1-trichloroethane
1,1'-(2,2,2-Trichloroethylidene)bis(4-chlorobenzene)
p,p'-DDT
$C_{14}H_9Cl_5$
Molecular mass: 354.5

ICSC # 0034
CAS # 50-29-3
RTECS # KJ3325000
UN # 2761
EC # 602-045-00-7
April 20, 2004 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible. Liquid formulations containing organic solvents may be flammable. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames.	Powder, water spray, foam, carbon dioxide.
EXPLOSION			
EXPOSURE		PREVENT DISPERSION OF DUST! STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
•INHALATION	Cough.	Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES	Redness.	Safety goggles, or eye protection in combination with breathing protection if powder.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Tremors. Diarrhoea. Dizziness. Headache. Vomiting. Numbness. Paresthesias. Hyperexcitability. Convulsions.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Give a slurry of activated charcoal in water to drink. Rest. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Do NOT let this chemical enter the environment. Sweep spilled substance into sealable non-metallic containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Personal protection: P3 filter respirator for toxic particles.	Provision to contain effluent from fire extinguishing. Separated from iron, aluminum and its salts, food and feedstuffs See Chemical Dangers.	Do not transport with food and feedstuffs. Severe marine pollutant. T symbol N symbol R: 25-40-48/25-50/53 S: 1/2-22-36/37-45-60-61 UN Hazard Class: 6.1 UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

International Chemical Safety Cards

DDT

ICSC: 0034

I M P O R T A N T D A T A

PHYSICAL STATE; APPEARANCE:
COLOURLESS CRYSTALS WHITE POWDER.
TECHNICAL PRODUCT IS WAXY SOLID.

PHYSICAL DANGERS:

CHEMICAL DANGERS:
On combustion, forms toxic and corrosive fumesincludinghydrogen chloride. Reacts with aluminium and iron.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 1 mg/m³ as TWA A3 (ACGIH 2004).
MAK: 1 mg/m³ H
Peak limitation category: II(8)
(DFG 2003).
OSHA PEL: TWA 1 mg/m^3 skin
NIOSH REL: Ca TWA 0.5 mg/m^3 See Appendix A
NIOSH IDLH: Ca 500 mg/m^3 See: 50293

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by ingestion.

INHALATION RISK:
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly especially if powdered.

EFFECTS OF SHORT-TERM EXPOSURE:
May cause mechanical irritation. The substance may cause effects on the central nervous system , resulting in convulsions and respiratory depression Exposure at high levels may result in death. Medical observation is indicated.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
The substance may have effects on the central nervous system and liver. This substance is possibly carcinogenic to humans. Animal tests show that this substance possibly causes toxicity to human reproduction or development.

PHYSICAL PROPERTIES

Boiling point: 260°C
Melting point: 109°C
Density: 1.6
g/cm3

Solubility in water: poor
Octanol/water partition coefficient as log Pow: 6.36

ENVIRONMENTAL DATA

The substance is very toxic to aquatic organisms. This substance may be hazardous to the environment; special attention should be given to birds. Bioaccumulation of this chemical may occur along the food chain, for example in milk and aquatic organisms. This substance does enter the environment under normal use. Great care, however, should be given to avoid any additional release, e.g. through inappropriate disposal.

N O T E S

Depending on the degree of exposure, periodic medical examination is indicated. Carrier solvents used in commercial formulations may change physical and toxicological properties. Do NOT take working clothes home. Consult national legislation. Agritan, Azotox, Anofex, Ixodex, Gesapon, Gesarex, Gesarol, Guesapon, Clofenotane, Zeidane, Dicophane, Neocid are trade names.

Transport Emergency Card: TEC (R)-61GT7-III

ADDITIONAL INFORMATION

ICSC: 0034 **DDT**

MSDS : 2,2-Bis-(4-chlorophenyl)-1,1-dichloroethylene, 99%
CAS : 72-55-9
SYNONYMS : p,p'-DDE ; ethylene,1,1-dichloro-2,2-bis-(p-chlorophenyl)- ; DDT dehydrochloride ; DDE; 1-1'-(Dichloroethenylidene)bis(4-chlorobenzene)

Catalog of Chemical Suppliers, Buyers, Custom Synthesis Companies And Equipment Manufacturers
[2,2-Bis-(4-chlorophenyl)-1,1-dichloroethylene, 99% 72-55-9]

Suppliers:

Not Available

Buyers:

Not Available

**** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ****

CAS#	Chemical Name	%	EINECS#
72-55-9	2,2-Bis-(4-chlorophenyl)-1,1-dichloroethylene	99	200-784-6

Hazard Symbols: XN
Risk Phrases: 22 33

**** SECTION 3 - HAZARDS IDENTIFICATION ****

EMERGENCY OVERVIEW
Harmful if swallowed. Danger of cumulative effects.Cancer suspect agent.Possible risks of irreversible effects.

Potential Health Effects
Eye:
May cause eye irritation.
Skin:
May cause skin irritation.
Ingestion:
May cause irritation of the digestive tract. May be harmful if swallowed. Ingestion of large amounts may cause liver and/or kidney damage.
Inhalation:
May cause respiratory tract irritation.
Chronic:
May cause cancer according to animal studies. Adverse reproductive effects have been reported in animals. Laboratory experiments have resulted in mutagenic effects.

**** SECTION 4 - FIRST AID MEASURES ****

Eyes:
Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.
Skin:
Get medical aid. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.
Ingestion:
If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.
Inhalation:
Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician:
Treat symptomatically and supportively.

**** SECTION 5 - FIRE FIGHTING MEASURES ****

General Information:

As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Water runoff can cause environmental damage. Dike and collect water used to fight fire. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Will burn if involved in a fire.
Extinguishing Media:
For large fires, use water spray, fog or regular foam. For small fires, use dry chemical, carbon dioxide, water spray or regular foam. Cool containers with flooding quantities of water until well after fire is out.

**** SECTION 6 - ACCIDENTAL RELEASE MEASURES ****

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks:
Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Sweep up, then place into a suitable container for disposal. Avoid generating dusty conditions. Provide ventilation.

**** SECTION 7 - HANDLING and STORAGE ****

Handling:
Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Do not ingest or inhale. Use with adequate ventilation.
Storage:
Keep container closed when not in use. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

**** SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION ****

Engineering Controls:
Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.
Exposure Limits
CAS# 72-55-9:

Personal Protective Equipment

Eyes:
Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin:
Wear appropriate protective gloves to prevent skin exposure.
Clothing:
Wear appropriate protective clothing to prevent skin exposure.
Respirators:
A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

**** SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES ****

Physical State: Crystals
Color: white
Odor: None reported.
pH: Not available.
Vapor Pressure: 6.5106 mm Hg @ 20 C
Viscosity: Not available.
Boiling Point: 336 deg C
Freezing/Melting Point: 88.00 - 90.00 deg C
Autoignition Temperature: Not available.
Flash Point: Not available.
Explosion Limits, lower: Not available.
Explosion Limits, upper: Not available.
Decomposition Temperature:
Solubility in water: 0.010 ppm
Specific Gravity/Density:
Molecular Formula: C14H8Cl4
Molecular Weight: 318.02

**** SECTION 10 - STABILITY AND REACTIVITY ****

Chemical Stability:
Stable under normal temperatures and pressures.
Conditions to Avoid:
Incompatible materials, dust generation, strong oxidants.
Incompatibilities with Other Materials:
Strong oxidizing agents - strong bases.
Hazardous Decomposition Products:
Hydrogen chloride, carbon monoxide, carbon dioxide.
Hazardous Polymerization: Has not been reported.

**** SECTION 11 - TOXICOLOGICAL INFORMATION ****

RTECS#:
CAS# 72-55-9: KV9450000
LD50/LC50:
CAS# 72-55-9: Oral, mouse: LD50 = 700 mg/kg; Oral, rat: LD50 = 880 mg/kg.
Carcinogenicity:
2,2-Bis-(4-chlorophenyl)-1,1-dichloroethylene -
California: carcinogen, initial date 1/1/89

Other:
See actual entry in RTECS for complete information.

**** SECTION 12 - ECOLOGICAL INFORMATION ****

Ecotoxicity:
Estimated BCF value = 8,300 based on water solubility. Estimated Koc value = 8,300. There was no movement of DDE reported in soil column mobility experiments.

**** SECTION 13 - DISPOSAL CONSIDERATIONS ****

Dispose of in a manner consistent with federal, state, and local regulations.

**** SECTION 14 - TRANSPORT INFORMATION ****

IATA
Not regulated as a hazardous material.
IMO
Not regulated as a hazardous material.
RID/ADR
Not regulated as a hazardous material.
USA RQ: CAS# 72-55-9: 1 lb final RQ; 0.454 kg final RQ

**** SECTION 15 - REGULATORY INFORMATION ****

European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols: XN
Risk Phrases:
R 22 Harmful if swallowed.
R 33 Danger of cumulative effects.
Safety Phrases:
S 24/25 Avoid contact with skin and eyes.
WGK (Water Danger/Protection)
CAS# 72-55-9: 3
Canada
None of the chemicals in this product are listed on the DSL/NDSL list.
CAS# 72-55-9 is listed on Canada's Ingredient Disclosure List.
US FEDERAL
TSCA
CAS# 72-55-9 is not listed on the TSCA inventory.
It is for research and development use only.

**** SECTION 16 - ADDITIONAL INFORMATION ****

MSDS Creation Date: 9/28/1998 Revision #3 Date: 3/18/2003

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no way shall the company be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if the company has been advised of the possibility of such damages.

4-Cyano-4-Phenylpiperidine Hydrochloride, 99% (TLC)	51304-58-6
Methanesulfonamide	3144-09-0
gamma-Octanoic lactone, 98%	104-50-7
Cis,cis,cis,cis-1,2,3,4-cyclopentane- tetracarboxylic dianhydride,	4802-47-5
Tetrachloroethylene Carbonate, 98+%	22432-68-4
Oxamic Acid, 98%	471-47-6
1O,11-Dihydro-5H-Dibenzo(A,D)-Cycloheptene, 98%	833-48-7
Thallium (I) Sulfate, 99.9+%	7446-18-6
N-(2,6-Dimethylphenylcarbamoyl-Methyl)-Iminodiacetic Acid, 99%	59160-29-1
P-(Dimethylamino)cinnamic Acid, 99%	1552-96-1
Biebrich Scarlet, 99% (UV-VIS)	4196-99-0
4-Chlorobenzenediazonium hexafluoro- phosphate	1582-27-0
Ammonium hexachloroiridate(IV), 99.99%	16940-92-4
Methylamine-d2 deuteriochloride, 98+ atom % D	593-51-1
2,2-Bis-(4-chlorophenyl)-1,1-dichloroethylene, 99%	72-55-9
Nitro red	56431-61-9
Methyl 2,3-dichlorobenzoate, 98+%	2905-54-6
Isopropyl Bromoacetate, 98% (GC)	29921-57-1
1-Iodo-4-Nitrobenzene, 99%	636-98-6
4-Ethylcyclohexanol, 99% cis/trans mixture	4534-74-1
Fluorescamine	38183-12-9
Tris(2,2,6,6-Tetramethyl-3,5-Heptanedionato)Dysprosium(III), 99+%	15522-69-7
3-Amino-2,2,5,5-Tetramethyl-1-Pyrrolidinyloxy, 99% (Titr.)	34272-83-8
3,4-Dihydroxyphenylacetic Acid,98%	102-32-9

Material Safety Data Sheet

Version 4.0
Revision Date 03/12/2010
Print Date 12/09/2011

1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	4,4'-DDD PESTANAL,250 MG (2,2-BIS(4-CHL&
Product Number	:	35486
Brand	:	Fluka
Company	:	Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA
Telephone	:	+1 800-325-5832
Fax	:	+1 800-325-5052
Emergency Phone #	:	(314) 776-6555

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Toxic by ingestion, Harmful by skin absorption., Possible carcinogen.

GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)

H301	Toxic if swallowed.
H312	Harmful in contact with skin.
H351	Suspected of causing cancer.
H400	Very toxic to aquatic life.
H413	May cause long lasting harmful effects to aquatic life.

Precautionary statement(s)

P273	Avoid release to the environment.
P280	Wear protective gloves/protective clothing.
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.

HMIS Classification

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	0
Physical hazards:	0

NFPA Rating

Health hazard:	2
Fire:	0
Reactivity Hazard:	0

Potential Health Effects

Inhalation	May be harmful if inhaled. May cause respiratory tract irritation.
Skin	Harmful if absorbed through skin. May cause skin irritation.
Eyes	May cause eye irritation.
Ingestion	Toxic if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms : 1,1-Dichloro-2,2-bis(4-chlorophenyl)ethane
4,4′-DDD
TDE

Formula : $C_{14}H_{10}Cl_4$
Molecular Weight : 320.04 g/mol

CAS-No.	EC-No.	Index-No.	Concentration
2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane			
72-54-8	200-783-0	-	-

4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing give artificial respiration Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for fire-fighters
Wear self contained breathing apparatus for fire fighting if necessary.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid dust formation. Avoid breathing dust. Ensure adequate ventilation. Evacuate personnel to safe areas.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves.

Eye protection
Face shield and safety glasses

Skin and body protection
Choose body protection according to the amount and concentration of the dangerous substance at the work place.

Hygiene measures
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	solid

Safety data

pH	no data available
Melting point	94.0 - 96.0 °C (201.2 - 204.8 °F)
Boiling point	193.0 °C (379.4 °F) at 1.3 hPa (1.0 mmHg)
Flash point	no data available
Ignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Vapour pressure	< 0.00001 hPa (< 0.00001 mmHg) at 25.0 °C (77.0 °F)
Density	1.38 g/cm3
Water solubility	no data available
Partition coefficient: n-octanol/water	log Pow: 6.02

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Conditions to avoid
no data available

Materials to avoid
Strong oxidizing agents

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas
Hazardous decomposition products formed under fire conditions. - Nature of decomposition products not known.

11. TOXICOLOGICAL INFORMATION

Acute toxicity
LD50 Oral - Hamster - > 5,000 mg/kg

TDLo Oral - Human - 428.5 mg/kg
Remarks: Endocrine:Adrenal cortex hypoplasia.

TDLo Oral - rat - 6,000 mg/kg
Remarks: Cardiac:Other changes. Gastrointestinal:Other changes. Kidney, Ureter, Bladder:Changes in both tubules and glomeruli.

TDLo Oral - rat - 14 mg/kg
Remarks: Liver:Changes in liver weight. Endocrine:Estrogenic. Musculoskeletal:Other changes.

TDLo Oral - rat - 2,100 mg/kg
Remarks: Behavioral:Altered sleep time (including change in righting reflex).

LD50 Dermal - rabbit - 1,200 mg/kg
Remarks: Behavioral:Excitement. Behavioral:Convulsions or effect on seizure threshold. Skin irritation

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization
no data available

Germ cell mutagenicity

no data available

Carcinogenicity

This product is or contains a component that has been reported to be possibly carcinogenic based on its IARC, ACGIH, NTP, or EPA classification.

Limited evidence of carcinogenicity in animal studies

IARC:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
ACGIH:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity

no data available

Specific target organ toxicity - single exposure (GHS)
no data available

Specific target organ toxicity - repeated exposure (GHS)
no data available

Aspiration hazard
no data available

Potential health effects

Inhalation	May be harmful if inhaled. May cause respiratory tract irritation.
Ingestion	Toxic if swallowed.
Skin	Harmful if absorbed through skin. May cause skin irritation.

Eyes May cause eye irritation.

Signs and Symptoms of Exposure
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Additional Information
RTECS: KI0700000

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish	LC50 - other fish - 1.18 - 9 mg/l - 96.0 h
	LC50 - Lepomis macrochirus (Bluegill) - 0.04 - 0.05 mg/l - 96.0 h
	LC50 - Oncorhynchus mykiss (rainbow trout) - 0.06 - 0.09 mg/l - 96.0 h
	LC50 - Pimephales promelas (fathead minnow) - 3.47 - 5.58 mg/l - 96.0 h
Toxicity to daphnia and other aquatic invertebrates.	EC50 - Daphnia pulex (Water flea) - 0.01 mg/l - 48 h

Persistence and degradability
no data available

Bioaccumulative potential
Indication of bioaccumulation.

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

13. DISPOSAL CONSIDERATIONS

Product
Observe all federal, state, and local environmental regulations. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN-Number: 2811 Class: 6.1 Packing group: III
Proper shipping name: Toxic solids, organic, n.o.s. (2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane)
Reportable Quantity (RQ): 1 lbs
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN-Number: 2811 Class: 6.1 Packing group: III EMS-No: F-A, S-A
Proper shipping name: TOXIC SOLID, ORGANIC, N.O.S. (2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane)
Marine pollutant: No

IATA
UN-Number: 2811 Class: 6.1 Packing group: III
Proper shipping name: Toxic solid, organic, n.o.s. (2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane)

15. REGULATORY INFORMATION

OSHA Hazards
Toxic by ingestion, Harmful by skin absorption., Possible carcinogen.

DSL Status
This product contains the following components that are not on the Canadian DSL nor NDSL lists.

	CAS-No.
2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane	72-54-8

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Acute Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane	72-54-8	

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane	72-54-8	

New Jersey Right To Know Components

	CAS-No.	Revision Date
2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane	72-54-8	

California Prop. 65 Components

	CAS-No.	Revision Date
WARNING! This product contains a chemical known to the State of California to cause cancer. 2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane	72-54-8	

16. OTHER INFORMATION

Further information

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

International Chemical Safety Cards

ZINC POWDER

ICSC: 1205

Blue powder
Merrillite
Zn
Atomic mass: 65.4
(powder)

ICSC # 1205
CAS # 7440-66-6
RTECS # ZG8600000
UN # 1436 (zinc powder or dust)
EC # 030-001-00-1
October 24, 1994 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Highly flammable. Many reactions may cause fire or explosion. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames, NO sparks, and NO smoking. NO contact with acid(s), base (s) and incompatible substances (see Chemical Dangers).	Special powder, dry sand, NO other agents. NO water.
EXPLOSION	Risk of fire and explosion on contact with acid(s), base(s), water and incompatible substances.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Prevent build-up of electrostatic charges (e.g., by grounding). Prevent deposition of dust.	In case of fire: cool drums, etc., by spraying with water but avoid contact of the substance with water.
EXPOSURE		PREVENT DISPERSION OF DUST! STRICT HYGIENE!	
•**INHALATION**	Metallic taste and metal fume fever. Symptoms may be delayed (see Notes).	Local exhaust.	Fresh air, rest. Refer for medical attention.
•**SKIN**	Dry skin.	Protective gloves.	Rinse and then wash skin with water and soap.
•**EYES**		Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•**INGESTION**	Abdominal pain. Nausea. Vomiting.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Extinguish or remove all ignition sources. Do NOT wash away into sewer. Sweep spilled substance into containers. then remove to safe place. Personal protection: self-contained breathing apparatus.	Fireproof. Separated from acids, bases oxidants Dry.	Airtight. F symbol N symbol R: 15-17-50/53 S: 2-7/8-43-46-60-61 UN Hazard Class: 4.3 UN Subsidiary Risks: 4.2

SEE IMPORTANT INFORMATION ON BACK

International Chemical Safety Cards

ZINC POWDER

ICSC: 1205

I M P O R T A N T D A T A

PHYSICAL STATE; APPEARANCE:
ODOURLESS GREY TO BLUE POWDER.

PHYSICAL DANGERS:
Dust explosion possible if in powder or granular form, mixed with air. If dry, it can be charged electrostatically by swirling, pneumatic transport, pouring, etc.

CHEMICAL DANGERS:
Upon heating, toxic fumes are formed. The substance is a strong reducing agent and reacts violently with oxidants. Reacts with water and reacts violently with acids and bases forming flammable/explosive gas (hydrogen - see ICSC0001) Reacts violently with sulfur, halogenated hydrocarbons and many other substances causing fire and explosion hazard.

OCCUPATIONAL EXPOSURE LIMITS:
TLV not established.

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation and by ingestion.

INHALATION RISK:
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.

EFFECTS OF SHORT-TERM EXPOSURE:
Inhalation of fumes may cause metal fume fever. The effects may be delayed.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
Repeated or prolonged contact with skin may cause dermatitis.

PHYSICAL PROPERTIES

Boiling point: 907°C
Melting point: 419°C
Relative density (water = 1): 7.14
Solubility in water: reaction
Vapour pressure, kPa at 487°C: 0.1
Auto-ignition temperature: 460°C

ENVIRONMENTAL DATA

N O T E S

Zinc may contain trace amounts of arsenic, when forming hydrogen, may also form toxic gas arsine (see ICSC 0001 and ICSC 0222). Reacts violently with fire extinguishing agents such as water, halons, foam and carbon dioxide. The symptoms of metal fume fever do not become manifest until several hours later. Rinse contaminated clothes (fire hazard) with plenty of water.

Transport Emergency Card: TEC (R)-43GWS-II+III
NFPA Code: H0; F1; R1;

ADDITIONAL INFORMATION

ICSC: 1205 **ZINC POWDER**

International Chemical Safety Cards

NICKEL

ICSC: 0062

Ni
Atomic mass: 58.7
(powder)

ICSC # 0062
CAS # 7440-02-0
RTECS # QR5950000
EC # 028-002-00-7
October 17, 2001 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Flammable as dust. Toxic fumes may be released in a fire.		Dry sand. NO carbon dioxide. NO water.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		PREVENT DISPERSION OF DUST! AVOID ALL CONTACT!	
•INHALATION	Cough. Shortness of breath.	Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES		Safety spectacles, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Vacuum spilled material. Carefully collect remainder, then remove to safe place. Personal protection: P2 filter respirator for harmful particles.	Separated from strong acids.	Xn symbol R: 40-43 S: 2-22-36

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0062

International Chemical Safety Cards

NICKEL

ICSC: 0062

I

PHYSICAL STATE; APPEARANCE:
SILVERY METALLIC SOLID IN VARIOUS FORMS.

PHYSICAL DANGERS:

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation of the dust.

IMPORTANT DATA	Dust explosion possible if in powder or granular form, mixed with air. **CHEMICAL DANGERS:** Reacts violently, in powder form, with titanium powder and potassium perchlorate, and oxidants such as ammonium nitrate, causing fire and explosion hazard. Reacts slowly with non-oxidizing acids and more rapidly with oxidizing acids. Toxic gases and vapours (such as nickel carbonyl) may be released in a fire involving nickel. **OCCUPATIONAL EXPOSURE LIMITS:** TLV: (Inhalable fraction) 1.5 mg/m³ as TWA A5 (not suspected as a human carcinogen); (ACGIH 2004). MAK: (Inhalable fraction) sensitization of respiratory tract and skin (Sah); Carcinogen category: 1; (DFG 2004). OSHA PEL*†: TWA 1 mg/m^3 *Note: The PEL does not apply to Nickel carbonyl. NIOSH REL*: Ca TWA 0.015 mg/m^3 See Appendix A *Note: The REL does not apply to Nickel carbonyl. NIOSH IDLH: Ca 10 mg/m^3 (as Ni) See: 7440020	**INHALATION RISK:** Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed. **EFFECTS OF SHORT-TERM EXPOSURE:** May cause mechanical irritation. Inhalation of fumes may cause pneumonitis. **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** Repeated or prolonged contact may cause skin sensitization. Repeated or prolonged inhalation exposure may cause asthma. Lungs may be affected by repeated or prolonged exposure. This substance is possibly carcinogenic to humans.
PHYSICAL PROPERTIES	Boiling point: 2730°C Melting point: 1455°C Density: 8.9 g/cm3	Solubility in water: none
ENVIRONMENTAL DATA		

N O T E S

At high temperatures, nickel oxide fumes will be formed. Depending on the degree of exposure, periodic medical examination is suggested. The symptoms of asthma often do not become manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation are therefore essential. Anyone who has shown symptoms of asthma due to this substance should avoid all further contact with this substance.

ADDITIONAL INFORMATION

ICSC: 0062 **NICKEL**

International Chemical Safety Cards

MERCURY

ICSC: 0056

Quicksilver
Liquid silver
Hg
Atomic mass: 200.6

ICSC # 0056
CAS # 7439-97-6
RTECS # OV4550000
UN # 2809
EC # 080-001-00-0
April 22, 2004 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION	Risk of fire and explosion.		In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE		STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN! AVOID EXPOSURE OF ADOLESCENTS AND CHILDREN!	IN ALL CASES CONSULT A DOCTOR!
•INHALATION	Abdominal pain. Cough. Diarrhoea. Shortness of breath. Vomiting. Fever or elevated body temperature.	Local exhaust or breathing protection.	Fresh air, rest. Artificial respiration if indicated. Refer for medical attention.
•SKIN	MAY BE ABSORBED! Redness.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
•EYES		Face shield, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work. Wash hands before eating.	Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area in case of a large spill! Consult an expert! Ventilation. Collect leaking and spilled liquid in sealable non-metallic containers as far as possible. Do NOT wash away into sewer. Do NOT let this chemical enter the environment. Chemical protection suit including self-contained breathing apparatus.	Provision to contain effluent from fire extinguishing. Separated from food and feedstuffs Well closed.	Special material. Do not transport with food and feedstuffs. T symbol N symbol R: 23-33-50/53 S: 1/2-7-45-60-61 UN Hazard Class: 8 UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

MERCURY

ICSC: 0056

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
ODOURLESS, HEAVY AND MOBILE SILVERY LIQUID METAL.

PHYSICAL DANGERS:

CHEMICAL DANGERS:
Upon heating, toxic fumes are formed. Reacts violently with ammonia and halogens causing fire and explosion hazard. Attacks aluminium and many other metals forming amalgams.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 0.025 mg/m³ as TWA (skin) A4 BEI issued (ACGIH 2004).
MAK: 0.1 mg/m³ Sh
Peak limitation category: II(8) Carcinogen category: 3B (DFG 2003).
OSHA PEL†: C 0.1 mg/m^3
NIOSH REL: Hg Vapor: TWA 0.05 mg/m^3 skin
Other: C 0.1 mg/m^3 skin
NIOSH IDLH: 10 mg/m^3 (as Hg) See: 7439976

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation of its vapour and through the skin , also as a vapour!

INHALATION RISK:
A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20°C.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance is irritating to the skin. Inhalation of the vapours may cause pneumonitis. The substance may cause effects on the central nervous systemandkidneys. The effects may be delayed. Medical observation is indicated.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
The substance may have effects on the central nervous system kidneys , resulting in irritability, emotional instability, tremor, mental and memory disturbances, speech disorders. Danger of cumulative effects. Animal tests show that this substance possibly causes toxic effects upon human reproduction.

PHYSICAL PROPERTIES

Boiling point: 357°C
Melting point: -39°C
Relative density (water = 1): 13.5
Solubility in water:
none

Vapour pressure, Pa at 20°C: 0.26
Relative vapour density (air = 1): 6.93
Relative density of the vapour/air-mixture at 20°C (air = 1): 1.009

ENVIRONMENTAL DATA

The substance is very toxic to aquatic organisms. In the food chain important to humans, bioaccumulation takes place, specifically in fish.

N O T E S

Depending on the degree of exposure, periodic medical examination is indicated. No odour warning if toxic concentrations are present. Do NOT take working clothes home.

Transport Emergency Card: TEC (R)-80GC9-II+III

ADDITIONAL INFORMATION

ICSC: 0056 **MERCURY**

International Chemical Safety Cards

LEAD

ICSC: 0052

Lead metal
Plumbum
Pb
Atomic mass: 207.2
(powder)

ICSC # 0052
CAS # 7439-92-1
RTECS # OF7525000
October 08, 2002 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE	See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE.	PREVENT DISPERSION OF DUST! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES		Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Abdominal pain. Nausea. Vomiting.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Give plenty of water to drink. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment. Personal protection: P3 filter respirator for toxic particles.	Separated from food and feedstuffs incompatible materials See Chemical Dangers.	R: S:

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0052

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

LEAD

ICSC: 0052

I M P O R T A N T D A T A

PHYSICAL STATE; APPEARANCE:
BLUISH-WHITE OR SILVERY-GREY SOLID IN VARIOUS FORMS. TURNS TARNISHED ON EXPOSURE TO AIR.

PHYSICAL DANGERS:
Dust explosion possible if in powder or granular form, mixed with air.

CHEMICAL DANGERS:
On heating, toxic fumes are formed. Reacts with oxidants. Reacts with hot concentrated nitric acid, boiling concentrated hydrochloric acid and sulfuric acid. Attacked by pure water and by weak organic acids in the presence of oxygen.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 0.05 mg/m³ A3 (confirmed animal carcinogen with unknown relevance to humans); BEI issued (ACGIH 2004).
MAK:
Carcinogen category: 3B; Germ cell mutagen group: 3A; (DFG 2004).
EU OEL: as TWA 0.15 mg/m³ (EU 2002).
OSHA PEL*: 1910.1025 TWA 0.050 mg/m^3 See Appendix C *Note: The PEL also applies to other lead compounds (as Pb) -- see Appendix C.
NIOSH REL*: TWA 0.050 mg/m^3 See Appendix C *Note: The REL also applies to other lead compounds (as Pb) -- see Appendix C.
NIOSH IDLH: 100 mg/m^3 (as Pb) See: 7439921

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation and by ingestion.

INHALATION RISK:
A harmful concentration of airborne particles can be reached quickly when dispersed, especially if powdered.

EFFECTS OF SHORT-TERM EXPOSURE:

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
The substance may have effects on the blood bone marrow central nervous system peripheral nervous system kidneys , resulting in anaemia, encephalopathy (e.g., convulsions), peripheral nerve disease, abdominal cramps and kidney impairment. Causes toxicity to human reproduction or development.

PHYSICAL PROPERTIES		
	Boiling point: 1740°C	Density: 11.34 g/cm3
	Melting point: 327.5°C	Solubility in water: none

ENVIRONMENTAL DATA	
	Bioaccumulation of this chemical may occur in plants and in mammals. It is strongly advised that this substance does not enter the environment. 

N O T E S

Depending on the degree of exposure, periodic medical examination is suggested. Do NOT take working clothes home.

Transport Emergency Card: TEC (R)-51S1872

ADDITIONAL INFORMATION

ICSC: 0052 **LEAD**

International Chemical Safety Cards

COPPER

ICSC: 0240

Cu
(powder)

ICSC # 0240
CAS # 7440-50-8
RTECS # GL5325000
September 24, 1993 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Special powder, dry sand, NO other agents.
EXPLOSION			
EXPOSURE		PREVENT DISPERSION OF DUST!	
•INHALATION	Cough. Headache. Shortness of breath. Sore throat.	Local exhaust or breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN	Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES	Redness. Pain.	Safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Abdominal pain. Nausea. Vomiting.	Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers. Carefully collect remainder. Then remove to safe place. (Extra personal protection: P2 filter respirator for harmful particles).	Separated from - See Chemical Dangers.	R: S:

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0240

International Chemical Safety Cards

COPPER

ICSC: 0240

I

M

P

PHYSICAL STATE; APPEARANCE:
RED POWDER, TURNS GREEN ON EXPOSURE TO MOIST AIR.

PHYSICAL DANGERS:

CHEMICAL DANGERS:

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation and by ingestion.

INHALATION RISK:
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.

O **R** **T** **A** **N** **T** **D** **A** **T** **A**	Shock-sensitive compounds are formed with acetylenic compounds, ethylene oxides and azides. Reacts with strong oxidants like chlorates, bromates and iodates, causing explosion hazard. **OCCUPATIONAL EXPOSURE LIMITS:** TLV: 0.2 mg/m³ fume (ACGIH 1992-1993). TLV (as Cu, dusts & mists): 1 mg/m³ (ACGIH 1992-1993). Intended change 0.1 mg/m³ Inhal., A4 (not classifiable as a human carcinogen); MAK: 0.1 mg/m³ (Inhalable fraction) Peak limitation category: II(2) Pregnancy risk group: D (DFG 2005). OSHA PEL*: TWA 1 mg/m^3 *Note: The PEL also applies to other copper compounds (as Cu) except copper fume. NIOSH REL*: TWA 1 mg/m^3 *Note: The REL also applies to other copper compounds (as Cu) except Copper fume. NIOSH IDLH: 100 mg/m^3 (as Cu) See: 7440508	**EFFECTS OF SHORT-TERM EXPOSURE:** Inhalation of fumes may cause metal fume fever. See Notes. **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** Repeated or prolonged contact may cause skin sensitization.

PHYSICAL PROPERTIES	Boiling point: 2595°C Melting point: 1083°C Relative density (water = 1): 8.9	Solubility in water: none
ENVIRONMENTAL DATA		

N O T E S

The symptoms of metal fume fever do not become manifest until several hours.

ADDITIONAL INFORMATION

ICSC: 0240 **COPPER**

IMPORTANT LEGAL NOTICE:	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

CHROMIUM

ICSC: 0029

Chrome
Cr
Atomic mass: 52.0
(powder)

ICSC # 0029
CAS # 7440-47-3
RTECS # GB4200000
October 27, 2004 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible under specific conditions.	No open flames if in powder form.	In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION		Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		PREVENT DISPERSION OF DUST!	
•**INHALATION**	Cough.	Local exhaust or breathing protection.	Fresh air, rest.
•**SKIN**		Protective gloves.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
•**EYES**	Redness.	Safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•**INGESTION**		Do not eat, drink, or smoke during work.	Rinse mouth.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Personal protection: P2 filter respirator for harmful particles.		R: S:

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0029

International Chemical Safety Cards

CHROMIUM

ICSC: 0029

I

M

P

PHYSICAL STATE; APPEARANCE:
GREY POWDER

PHYSICAL DANGERS:
Dust explosion possible if in powder or granular form, mixed with air.

ROUTES OF EXPOSURE:

INHALATION RISK:
A harmful concentration of airborne particles can be reached quickly when dispersed.

O R T A N T D A T A	**CHEMICAL DANGERS:** Chromium is a catalytic substance and may cause reaction in contact with many organic and inorganic substances , causing fire and explosion hazard. **OCCUPATIONAL EXPOSURE LIMITS:** TLV: (as Cr metal, Cr(III) compounds) 0.5 mg/m³ as TWA A4 (ACGIH 2004). MAK not established. OSHA PEL*: TWA 1 mg/m^3 See Appendix C *Note: The PEL also applies to insoluble chromium salts. NIOSH REL: TWA 0.5 mg/m^3 See Appendix C NIOSH IDLH: 250 mg/m^3 (as Cr) See: 7440473 **EFFECTS OF SHORT-TERM EXPOSURE:** May cause mechanical irritation tothe eyesandthe respiratory tract. **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
PHYSICAL PROPERTIES	Boiling point: 2642°C Melting point: 1900°C Density: 7.15 g/cm³ Solubility in water: none
ENVIRONMENTAL DATA	

N O T E S

The surface of the chromium particles is oxidized to chromium(III)oxide in air. See ICSC 1531 Chromium(III) oxide.

ADDITIONAL INFORMATION

ICSC: 0029 **CHROMIUM**

IMPORTANT LEGAL NOTICE:	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

CADMIUM

ICSC: 0020

Cd
Atomic mass: 112.4

ICSC # 0020
CAS # 7440-43-9
RTECS # EU9800000
UN # 2570
EC # 048-002-00-0
April 22, 2005 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Flammable in powder form and spontaneously combustible in pyrophoric form. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames, NO sparks, and NO smoking. NO contact with heat or acid(s).	Dry sand. Special powder. NO other agents.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		PREVENT DISPERSION OF DUST! AVOID ALL CONTACT!	IN ALL CASES CONSULT A DOCTOR!
•**INHALATION**	Cough. Sore throat.	Local exhaust or breathing protection.	Fresh air, rest. Refer for medical attention.
•**SKIN**		Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•**EYES**	Redness. Pain.	Safety goggles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•**INGESTION**	Abdominal pain. Diarrhoea. Headache. Nausea. Vomiting.	Do not eat, drink, or smoke during work.	Rest. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area! Personal protection: chemical protection suit including self-contained breathing apparatus. Remove all ignition sources. Sweep spilled substance into containers. Carefully collect remainder, then remove to safe place.	Fireproof. Dry. Keep under inert gas. Separated from igntion sources, oxidants acids, food and feedstuffs	Airtight. Unbreakable packaging; put breakable packaging into closed unbreakable container. Do not transport with food and feedstuffs. Note: E T+ symbol N symbol R: 45-26-48/23/25-62-63-68-50/53 S: 53-45-60-61 UN Hazard Class: 6.1

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0020

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

CADMIUM

ICSC: 0020

I M P O R T A N T D A T A

PHYSICAL STATE; APPEARANCE:
SOFT BLUE-WHITE METAL LUMPS OR GREY POWDER. MALLEABLE. TURNS BRITTLE ON EXPOSURE TO 80°C AND TARNISHES ON EXPOSURE TO MOIST AIR.

PHYSICAL DANGERS:
Dust explosion possible if in powder or granular form, mixed with air.

CHEMICAL DANGERS:
Reacts with acids forming flammable/explosive gas (hydrogen - see ICSC0001.) Dust reacts with oxidants, hydrogen azide, zinc, selenium or tellurium , causing fire and explosion hazard.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: (Total dust) 0.01 mg/m³
(Respirable fraction)
0.002 mg/m³ as TWA A2 (suspected human carcinogen); BEI issued (ACGIH 2005).
MAK: skin absorption (H);
Carcinogen category: 1; Germ cell mutagen group: 3A; (DFG 2004).
OSHA PEL*: 1910.1027 TWA 0.005 mg/m^3 *Note: The PEL applies to all Cadmium compounds (as Cd).
NIOSH REL*: Ca See Appendix A *Note: The REL applies to all Cadmium compounds (as Cd).
NIOSH IDLH: Ca 9 mg/m^3 (as Cd) See: IDLH INDEX

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation of its aerosol and by ingestion.

INHALATION RISK:
A harmful concentration of airborne particles can be reached quickly when dispersed, especially if powdered.

EFFECTS OF SHORT-TERM EXPOSURE:
The fume is irritating to the respiratory tract Inhalation of fume may cause lung oedema (see Notes). Inhalation of fumes may cause metal fume fever. The effects may be delayed. Medical observation is indicated.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
Lungs may be affected by repeated or prolonged exposure to dust particles. The substance may have effects on the kidneys , resulting in kidney impairment This substance is carcinogenic to humans.

PHYSICAL PROPERTIES

Boiling point: 765°C
Melting point: 321°C
Density: 8.6
g/cm3

Solubility in water: none
Auto-ignition temperature: (cadmium metal dust) 250°C

ENVIRONMENTAL DATA

N O T E S

Reacts violently with fire extinguishing agents such as water,foam,carbon dioxideand halons. Depending on the degree of exposure, periodic medical examination is indicated. The symptoms of lung oedema often do not become manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation are therefore essential. Do NOT take working clothes home. Cadmium also exists in a pyrophoric form (EC No. 048-011-00-X), which bears the additional EU labelling symbol F, R phrase 17, and S phrases 7/8 and 43. UN numbers and packing group will vary according to the physical form of the substance.

ADDITIONAL INFORMATION

International Chemical Safety Cards

BARIUM SULFATE

ICSC: 0827

Barium sulphate
Blanc fixe
Artificial barite
$BaSO_4$
Molecular mass: 233.43

ICSC # 0827
CAS # 7727-43-7
RTECS # CR0600000
October 20, 1999 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION			
EXPOSURE		PREVENT DISPERSION OF DUST!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
•EYES		Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Personal protection: P1 filter respirator for inert particles.		R: S:

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0827

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

BARIUM SULFATE

ICSC: 0827

IMPORTANT DATA	**PHYSICAL STATE; APPEARANCE:** ODOURLESS TASTELESS, WHITE OR YELLOWISH CRYSTALS OR POWDER. **PHYSICAL DANGERS:** **CHEMICAL DANGERS:** Reacts violently with aluminium powder. **OCCUPATIONAL EXPOSURE LIMITS:** TLV: 10 mg/m³ as TWA; (ACGIH 2004). MAK: (Inhalable fraction) 4 mg/m³; (Respirable fraction) 1.5 mg/m³; (DFG 2004). OSHA PEL†: TWA 15 mg/m^3 (total) TWA 5 mg/m^3 (resp) NIOSH REL: TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp) NIOSH IDLH: N.D. See: IDLH INDEX **ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation of its aerosol. **INHALATION RISK:** Evaporation at 20°C is negligible; a nuisance-causing concentration of airborne particles can, however, be reached quickly. **EFFECTS OF SHORT-TERM EXPOSURE:** **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** Lungs may be affected by repeated or prolonged exposure to dust particles , resulting in baritosis (a form of benign pneumoconiosis).
PHYSICAL PROPERTIES	Melting point (decomposes): 1600°C Density: 4.5 g/cm³ Solubility in water: none
ENVIRONMENTAL DATA	

NOTES

Occurs in nature as the mineral barite; also as barytes, heavy spar. Card has been partly updated in October 2005. See section Occupational Exposure Limits.

ADDITIONAL INFORMATION

IMPORTANT LEGAL NOTICE:	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

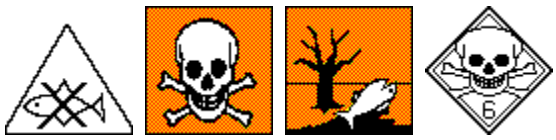
International Chemical Safety Cards

ARSENIC

ICSC: 0013

Grey arsenic
As
Atomic mass: 74.9

ICSC # 0013
CAS # 7440-38-2
RTECS # CG0525000
UN # 1558
EC # 033-001-00-X
October 18, 1999 Peer reviewed



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames. NO contact with strong oxidizers. NO contact with hot surfaces.	Powder, water spray, foam, carbon dioxide.
EXPLOSION	Risk of fire and explosion is slight when exposed to hot surfaces or flames in the form of fine powder or dust.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		PREVENT DISPERSION OF DUST! AVOID ALL CONTACT! AVOID EXPOSURE OF (PREGNANT) WOMEN!	IN ALL CASES CONSULT A DOCTOR!
•INHALATION	Cough. Sore throat. Shortness of breath. Weakness. See Ingestion.	Closed system and ventilation.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.
•SKIN	Redness.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
•EYES	Redness.	Face shield or eye protection in combination with breathing protection if powder.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Abdominal pain. Diarrhoea. Nausea. Vomiting. Burning sensation in the throat and chest. Shock or collapse. Unconsciousness.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area! Sweep spilled substance into sealable containers. Carefully collect remainder, then remove to safe place. Chemical protection suit including self-contained breathing apparatus. Do NOT let this chemical enter the environment.	Separated from strong oxidants, acids, halogens, food and feedstuffs. Well closed.	Do not transport with food and feedstuffs. Marine pollutant. T symbol N symbol R: 23/25-50/53 S: 1/2-20/21-28-45-60-61 UN Hazard Class: 6.1 UN Packing Group: II

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0013

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

ARSENIC

ICSC: 0013

I M P O R T A N T D A T A

PHYSICAL STATE; APPEARANCE:
ODOURLESS, BRITTLE, GREY, METALLIC-LOOKING CRYSTALS.

PHYSICAL DANGERS:

CHEMICAL DANGERS:
Upon heating, toxic fumes are formed. Reacts violently with strong oxidants and halogens, causing fire and explosion hazard. Reacts with acids to produce

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 0.01 mg/m³ as TWA A1 (confirmed human carcinogen); BEI issued (ACGIH 2004).
MAK:
Carcinogen category: 1; Germ cell mutagen group: 3A; (DFG 2004).
OSHA PEL: 1910.1018 TWA 0.010 mg/m^3
NIOSH REL: Ca C 0.002 mg/m^3 15-minute See Appendix A
NIOSH IDLH: Ca 5 mg/m^3 (as As) See: 7440382

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation of its aerosol and by ingestion.

INHALATION RISK:
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly, when dispersed.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance is irritating to the eyes the skin and the respiratory tract. The substance may cause effects on the gastrointestinal tract cardiovascular system central nervous system kidneys , resulting in severe gastroenteritis, loss of fluid, and electrolytes, cardiac disorders shock convulsions and kidney impairment Exposure above the OEL may result in death. The effects may be delayed. Medical observation is indicated.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the mucous membranes, skin, peripheral nervous system liver bone marrow , resulting in pigmentation disorders, hyperkeratosis, perforation of nasal septum, neuropathy, liver impairment anaemia This substance is carcinogenic to humans. Animal tests show that this substance possibly causes toxicity to human reproduction or development.

PHYSICAL PROPERTIES

Sublimation point: 613°C
Density: 5.7 g/cm³

Solubility in water:
none

ENVIRONMENTAL DATA

The substance is toxic to aquatic organisms. It is strongly advised that this substance does not enter the environment.

N O T E S

The substance is combustible but no flash point is available in literature. Depending on the degree of exposure, periodic medical examination is suggested. Do NOT take working clothes home. Refer also to cards for specific arsenic compounds, e.g., Arsenic pentoxide (ICSC 0377), Arsenic trichloride (ICSC 0221), Arsenic trioxide (ICSC 0378), Arsine (ICSC 0222).

Transport Emergency Card: TEC (R)-61GT5-II

ADDITIONAL INFORMATION

IMPORTANT LEGAL NOTICE:

APPENDIX D

HOSPITAL INFORMATION AND MAP

FIELD ACCIDENT REPORT

FIELD ACCIDENT REPORT

This report is to be filled out by the designated Site Safety Officer after EVERY accident.

PROJECT NAME _____ PROJECT. NO._____

Date of Accident _____ Time _____ Report By _____

Type of Accident (Check One):

( ) Vehicular ( ) Personal ( ) Property

Name of Injured _____ DOB or Age _____

How Long Employed _____

Names of Witnesses _____

_____

Description of Accident _____

_____

_____

Action Taken _____

_____

_____

Did the Injured Lose Any Time? _____ How Much (Days/Hrs.)? _____

Was Safety Equipment in Use at the Time of the Accident (Hard Hat, Safety Glasses, Gloves, Safety Shoes, etc.)? _____

_____

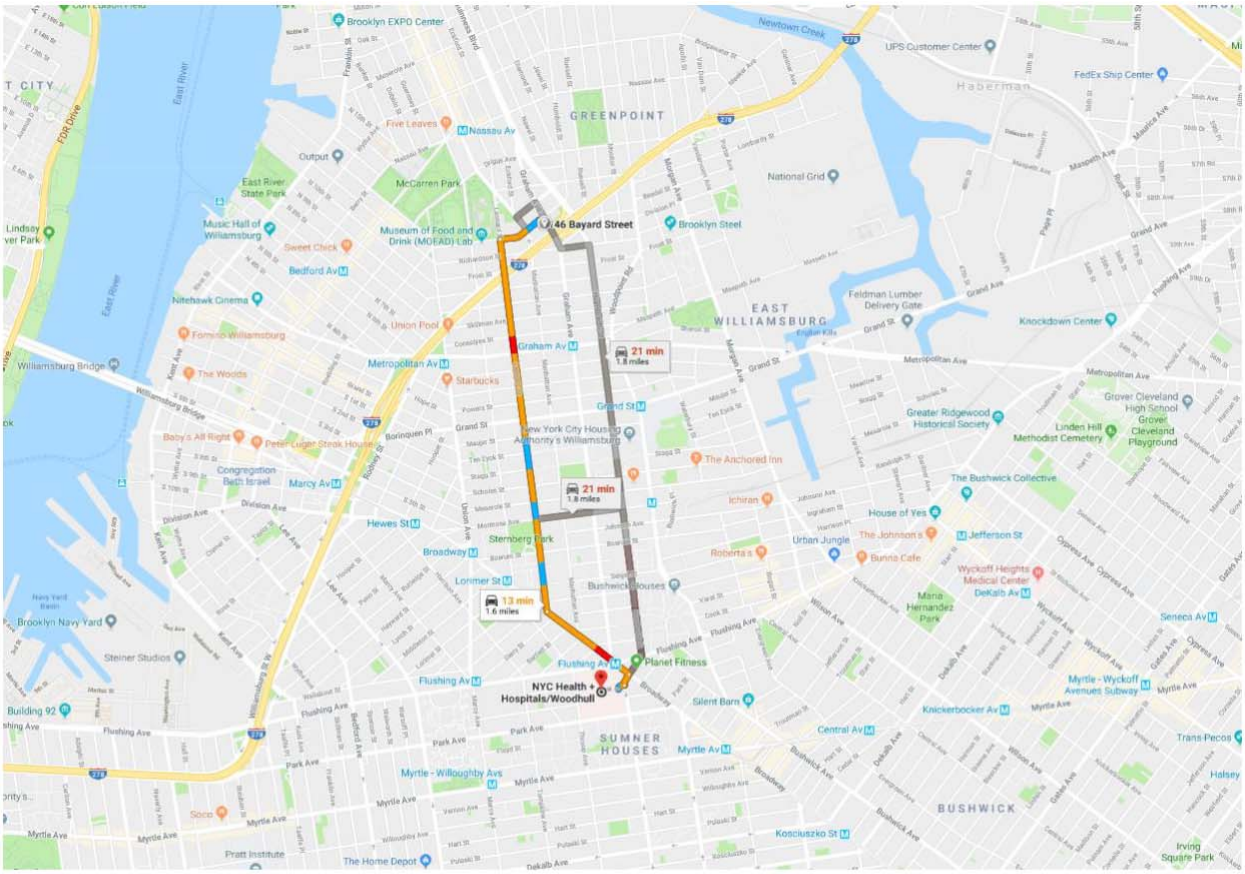
(If not, it is the EMPLOYEE'S sole responsibility to process his/her claim through his/her Health and Welfare Fund.)

INDICATE STREET NAMES, DESCRIPTION OF VEHICLES, AND NORTH ARROW

HOSPITAL INFORMATION AND MAP

The hospital nearest the site is:

NYC Health + Hospitals/Woodhull
760 Broadway, Brooklyn, NY 11206
718-963-8000
2.3 Miles – About 17 Minutes



146 Bayard St
Brooklyn, NY 11222

- Head southwest on Bayard St toward Manhattan Ave — 0.1 mi
- Turn left at the 2nd cross street onto Leonard St — 1.1 mi
- Turn left onto Broadway — 0.3 mi
- Turn right onto Marcus Garvey Blvd/Sumner Ave — 197 ft
- Turn right — Destination will be on the right — 135 ft

NYC Health + Hospitals/Woodhull
760 Broadway, Brooklyn, NY 11206

ATTACHMENT C
Quality Assurance Project Plan

QUALITY ASSURANCE PROJECT PLAN
146 BAYARD STREET SITE
146 Bayard Street, Brooklyn, NY

Prepared on behalf of:

Bayard Holdings, LLC
670 Myrtle Ave Suite 370
Brooklyn, NY 11211

June 2020

Prepared by:

EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
1808 MIDDLE COUNTRY ROAD
RIDGE, NY 11961

TABLE OF CONTENTS

QUALITY ASSURANCE PROJECT PLAN
146 BAYARD STREET SITE
146 Bayard Street, Brooklyn, NY

TABLES

1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) has been prepared in accordance with DER-10 to detail procedures to be followed during the course of the sampling and analytical portion of the project, as required by the approved Remedial Action Work Plan.

To ensure the successful completion of the project each individual responsible for a given component of the project must be aware of the quality assurance objectives of his / her particular work and of the overall project. The EBC Project Director, Charles Sosik will be directly responsible to the client for the overall project conduct and quality assurance/quality control (QA/QC) for the project. The Project Director will be responsible for overseeing all technical and administrative aspects of the project and for directing QA/QC activities. Ms Chawinie Reilly will serve as the Quality Assurance Officer (QAO) and in this role may conduct:

- conduct periodic field and sampling audits;
- interface with the analytical laboratory to resolve problems; and
- interface with the data validator and/or the preparer of the DUSR to resolve problems.

Keith Butler will serve as the Project Manager and will be responsible for implementation of the Remedial Investigation and coordination with field sampling crews and subcontractors. Reporting directly to the Project Manager will be the Field Operations Officer, Tom Gallo; who will serve as the on-Site environmental professional who will record observations and be responsible for the collection and handling of all samples.

1.1 Organization

Project QA will be maintained under the direction of the Project Manager, in accordance with this QAPP. QC for specific tasks will be the responsibility of the individuals and organizations listed below, under the direction and coordination of the Project Manager.

GENERAL RESPONSIBILITY	SCOPE OF WORK	RESPONSIBILITY OF QUALITY CONTROL
Remedial Engineer	Overall responsibility for the Remedial Action	Ariel Czemerinski, AMC
Field Operations	Supervision of Field Crew, sample collection and handling	Thomas Gallo, EBC
Project Manager	Implementation of the remedial action according to the RAWP.	Keith Butler, EBC
Quality Assurance Officer	Interface with laboratory, validator and field crew to identify / resolve data quality issues.	C. Reilly, EBC
Laboratory Analysis	Laboratory Analysis of soil/groundwater samples for PFAS by NYSDEC ASP methods	Alpha Analytical Inc. PFAS
Laboratory Analysis	Laboratory Analysis of soil and groundwater samples 1,4-dioxane by NYSDEC ASP methods	Phoenix Environmental Laboratories, Inc.
Data review	Review for completeness and compliance	3rd party validation – Koman Government Solutions, LLC – Sherri Pullar

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2.0 QUALITY ASSURANCE PROJECT PLAN OBJECTIVES

2.1 Overview

Overall project goals are defined through the development of Data Quality Objectives (DQOs), which are qualitative and quantitative Statements that specify the quality of the data required to support decisions; DQOs, as described in this section, are based on the end uses of the data as described in the work plan.

In this plan, Quality Assurance and Quality Control are defined as follows:

- Quality Assurance - The overall integrated program for assuring reliability of monitoring and measurement data.

- Quality Control - The routine application of procedures for obtaining prescribed standards of performance in the monitoring and measurement process.

2.2 QA / QC Requirements for Analytical Laboratory

Samples will be analyzed by a New York State Department of Health (NYSDOH) certified laboratory that is certified in the appropriate categories. Data generated from the laboratory will be used to evaluate contaminants such as chlorinated and other volatile organic compounds (VOCs) in soil, soil gas and groundwater. The QA requirements for all subcontracted analytical laboratory work performed on this project are described below. QA elements to be evaluated include accuracy, precision, sensitivity, representativeness, and completeness. The data generated by the analytical laboratory for this project are required to be sensitive enough to achieve required quantification limits as specified in NYSDEC Analytical Services Protocol (NYSDEC ASP, 07/2005) and useful for comparison with clean-up objectives. The analytical results meeting the required quantification limits will provide data sensitive enough to meet the data quality objectives of this remedial program as described in the work plan. Reporting of the data must be clear, concise, and comprehensive. The QC elements that are important to this project are completeness of field data, sample custody, sample holding times, sample preservation, sample storage, instrument calibration and blank contamination.

2.2.1 Instrument Calibration

Calibration curves will be developed for each of the compounds to be analyzed. Standard concentrations and a blank will be used to produce the initial curves. The development of calibration curves and initial calibration response factors must be consistent with method requirements presented in the most recent version of NYSDEC ASP 07/2005).

2.2.2 Continuing Instrument Calibration

The initial calibration curve will be verified every 12 hrs by analyzing one calibration standard. The standard concentration will be the midpoint concentration of the initial calibration curve. The calibration check compound must come within 25% relative percent difference (RPD) of the average response factor obtained during initial calibration. If the RPD is greater than 25%, then corrective action must be taken as provided in the specific methodology.

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2.2.3 Method Blanks

Method blank or preparation blank is prepared from an analyte·free matrix which includes the same reagents, internal standards and surrogate standards as me related samples. II is carried through the entire sample preparation and analytical procedure. A method blank analysis will be performed once for each 12 hr period during the analysis of samples for volatiles. An acceptable method blank will contain less than two (2) times the CRQL of methylene chloride, acetone and 2-butanone. For all other target compounds, the method blank must contain less than or equal to the CRQL of any single target compound. For non-target peaks in the method blank, the peak area must be less than 10 percent of the nearest internal standard. The method blank will be used to demonstrate the level of laboratory background and reagent contamination that might result from the analytical process itself.

2.2.4 Trip Blanks.

Trip blanks consist of a single set of sample containers filled at the laboratory with deionized. laboratory-grade water. The water used will be from the same source as that used for the laboratory method blank. The containers will be carried into the field and handled and transported in the same way as the samples collected that day. Analysis of the trip blank for VOCs is used to identify contamination from the air, shipping containers, or from other items coming in contact with the sample bottles. (The bottles holding the trip blanks will be not opened during this procedure.) A complete set of trip blanks will be provided with each shipment of samples to the certified laboratory.

2.2.5 Surrogate Spike Analysis

For organic analyses, all samples and blanks will be spiked with surrogate compounds before purging or extraction in order to monitor preparation and analyses of samples. Surrogate spike recoveries shall fall within the advisory limits in accordance with the NY5DEC ASP protocols for samples falling within the quantification limits without dilution.

2.2.6 Matrix Spike / Matrix Spike Duplicate / Matrix Spike Blank (MS/MSDIMSB) Analysis

MS, MSD and MSB analyses will be performed to evaluate the matrix effect of the sample upon the analytical methodology along with the precision of the instrument by measuring recoveries. The MS / MSD / MSB samples will be analyzed for each group of samples of a similar matrix at a rate of 5% (one for every 20 field samples). The RPD will be calculated from the difference between the MS and MSD. Matrix spike blank analysis will be performed to indicate the appropriateness of the spiking solution(s) used for the MS/MSD. 10% of the samples of each matrix should be sampled and anlayzed as Duplicates.

2.3 Accuracy

Accuracy is defined as the nearness of a real or the mean (x) of a set of results to the true value. Accuracy is assessed by means of reference samples and percent recoveries. Accuracy includes both precision and recovery and is expressed as percent recovery (% REC). The MS sample is used to determine the percent recovery. The matrix spike percent recovery (% REC) is calculated by the following equation:

$$\%REC = \frac{SSR - SR}{SA} \times 100$$

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Where:
SSR = spike sample results
SR = sample results
SA = spike added from spiking mix

2.4 Precision

Precision is defined as the measurement of agreement of a set of replicate results among themselves without a Precision is defined as the measurement of agreement of a set of replicate results among themselves without assumption of any prior information as to the true result. Precision is assessed by means of duplicate/replicate sample analyses.

Analytical precision is expressed in terms of RPD. The RPD is calculated using the following formula:

$$RPD = \frac{D^1 - D^2}{(D^1 + D^2)/2} \times 100$$

Where:
RPD = relative percent difference
D^1 = first sample value
D^2 = second sample value (duplicate)

2.5 Sensitivity

The sensitivity objectives for this plan require that data generated by the analytical laboratory achieve quantification levels low enough to meet the required detection limits specified by NYSDEC ASP and to meet all site-specific standards, criteria and guidance values (SGCs) established for this project.

2.6 Representativeness

Representativeness is a measure of the relationship of an individual sample taken from a particular site to the remainder of that site and the relationship of a small aliquot of the sample (i.e., the one used in the actual analysis) to the sample remaining on site. The representativeness of samples is assured by adherence to sampling procedures described in the Remedial Investigation Work Plan.

2.7 Completeness

Completeness is a measure of the quantity of data obtained from a measurement system as compared to the amount of data expected from the measurement system. Completeness is defined as the percentage of all results that are not affected by failing QC qualifiers, and should be between 70 and 100% of all analyses performed. The objective of completeness in laboratory reporting is to provide a thorough data support package. The laboratory data package provides documentation of sample analysis and results in the form of summaries, QC data, and raw analytical data. The laboratory will be required to submit data packages that follow NYSDEC ASP Category B reporting format which, at a minimum, will include the following components:

1. All sample chain-of-custody forms.
2. The case narrative(s) presenting a discussion of any problems and/or procedural changes required during analyses. Also presented in the case narrative are sample summary forms.
3. Documentation demonstrating the laboratory's ability to attain the contract specified detection limits for all target analytes in all required matrices.
4. Tabulated target compound results and tentatively identified compounds.
5. Surrogate spike analysis results (organics).

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6. Matrix spike/matrix spike duplicate/matrix spike blank results.
7. QC check sample and standard recovery results
8. Blank results (field, trip, and method).
9. Internal standard area and RT summary.

2.8 Laboratory Custody Procedures

The following elements are important for maintaining the field custody of samples:

- Sample identification
- Sample labels
- Custody records
- Shipping records
- Packaging procedures

Sample labels will be attached to all sampling bottles before field activities begin; each label will contain an identifying number. Each number will have a suffix that identifies the site and where the sample was taken. Approximate sampling locations will be marked on a map with a description of the sample location. The number, type of sample, and sample identification will be entered into the field logbook. A chain-of-custody form, initiated at the analytical laboratory will accompany the sample bottles from the laboratory into the field. Upon receipt of the bottles and cooler, the sampler will sign and date the first received blank space. After each sample is collected and appropriately identified, entries will be made on the chain-of-custody form that will include:

- Site name and address
- Samplers' names and signatures

2.9 Sample Handling and Decontamination Procedures

Collected samples will be appropriately packaged, placed in coolers and shipped via overnight courier or delivered directly to the analytical laboratory by field personnel. Samples will be containerized in appropriate laboratory provided glassware and shipped in plastic coolers. Samples will be preserved through the use of ice or cold-pak(s) to maintain a temperature of 4^{o}C.

Dedicated disposable sampling materials will be used for both soil and groundwater samples (if collected), eliminating the need to prepare field equipment (rinsate) blanks. However, if non-disposable equipment is used, (stainless steel scoop, etc.) field rinsate blanks will be prepared at the rate of 1 for every eight samples collected. No field filtering will be conducted; any required filtration will be completed by the laboratory.

Decontamination of non-dedicated sampling equipment will consist of the following:

- Gently tap or scrape to remove adhered soil;
- Rinse with tap water;
- Wash with alconox® detergent solution and scrub ;
- Rinse with tap water;
- Rinse with distilled or deionized water.

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Prepare field blanks by pouring distilled or deionized water over decontaminated equipment and collecting the water in laboratory provided containers. Trip blanks will accompany samples each time they are transported to the laboratory. Matrix spike and matrix spike duplicates (MS/MSD) will be collected at the rate of one per 20 samples submitted to the laboratory and duplicate samples will be collected at a rate of one per ten samples submitted to the laboratory.

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3.0 ANALYTICAL PROCEDURES

3.1 Laboratory Analysis

Samples will be analyzed by the NYSDOH ELAP laboratory for one or more of the following parameters: VOCs in soil by USEPA Method 8260C, SVOCs in soil by USEPA Method 8270D, Target Analyte List (TAL) Metals 6010 in soil, pesticides / PCBs by USEPA Method 8081B/8082A, 21 PFAS compounds by USEPA Method 537 Modified and 1,4 dioxane by USEPA 8270. (Table 2). If any modifications or additions to the standard procedures are anticipated and if any nonstandard sample preparation or analytical protocol is to be used, the modifications and the nonstandard protocol will be explicitly defined and documented. Prior approval by EBC's PM will be necessary for any nonstandard analytical or sample preparation protocol used by the laboratory, i.e., dilution of samples or extracts by greater than a factor of five (5).

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4.0 DATA REDUCTION, REVIEW, AND REPORTING

4.1 Overview

The process of data reduction, review, and reporting ensures the assessments or a conclusion based on the final data accurately reflects actual site conditions. This plan presents the specific procedures, methods, and format that will be employed for data reduction, review and reporting of each measurement parameter determined in the laboratory and field. Also described in this section is the process by which all data, reports, and work plans are proofed and checked for technical and numerical errors prior to final submission.

4.2 Data Reduction

Standard methods and references will be used as guidelines for data handling, reduction, validation, and reporting. All data for the project will be compiled and summarized with an independent verification at each step in the process to prevent transcription/typographical errors. Any computerized entry of data will also undergo verification review.

Sample analysis will be provided by a New York State certified environmental laboratory. Laboratory reports will include ASP category B deliverables for use in the preparation of a data usability summary report (DUSR). All results will be provided in accordance with the NYSDEC Environmental Information Management System (EIMS) electronic data deliverable (EDD) format. Analytical results shall be presented on standard NYSDEC ASP-B forms or equivalents, and include the dates the samples were received and analyzed, and the actual methodology used. Note that if waste characterization samples are analyzed they will be in results only format and will not be evaluated in the DUSR.

Laboratory QA/QC information required by the method protocols will be compiled, including the application of data QA/QC qualifiers as appropriate. In addition, laboratory worksheets, laboratory notebooks, chains-of-custody, instrument logs, standards records, calibration records, and maintenance records, as applicable, will be provided in the laboratory data packages to determine the validity of data. Specifics on internal laboratory data reduction protocols are identified in the laboratory's SOPs.

Following receipt of the laboratory analytical results by EBC, the data results will be compiled and presented in an appropriate tabular form. Where appropriate, the impacts of QA/QC qualifiers resulting from laboratory or external validation reviews will be assessed in terms of data usability.

4.3 Laboratory Data Reporting

All sample data packages submitted by the analytical laboratory will be required to be reported in conformance to the NYSDEC ASP (7/2005), Category B data deliverable requirements as applicable to the method utilized. All results will be provided in accordance with the NYSDEC Environmental Information Management System (EIMS) electronic data deliverable (EDD) format. Note that waste characterization samples, if analyzed, will be in results only format and will not be evaluated in the DUSR.

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5.0 CORRECTIVE ACTION

Review and implementation of systems and procedures may result in recommendations for corrective action. Any deviations from the specified procedures within approved project plans due to unexpected site-specific conditions shall warrant corrective action. All errors, deficiencies, or other problems shall be brought to the immediate attention of the EBC PM, who in turn shall contact the Quality Assurance/Data Quality Manager or his designee (if applicable).

Procedures have been established to ensure that conditions adverse to data quality are promptly investigated, evaluated and corrected. These procedures for review and implementation of a change are as follows:

- Define the problem.
- Investigate the cause of the problem.
- Develop a corrective action to eliminate the problem, in consultation with the personnel who defined the problem and who will implement the change.
- Complete the required form describing the change and its rationale (see below for form requirements).
- Obtain all required written approvals.
- Implement the corrective action.
- Verify that the change has eliminated the problem.

During the field investigation, all changes to the sampling program will be documented in field logs/sheets and the EBC PM advised.

If any problems occur with the laboratory or analyses, the laboratory must immediately notify the PM, who will consult with other project staff. All approved corrective actions shall be controlled and documented.

All corrective action documentation shall include an explanation of the problem and a proposed solution which will be maintained in the project file or associated logs. Each report must be approved by the necessary personnel (e.g., the PM) before implementation of the change occurs. The PM shall be responsible for controlling, tracking, implementing and distributing identified changes.

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TABLE 1
SUMMARY OF
SAMPLING PROGRAM RATIONALE AND ANALYSIS

Matrix	Location	Approximate Number of Samples	Frequency	Rationale for Sampling	Laboratory Analysis	Duplicates	Matrix Spikes	Spike Duplicates	Trip Blanks
Soil	Site Wide Excavation	10	1 per 900 square feet of excavation base	Endpoint Verification of excavations	VOCs EPA Method 8260B, pesticides, SVOCs EPA Method 8270, Pesticides / PCBs by EPA 8081/8082, and TAL Metals EPA 6010	1 per day	1 per 20 samples	1 per 20 samples	1 per trip
Soil	Site Wide Excavation	2	20% of Site Wide Samples	Endpoint Verification of excavations	21 PFAS Compounds by EPA Method 537 Modified, 1,4-dioxane EPA 8270.	1 per day	1 per 20 samples	1 per 20 samples	1 per trip
Soil	Excavated Historic Fill Material	2	1 per 800 cy	Waste Characterization for disposal if not stockpiled on site	VOCs EPA Method 8260B, PAHs EPA Method 8270, RCRA metals, pesticides and PCBs by EPA 8081/8082, other as per disposal facility	0	0	0	0
Soil	Excavated Uncontaminated Native Soil	9	7 Grabs for 1st 1,000 cy, 2 for each additional 1,000 cy As per CP51	Clean Verification for disposal if not stockpiled.	VOCs EPA Method 8260B	0	0	0	0
Soil	Excavated Uncontaminated Native Soil	2	2 Composites for 1st 1,000 cy, 1 for each additional 1,000 cy As per CP51	Clean Verification for disposal if not stockpiled.	SVOCs, pesticides/and PCBs by EPA 8081/8082, and RCRA metals.	0	0	0	0

TABLE 2
SAMPLE COLLECTION AND ANALYSIS PROTOCOLS

Sample Type	Matrix	Sampling Device	Parameter	Sample Container	Sample Preservation	Analytical Method#	CRQL / MDLH	Holding Time
Grab	Soil	Scoop Direct into Jar	VOCs	(1) 2 oz Jar	Cool to 4^{o} C	EPA Method 8260C (test method 5035A)	Compound specific (1-5 ug/kg)	14 days
Grab	Soil	Scoop Direct into Jar	SVOCs	(1) 8 oz jar	Cool to 4^{o} C	EPA Method 8270D	Compound specific (1-5 ug/kg)	14 day ext/40 days
Grab	Soil	Scoop Direct into Jar	Pest/PCBs	from 8oz jar above	Cool to 4^{o} C	EPA Method 8081B/8082A	Compound specific (1-5 ug/kg)	14 day ext/40 days
Grab	Soil	Scoop Direct into Jar	Metals	from 8oz jar above	Cool to 4^{o} C	TAL Metals 6010	Compound specific (01-1 mg/kg)	6 months
Grab	Soil	Scoop Direct into Jar	1,4 – dioxane	(1) 8 oz jar	Cool to 4^{o} C Water ice only	Method 8270 SIM	[0.1 mg/kg (ppm)]	14 days 40 days after extraction
Grab	Soil	Scoop Direct into Jar	PFAS Target Analyte List	(1) 8 oz jar	Cool to 4^{o} C Water ice only	EPA Method 537 Modified	Compound specific [but less than 1 ug/kg (ppb)]	14 days 40 days after extraction

Notes:
All holding times listed are from Verified Time of Sample Receipt (VTSR) unless noted otherwise. * Holding time listed is from time of sample collection.
The number in parentheses in the "Sample Container" column denotes the number of containers needed.
Triple volume required when collected MS/MSD samples
The number of trip blanks are estimated.
CRQL / MDL = Contract Required Quantitation Limit / Method Detection Limit
NA = Not available or not applicable.

EPA 537 (PFAS) Field Sampling Guidelines

PLEASE READ INSTRUCTIONS ENTIRELY PRIOR TO SAMPLING EVENT

Sampling for PFAS via EPA 537 can be challenging due to the prevalence of these compounds in consumer products. The following guidelines are strongly recommended when conducting sampling.

Reference-NHDES https://www.des.nh.gov/organization/divisions/waste/hwrb/documents/pfc-stakeholder-notification-20161122.pdf

FIELD CLOTHING and PPE

- No clothing or boots containing Gore-Tex®
- All safety boots made from polyurethane and PVC
- No materials containing Tyvek®
- Do not use fabric softener on clothing to be worn in field
- Do not used cosmetics, moisturizers, hand cream, or other related products the morning of sampling
- Do not use unauthorized sunscreen or insect repellant (see reference above for acceptable products)

FOOD CONSIDERATIONS

No food or drink on-site with exception of bottled water and/or hydration drinks (i.e., Gatorade and Powerade) that is available for consumption only in the staging area

OTHER RECOMMENDATIONS

Sample for PFAS first! Other containers for other methods may have PFAS present on their sampling containers

SAMPLE CONTAINERS

- All sample containers made of HDPE or polypropylene
- Caps are unlined and made of HDPE or polypropylene (no Teflon® -lined caps)

WET WEATHER (AS APPLICABLE)

Wet weather gear made of polyurethane and PVC only

EQUIPMENT DECONTAMINATION

- "PFAS-free" water on-site for decontamination of sample equipment. No other water sources to be used
- Only Alconox and Liquinox can be used as decontamination materials

FIELD EQUIPMENT

- Must not contain Teflon® (aka PTFE) or LDPE materials
- All sampling materials must be made from stainless steel, HDPE, acetate, silicon, or polypropylene
- No waterproof field books can be used
- No plastic clipboards, binders, or spiral hard cover notebooks can be used
- No adhesives (i.e. Post-It® Notes) can be used
- Sharpies and permanent markers not allowed; regular ball point pens are acceptable
- Aluminum foil must not be used
- Keep PFC samples in separate cooler, away from sampling containers that may contain PFAS
- Coolers filled with regular ice only - Do not use chemical (blue) ice packs

EPA 537 (PFAS) Field Sampling Guidelines

PLEASE READ INSTRUCTIONS ENTIRELY PRIOR TO SAMPLING EVENT

Sampler must wash hands before wearing nitrile gloves in order to limit contamination during sampling. Each sample set requires a set of containers to comply with the method as indicated below. **Sample set is composed of samples collected from the same sample site and at the same time.*

Container Count	Container Type	Preservative
3 Sampling Containers - Empty	250 mL container	Pre preserved with 1.25 g Trizma
1 Reagent Water for Field Blank use	250 mL container	Pre preserved with 1.25 g Trizma
P1 Field Blank (FRB) - Empty	250 mL container	Unpreserved

Sampling container must be filled to the neck. For instructional purposes a black line has been drawn to illustrate the required fill level for each of the 3 Sample containers

Field blanks are recommended and the containers have been provided, please follow the instructions below.

Field Blank Instructions:

1. Locate the Reagent Water container from the bottle order. The Reagent Water container will be pre-filled with PFAS-free water and is preserved with Trizma.
2. Locate the empty container labeled "Field Blank".
3. Open both containers and proceed to transfer contents of the "Reagent Water" container into the "Field Blank" container.
4. If field blanks are to be analyzed, they need to be noted on COC, and will be billed accordingly as a sample.

Both the empty Reagent Water container and the filled Field Blank container must be returned to the lab along with the samples taken.

Sampling Instructions:

1. Each sampling event requires 3 containers to be filled to the neck of the provided containers for each sampling location.
2. Before sampling, remove faucet aerator, run water for 5 min, slow water to flow of pencil to avoid splashing and fill sample containers to neck of container (as previously illustrated) and invert 5 times.
3. Do not overfill or rinse the container.
4. Close containers securely. Place containers in sealed ZipLoc® bags, and in a separate cooler (no other container types).
5. Ensure Chain-of-Custody and all labels on containers contain required information. Place sample, Field Blank and empty Reagent Blank containers in ice filled cooler (do not use blue ice) and return to the laboratory. Samples should be kept at 4°C ±2. Samples must not exceed 10°C during first 48 hours after collection. Hold time is 14 days.

Please contact your Alpha Analytical project manager with additional questions or concerns.

PFAS Sampling Instructions for non-Drinking Water (non-SDWA) for EPA Method 537 and/or LC/MS/MS Incorporating the Isotope Dilution Technique

Please read instructions entirely prior to sampling event.

It should be noted that there is considerable information available from the US EPA as well as a multitude of state regulatory agencies regarding the potential for PFAS cross-contamination during sampling. It is recommended that samplers consult the applicable regulatory guidance prior to sampling. For additional information, please refer to "METHOD 537. Version 1.1, September 2009, EPA Document #: EPA/600/R-08/092".

The sample handler should wash their hands before sampling and wear nitrile gloves while filling and sealing the sample bottles. PFAS contamination during sampling can occur from a number of common sources, such as food packaging and certain foods and beverages. Proper hand washing and wearing nitrile gloves will aid in minimizing this type of accidental contamination of the samples.

Container Count	Container Type	Preservative
2 Sampling Containers - Empty	275 mL container	Unpreserved
Reagent Water for Field Blank use	275 mL container	Unpreserved
1 Field Blank (FRB) Container - Empty	275 mL container	Unpreserved

**** Sampling container must be filled to the neck. For instructional purposes a black line has been drawn to illustrate the required fill level for each of the 2 Sample containers****

Sample containers for field blanks are included with your container order. If you wish to submit field blanks (billable samples) in addition to your field samples, please prepare them as instructed below:

Field Blank Instructions:

1. Locate the Reagent Water container from the bottle order. The Reagent Water container is prefilled with PFAS-free water and preserved with Trizma.
2. Locate the empty container labeled "Field Blank".
3. Open both containers and proceed to transfer contents of the "Reagent Water" container into the "Field Blank" container.

Both the empty Reagent Water container and the filled Field Blank container must be returned to the laboratory along with the samples taken.

Sampling Instructions:

1. Each sampling event requires 2 containers to be filled to the neck of the provided containers for each sampling location.
2. Fill sample containers to neck of container (as previously illustrated) and invert 5 times.
3. Do not overfill or rinse the container.
4. Close containers securely.
5. Ensure Chain-of-Custody and all labels on containers contain required information.
   Place sample, Field Blank and empty Reagent Blank containers in ice filled cooler and return to the laboratory. Samples should be kept at 4°C ±2. Samples must not exceed 10°C during first 48 hours after collection. Hold time is 14 days.

Please contact your project manager with additional questions or concerns.

Date Created: 05/14/19
Created By: Tom Tanico
File: PM6636-1
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NY PFAAs via EPA 537(M)-Isotope Dilution (SOIL)

Holding Time: 28 days
Container/Sample Preservation: 1 - Plastic 8oz unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Perfluorobutanoic Acid (PFBA)	375-22-4	1	0.0213	ng/g	71-135	30	71-135	30	30			
Perfluoropentanoic Acid (PFPeA)	2706-90-3	1	0.01035	ng/g	69-132	30	69-132	30	30			
Perfluorobutanesulfonic Acid (PFBS)	375-73-5	1	0.0635	ng/g	72-128	30	72-128	30	30			
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	0.064	ng/g	70-132	30	70-132	30	30			
Perfluoroheptanoic Acid (PFHpA)	375-85-9	1	0.064	ng/g	71-131	30	71-131	30	30			
Perfluorohexanesulfonic Acid (PFHxS)	355-46-4	1	0.057	ng/g	67-130	30	67-130	30	30			
Perfluorooctanoic Acid (PFOA)	335-67-1	1	0.04105	ng/g	69-133	30	69-133	30	30			
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	27619-97-2	1	0.198	ng/g	64-140	30	64-140	30	30			
Perfluoroheptanesulfonic Acid (PFHpS)	375-92-8	1	0.136	ng/g	70-132	30	70-132	30	30			
Perfluorononanoic Acid (PFNA)	375-95-1	1	0.083	ng/g	72-129	30	72-129	30	30			
Perfluorooctanesulfonic Acid (PFOS)	1763-23-1	1	0.1205	ng/g	68-136	30	68-136	30	30			
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.072	ng/g	69-133	30	69-133	30	30			
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	39108-34-4	1	0.275	ng/g	65-137	30	65-137	30	30			
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSA	2355-31-9	1	0.103	ng/g	63-144	30	63-144	30	30			
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.056	ng/g	64-136	30	64-136	30	30			
Perfluorodecanesulfonic Acid (PFDS)	335-77-3	1	0.097	ng/g	59-134	30	59-134	30	30			
Perfluorooctanesulfonamide (FOSA)	754-91-6	1	0.1025	ng/g	67-137	30	67-137	30	30			
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	2991-50-6	1	0.09	ng/g	61-139	30	61-139	30	30			
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.086	ng/g	69-135	30	69-135	30	30			
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.062	ng/g	66-139	30	66-139	30	30			
Perfluorotetradecanoic Acid (PFTA)	376-06-7	1	0.07	ng/g	69-133	30	69-133	30	30			
PFOA/PFOS, Total		1	0.04105	ng/g				30	30			
Perfluoro[13C4]Butanoic Acid (MPFBA)	*NONE*									*60-153*		
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	*NONE*									*65-182*		
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	*NONE*									*70-151*		
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	*NONE*									*61-147*		
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	*NONE*									*62-149*		
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	*NONE*									*63-166*		
Perfluoro[13C8]Octanoic Acid (M8PFOA)	*NONE*									*62-152*		
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-	*NONE*									*32-182*		
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	*NONE*									*61-154*		
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	*NONE*									*65-151*		
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	*NONE*									*65-150*		
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-	*NONE*									*25-186*		
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid	*NONE*									*45-137*		
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	*NONE*									*64-158*		
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	*NONE*									*1-125*		
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (	*NONE*									*42-136*		
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	*NONE*									*56-148*		
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	*NONE*									*26-160*		

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)
Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, In

ATTACHMENT D
Community Air Monitoring Plan

COMMUNITY AIR MONITORING PLAN

146 BAYARD STREET
BROOKLYN, NY

APRIL - 2020

Prepared on behalf of:

Bayard Holdings, LLC
670 Myrtle Ave Suite 370
Brooklyn, NY 11211

Prepared by:

EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
RIDGE, NY 11961

COMMUNITY AIR MONITORING PLAN
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APPENDICES

1.0 INTRODUCTION

This Community Air Monitoring Plan (CAMP) has been prepared for the excavation and remediation activities to be performed under a Remedial Action Work Plan (RAWP). The CAMP provides measures for protection for the downwind community (i.e., off-site receptors including residences, businesses, and on-site workers not directly involved in the remedial activities) from potential airborne contaminant releases resulting from remedial activities at the site.

Compliance with this CAMP is required during all activities associated with redevelopment that have the potential to generate airborne particulate matter and volatile organic compounds (VOCs). These activities include soil excavation and tank removal. This CAMP has been prepared to ensure that remedial activities do not adversely affect passersby, residents, or workers in the area immediately surrounding the Site and to preclude or minimize airborne migration of site-related contaminants to off-site areas.

1.1 Regulatory Requirements

This CAMP was established in accordance with the following requirements:

- New York State Department of Health's (NYSDOH) Generic Community Air Monitoring Plan as presented in DER-10 Technical Guidance for Site Investigation and Remediation (NYSDEC May 3, 2010). This guidance specifies that a community air-monitoring program shall be implemented to protect the surrounding community and to confirm that the work does not spread contamination off-site through the air;

- New York State Department of Environmental Conservation (NYSDEC) DER-10 Technical Guidance for Site Investigation and Remediation: This guidance provides a basis for developing and implementing a fugitive dust suppression and particulate monitoring program as an element of a hazardous waste site's health and safety program.

2.0 AIR MONITORING

Petroleum related VOCs / SVOCs, chlorinated VOCs and SVOCs and heavy metals are the constituents of concern at the Site. The appropriate method to monitor air for these constituents during remediation activities is through real-time VOC and air particulate (dust) monitoring.

The continuous monitoring locations for VOCs and particulates must reflect the nearest potentially exposed individuals and the location of ventilation system intakes for nearby structures.

2.1 Meteorological Data

At a minimum, wind direction will be evaluated at the start of each workday, noon of each workday, and the end of each workday. These readings will be utilized to position the monitoring equipment in appropriate upwind and downwind locations.

2.2 Community Air Monitoring Requirements

To establish ambient air background concentrations, air will be monitored at several locations around the site perimeter before activities begin. These points will be monitored continuously in series during the site work. The perimeter monitoring points will be located to represent the nearest potentially exposed individuals at the downwind location.

Fugitive respirable dust will be monitored using a MiniRam Model PDM-3 aerosol monitor (or equivalent). Air will be monitored for VOCs with a portable miniRAE 3000 photoionization detector (PID), or equivalent. All air monitoring data will be documented in a site log book by the designated site safety officer. The site safety officer or delegate must ensure that air monitoring instruments are calibrated and maintained in accordance with manufacturer's specifications. All instruments will be zeroed daily and checked for accuracy. A daily log will be kept. If additional monitoring is required, the protocols will be developed and appended to this plan.

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

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

- If total particulate concentrations opposite the walls of occupied structures or next to intake vents exceed 150 mcg/m3, work activities should be suspended until controls are

implemented and are successful in reducing the total particulate concentration to 150 mcg/m3 or less at the monitoring point.

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

3.0 VOC MONITORING, RESPONSE LEVELS, AND ACTIONS

Volatile organic compounds (VOCs) will be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis. Upwind concentrations will be measured at the start of each workday and periodically thereafter to establish background conditions. The monitoring work will be performed using equipment appropriate to measure the types of contaminants known or suspected to be present.

The equipment will be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment will be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

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

- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown. All 15-minute readings must be recorded and be available for State (DEC and DOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

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

All readings will be recorded and made available for NYSDEC and NYSDOH personnel to review. If an exceedance of the Action Limits occurs, an Action Limit Report, as shown in Appendix A, will be completed.

3.1 Potential Corrective Measures and VOC Suppression Techniques

If the 15-minute integrated VOC level at the downwind location persists at a concentration that exceeds the upwind level by more than 5 ppm but less than 25 ppm during remediation activities, then vapor suppression techniques will be employed. The following techniques, or others, may be employed to mitigate the generation and migration of fugitive organic vapors:

- limiting the excavation size;
- limiting the drop-height when loading soil into trucks;
- spraying chemical odorants onto the soil;
- covering soil stockpiles with 6-mil plastic sheeting or tarps;
- hauling waste materials in properly tarped containers; and/or
- applying vapor suppressant foam.

4.0 PARTICULATE MONITORING

Air monitoring for particulates (i.e., dust) will be performed continuously during excavation and loading activities using both air monitoring equipment and visual observation at upwind and downwind locations. Monitoring equipment capable of measuring particulate matter smaller than 10 microns (PM10) and capable of integrating (averaging) over periods of 15 minutes or less will be set up at upwind (i.e., background) and downwind locations, at heights approximately four to five feet above land surface (i.e., the breathing zone). Monitoring equipment will be MIE Data Ram monitors, or equivalent. The audible alarm on the particulate monitoring device will be set at 90 micrograms per cubic meter (µg/m3). This setting will allow proactive evaluation of worksite conditions prior to reaching the action level of 100 µg/m^3 above background. The monitors will be calibrated at least once per day prior to work activities and recalibrated as needed thereafter. In addition, fugitive dust migration will be visually assessed during all intrusive work activities.

The following summarizes particulate action levels and the appropriate responses:

- If the downwind PM-10 particulate level is 100 µg/m^3 greater than background (upwind perimeter) for the 15-minute period, or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 µg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 µg/m^3 above the upwind level, work must be stopped and an evaluation of activities initiated. Work can resume provided that dust suppression measures (as described in Section 2.3.1 below) and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 µg/m^3 of the upwind level and in preventing visible dust migration.

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

All readings will be recorded and be available for NYSDEC and NYSDOH personnel to review. If an exceedance of the Action Limits occurs, an Action Limit Report as shown in **Appendix A** will be completed.

4.1 Potential Particulate Suppression Techniques

If the integrated particulate level at the downwind location exceeds the upwind level by more than 100 µg/m^3 at any time during remediation activities, then dust suppression techniques will be employed. The following techniques, or others, may be employed to mitigate the generation and migration of fugitive dusts:

- limiting the excavation size;

- spraying water onto the excavation faces and equipment;
- covering soil stockpiles with plastic sheeting or tarps;
- Use of gravel paths / roadways;
- hauling waste materials in properly tarped containers; and/or
- limiting vehicle speeds onsite.

Work may continue with dust suppression techniques provided that downwind PM_{10} levels are not more than 150 $\mu g/m^3$ greater than the upwind levels.

There may also be situations where the dust is generated by remediation activities and migrates to downwind locations, but is not detected by the monitoring equipment at or above the action level. Therefore, if dust is observed leaving the working area, dust suppression techniques such as those listed above will be employed.

If dust suppression techniques do not lower particulates to below 150 $\mu g/m^3$, or visible dust persists, work will be suspended until appropriate corrective measures are identified and implemented to remedy the situation.

All air monitoring readings will be recorded in the field logbook and will be available for the NYSDEC and NYSDOH personnel to review.

5.0 DATA QUALITY ASSURANCE

5.1 Calibration

Instrument calibration shall be documented on instrument calibration and maintenance sheets or in the designated field logbook. All instruments shall be calibrated as required by the manufacturer. Calibration checks may be used during the day to confirm instrument accuracy. Duplicate readings may be taken to confirm individual instrument response.

5.2 Operations

All instruments shall be operated in accordance with the manufacturer's specifications. Manufacturers' literature, including an operations manual for each piece of monitoring equipment will be maintained on-site by the SSO for reference.

5.3 Data Review

The SSO will interpret all monitoring data based the established criteria and his/her professional judgment. The SSO shall review the data with the PM to evaluate the potential for worker exposure, upgrades/downgrades in level of protection, comparison to direct reading instrumentation and changes in the integrated monitoring strategy.

Monitoring and sampling data, along with all sample documentation will be periodically reviewed by the PM.

6.0 RECORDS AND REPORTING

- All air readings must be recorded on daily air monitoring log sheets and made available for review by personnel from NYSDEC and NYSDOH. CAMP summary tables will also be provided on a weekly basis and NYSDEC and NYSDOH will be notified immediately (within 24 hours) of any exceedances of CAMP action levels as well as corrective actions taken.

APPENDIX A
ACTION LIMIT REPORT

CAMP
ACTION LIMIT REPORT

Project Location: _____

Date: _____ Time: _____

Name: _____

Contaminant: _____ PM-10: _____ VOC: _____

Wind Speed: _____ Wind Direction: _____

Temperature: _____ Barometric Pressure: _____

DOWNWIND DATA

Monitor ID #: _____ Location: _____ Level Reported: _____

Monitor ID#: _____ Location: _____ Level Reported: _____

UPWIND DATA

Monitor ID #: _____ Location: _____ Level Reported: _____

Monitor ID#: _____ Location: _____ Level Reported: _____

BACKGROUND CORRECTED LEVELS

Monitor ID #: Location: _____ Level Reported: Level Reported: _____

ACTIONS TAKEN

_____
_____
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ATTACHMENT E
Citizen Participation Plan

NEW YORK STATE OF OPPORTUNITY. Department of Environmental Conservation

Brownfield Cleanup Program

Citizen Participation Plan
for
146 BAYARD STREET SITE

APRIL 2019

146-150 Bayard Street
Brooklyn, N Y 11222

Contents

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

Applicant: Harrison Realty, LLC **("Applicant")**
Site Name: **146 Bayard Street ("Site")**
Site Address: **146-150 Bayard Steet, Brooklyn, NY 11222**
Site County: Kings
Site Number: TBD

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

New York's Brownfield Cleanup Program (BCP) works with private developers to encourage the voluntary cleanup of contaminated properties known as "brownfields" so that they can be reused and developed. These uses include recreation, housing, and business.

A *brownfield* is any real property that is difficult to reuse or redevelop because of the presence or potential presence of contamination. A brownfield typically is a former industrial or commercial property where operations may have resulted in environmental contamination. A brownfield can pose environmental, legal, and financial burdens on a community. If a brownfield is not addressed, it can reduce property values in the area and affect economic development of nearby properties.

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

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

2. Citizen Participation Activities

Why NYSDEC Involves the Public and Why It Is Important

NYSDEC involves the public to improve the process of investigating and cleaning up contaminated sites, and to enable citizens to participate more fully in decisions that affect their health, environment, and social well-being. NYSDEC provides opportunities for citizen involvement and encourages early two-way communication with citizens before decision makers form or adopt final positions.

Involving citizens affected and interested in site investigation and cleanup programs is important for many reasons. These include:

- Promoting the development of timely, effective site investigation and cleanup programs that protect public health and the environment

- Improving public access to, and understanding of, issues and information related to a particular site and that site's investigation and cleanup process

- Providing citizens with early and continuing opportunities to participate in NYSDEC's site investigation and cleanup process

- Ensuring that NYSDEC makes site investigation and cleanup decisions that benefit from input that reflects the interests and perspectives found within the affected community

- Encouraging dialogue to promote the exchange of information among the affected/interested public, State agencies, and other interested parties that strengthens trust among the parties, increases understanding of site and community issues and concerns, and improves decision making.

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

Project Contacts

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

Locations of Reports and Information

The locations of the reports and information related to the site's investigation and cleanup program also are identified in Appendix A. These locations provide convenient access to important project documents for public review and comment. Some documents may be placed on the NYSDEC web site. If this occurs, NYSDEC will inform the public in fact sheets distributed about the site and by other means, as appropriate.

Site Contact List

Appendix B contains the site contact list. This list has been developed to keep the community informed about, and involved in, the site's investigation and cleanup

process. The site contact list will be used periodically to distribute fact sheets that provide updates about the status of the project. These will include notifications of upcoming activities at the site (such as fieldwork), as well as availability of project documents and announcements about public comment periods.
The site contact list includes, at a minimum:

- Chief executive officer and planning board chairperson of each county, city, town and village in which the Site is located;
- Residents, owners, and occupants of the Site and properties adjacent to the Site;
- The public water supplier which services the area in which the Site is located;
- Any person who has requested to be placed on the site contact list;
- The administrator of any school or day care facility located on or near the Site for purposes of posting and/or dissemination of information at the facility;
- Location(s) of reports and information.

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

Note: The first site fact sheet (usually related to the draft Remedial Investigation Work Plan) is distributed both by paper mailing through the postal service and through DEC Delivers, its email listserv service. The fact sheet includes instructions for signing up with the appropriate county listserv to receive future notifications about the site. See http://www.dec.ny.gov/chemical/61092.html .

Subsequent fact sheets about the site will be distributed exclusively through the listserv, except for households without internet access that have indicated the need to continue to receive site information in paper form. Please advise the NYSDEC site project manager identified in Appendix A if that is the case. Paper mailings may continue during the investigation and cleanup process for some sites, based on public interest and need.

CP Activities

The table at the end of this section identifies the CP activities, at a minimum, that have been and will be conducted during the site's investigation and cleanup program. The flowchart in Appendix D shows how these CP activities integrate with the site investigation and cleanup process. The public is informed about these CP activities through fact sheets and notices distributed at significant points during the program. Elements of the investigation and cleanup process that match up with the CP activities are explained briefly in Section 5.

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

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

The public is encouraged to contact project staff at any time during the site's investigation and cleanup process with questions, comments, or requests for information.

This CP Plan may be revised due to changes in major issues of public concern identified in Section 3 or in the nature and scope of investigation and cleanup activities. Modifications may include additions to the site contact list and changes in planned citizen participation activities.

Technical Assistance Grant

NYSDEC must determine if the site poses a significant threat to public health or the environment. This determination generally is made using information developed during the investigation of the site, as described in Section 5.

If the Site is determined to be a significant threat, a qualifying community group may apply for a Technical Assistance Grant (TAG). The purpose of a TAG is to provide funds to the qualifying group to obtain independent technical assistance. This assistance helps the TAG recipient to interpret and understand existing environmental information about the nature and extent of contamination related to the site and the development/implementation of a remedy.

An eligible community group must certify that its membership represents the interests of the community affected by the site, and that its members' health, economic well-being or enjoyment of the environment may be affected by a release or threatened release of contamination at the site.

The significant threat determination for the site has not yet been made.

To verify the significant threat status of the site, the interested public may contact the NYSDEC project manager identified in Appendix A.

For more information about TAGs, go online at
http://www.dec.ny.gov/regulations/2590.html

Note: The table identifying the citizen participation activities related to the site's investigation and cleanup program follows bellow:

Citizen Participation Activities	Timing of CP Activity(ies)
Application Process:	
• Prepare site contact list • Establish document repository(ies)	At time of preparation of application to participate in the BCP.
• Publish notice in Environmental Notice Bulletin (ENB) announcing receipt of application and 30-day public comment period • Publish above ENB content in local newspaper • Mail above ENB content to site contact list • Conduct 30-day public comment period	When NYSDEC determines that BCP application is complete. The 30-day public comment period begins on date of publication of notice in ENB. End date of public comment period is as stated in ENB notice. Therefore, ENB notice, newspaper notice, and notice to the site contact list should be provided to the public at the same time.
After Execution of Brownfield Site Cleanup Agreement (BCA):	
• Prepare Citizen Participation (CP) Plan	Before start of Remedial Investigation **Note:** Applicant must submit CP Plan to NYSDEC for review and approval within 20 days of the effective date of the BCA.
Before NYSDEC Approves Remedial Investigation (RI) Work Plan:	
• Distribute fact sheet to site contact list about proposed RI activities and announcing 30-day public comment period about draft RI Work Plan • Conduct 30-day public comment period	Before NYSDEC approves RI Work Plan. If RI Work Plan is submitted with application, public comment periods will be combined and public notice will include fact sheet. Thirty-day public comment period begins/ends as per dates identified in fact sheet.
After Applicant Completes Remedial Investigation:	
• Distribute fact sheet to site contact list that describes RI results	Before NYSDEC approves RI Report
Before NYSDEC Approves Remedial Work Plan (RWP):	
• Distribute fact sheet to site contact list about draft RWP and announcing 45-day public comment period • Public meeting by NYSDEC about proposed RWP (if requested by affected community or at discretion of NYSDEC project manager) • Conduct 45-day public comment period	Before NYSDEC approves RWP. Forty-five day public comment period begins/ends as per dates identified in fact sheet. Public meeting would be held within the 45-day public comment period.
Before Applicant Starts Cleanup Action:	
• Distribute fact sheet to site contact list that describes upcoming cleanup action	Before the start of cleanup action.
After Applicant Completes Cleanup Action:	
• Distribute fact sheet to site contact list that announces that cleanup action has been completed and that NYSDEC is reviewing the Final Engineering Report • Distribute fact sheet to site contact list announcing NYSDEC approval of Final Engineering Report and issuance of Certificate of Completion (COC)	At the time the cleanup action has been completed. **Note:** The two fact sheets are combined when possible if there is not a delay in issuing the COC.

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3. Major Issues of Public Concern

This section of the CP Plan identifies major issues of public concern that relate to the site. Additional major issues of public concern may be identified during the course of the site's investigation and cleanup process.

The major issues of concern to the public will be potential impacts of vapors, nuisance odors and dust during the removal of affected soil at the Site. Another example of a major issue of public concern would be the impact of increased truck traffic on the surrounding neighborhood. Construction safety issues will also be addressed. The Applicant needs to be aware of impacts related to odor, noise and truck traffic.

This work will be performed in accordance with procedures which will be specified under a detailed Remedial Program which considers and takes preventive measures for exposures to future residents of the property and those on adjacent properties during construction. Detailed plans to monitor the potential for exposure including a Health and Safety Plan (HASP) and a Community Air Monitoring Plan (CAMP) are required components of the remedial program. Implementation of these plans will be under the direct oversight of the NYSDEC and the New York State Department of Health (NYSDOH).

These plans will specify the following worker and community health and safety activities during remedial activity at the Site:

- On-site air monitoring for worker protection;
- Perimeter air monitoring for community protection;
- The use of odor, vapor, and dust controls, such as water or foam sprays, as needed;
- Monitoring and control of soil, sediments, and water generated during remediation; and
- Truck routes which avoid residential streets.

The HASP and the CAMP will be prepared as part of the Remedial Action Work Plan (RAWP) and will be available for public review at the document repository as identified in Appendix A.

Experience from similar projects, 311 complaints and other construction projects in the area will help in identifying such issues.

The Site is not located in an Environmental Justice Area. For further information, visit: https://statisticalatlas.com/tract/New-York/Kings-County/050700/Race-and-Ethnicity

Environmental justice is defined as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.

In addition, there may be concerns with regards to noise, odor or truck traffic.

4. Site Information

Appendix C contains a map identifying the location of the site.

Site Description

The Site to be remediated and redeveloped is located in the Greenpoint neighborhood of Brooklyn, and is comprised of one 8,800 square foot tax parcel (0.20 acres). The street addresses for the Site are 146 Bayard Street and 481 Graham Avenue, Brooklyn, New York 11222 The Site is located on the southern corner of the intersection of Bayard Street and Graham Avenue. The Site consists of 96.12 feet of street frontage on Bayard Street and 101.33 feet of street frontage on Graham Avenue.

There are no structures presently on the Site. A building was previously demolished in 2018. The Site is currently vacant and surrounded by an 8 ft high chain-link fence with a gate on Bayard Street.

History of Site Use, Investigation, and Cleanup

The Site was originally developed with multiple dwellings fronting Bayard Street and multiple mixed-use storefronts along Graham Avenue sometime prior to 1887. The Site was redeveloped in 1972 with a one-story manufacturing building that was demolished in 2018. The Site was identified with a manufacturing use on Sanborn maps from 1965 through 2007. Residential tenants were listed for the Site for the intermittent years from 1928 through 1960. Several commercial uses were identified, including a Venetian Blind Supply Company (1949), a beauty salon (1949), “House of Chan Enterprise Inc (1973), Meyers Herring Importing Corporation (1985), Le Classic Group, Inc. (1997-2000), and NCL (2005).

Historic fill material is present across the Site to a depth of approximately 6 feet below grade. Semi-volatile Organic Compounds (SVOCs), pesticides and metals are present at concentrations above Restricted Residential SCOs within the fill material.

5. Investigation and Cleanup Process

Application

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

The Applicant in its Application proposes that the site will be used for unrestricted purposes.

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

Investigation

The Applicant has completed a "full" site investigation before it entered into the BCP. The Applicant has submitted an investigation report for the full site investigation. NYSDEC will determine if the investigation goals and requirements of the BCP have been met or if additional work is needed before a remedy can be selected."

NYSDEC will use the information in the investigation report to determine if the Site poses a significant threat to public health or the environment. If the Site is a "significant threat," it must be cleaned up using a remedy selected by NYSDEC from an analysis of alternatives prepared by the Applicant and approved by NYSDEC. If the Site does not pose a significant threat, the Applicant may select the remedy from the approved analysis of alternatives.

Interim Remedial Measures

An Interim Remedial Measure (IRM) is an action that can be undertaken at a site when a source of contamination or exposure pathway can be effectively addressed before the site investigation and analysis of alternatives are completed. If an IRM is likely to represent all or a significant part of the final remedy, NYSDEC will require a 30-day public comment period.

Remedy Selection

When the investigation of the Site has been determined to be complete, the project likely would proceed in one of two directions:

1. The Applicant may recommend in its investigation report that no action is necessary at the Site. In this case, NYSDEC would make the investigation report available for public comment for 45 days. NYSDEC then would complete its review, make any necessary revisions, and, if appropriate, approve the investigation report. NYSDEC would then issue a "Certificate of Completion" (described below) to the Applicant.

or

2. The Applicant may recommend in its investigation report that action needs to be taken to address site contamination. After NYSDEC approves the investigation report, the Applicant may then develop a cleanup plan, officially called a "Remedial Work Plan". The Remedial Work Plan describes the Applicant's proposed remedy for addressing contamination related to the site.

When the Applicant submits a draft Remedial Work Plan for approval, NYSDEC would announce the availability of the draft plan for public review during a 45-day public comment period.

Cleanup Action

NYSDEC will consider public comments, and revise the draft cleanup plan if necessary, before approving the proposed remedy. The New York State Department of Health (NYSDOH) must concur with the proposed remedy. After approval, the proposed remedy becomes the selected remedy. The selected remedy is formalized in the site Decision Document.

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

Certificate of Completion

When NYSDEC is satisfied that cleanup requirements have been achieved or will be achieved for the site, it will approve the FER. NYSDEC then will issue a Certificate of Completion (COC) to the Applicant. The COC states that cleanup goals have been achieved, and relieves the Applicant from future liability for site-related contamination,

subject to certain conditions. The Applicant would be eligible to redevelop the site after it receives a COC.

Site Management

The purpose of site management is to ensure the safe reuse of the property if contamination will remain in place. Site management is the last phase of the site cleanup program. This phase begins when the COC is issued. Site management incorporates any institutional and engineering controls required to ensure that the remedy implemented for the site remains protective of public health and the environment. All significant activities are detailed in a Site Management Plan.

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

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

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

Appendix A -
Project Contacts and Locations of Reports and Information

Project Contacts

For information about the site's investigation and cleanup program, the public may contact any of the following project staff:

New York State Department of Environmental Conservation (NYSDEC):

Christopher H. Allan
Project Manager
NYSDEC
Division of Environmental Remediation
47-40 21st Street
Long Island City, NY 11101-5401
Phone: Tel: 718-482-4065
Email: christopher.Allan@dec.ny.gov

Thomas V. Panzone
Public Participation Specialist
NYSDEC Region 2
Office of Communications Services
47-40 21st Street
Long Island City, NY 11101
Phone: (718) 482-4953
Email: Thomas.panzone@dec.ny.gov

New York State Department of Health (NYSDOH):

Shaun Surani
Project Manager
NYSDOH
Empire State Plaza
Corning Tower Room 1782
Albany, NY 12237
Phone Phone: (518) 402-7860
Email: BEEI@health.ny.gov

Locations of Reports and Information

The facilities identified below are being used to provide the public with convenient access to important project documents:

Brooklyn Public Library – Greenpoint Branch
107 Norman Avenue
Brooklyn, NY 11206
718-349-8504

Brooklyn Community Board 1
435 Graham Avenue
Brooklyn, NY, 11211
Phone: 718-389-0009

Appendix B - Site Contact List

Local Government Contacts

Hon. Bill de Blasio
Mayor of New York City
City Hall, New York, NY 10007

Hon. Eric Adams
Brooklyn Borough President
209 Joralemon Street
New York, NY 11201

Ms. Dealice Fuller
Chairwoman, Brooklyn Community Board 1
435 Graham Avenue
Brooklyn, NY, 11211

Mr. Gerald Esposito
District Manager, Brooklyn Community Board 1
435 Graham Avenue
Brooklyn, NY, 11211

T. Willis Elkins,Chairwoman
Environmental Committee
Brooklyn Community Board 1
435 Graham Avenue
Brooklyn, NY, 11211

Hon. Stephen Levin
NYC Councilman
33rd District
410 Atlantic Avenue
Brooklyn, NY 11217

Marisa Lago, Commissioner
NYC Department of City Planning
New York, NY 10271

Keith Bray
New York City Department of Transportation
Brooklyn Borough Commissioner
55 Water Street, 9th Floor
New York, NY 10041

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Kings County Clerk's Office
Nancy Sunshine, County Clerk
360 Adams Street, Room 189
Brooklyn, NY 11201

Vacant
Public Advocate
1 Centre Street, 15th Floor
New York, NY 10007

Hon. Scott M. Stringer
Office of the Comptroller
1 Centre Street
New York, NY 10007

Julie Stein
Office of Environmental Planning & Assessment
NYC Dept. of Environmental Protection
96-05 Horace Harding Expressway
Flushing, NY 11373

Mark McIntyre - Director
NYC Department of Environmental Remediation
100 Gold Street, 2nd Floor
New York, NY 10038

Hon. Brian Kavanaugh
NYS Senator
209 Joralemon Street, Suite 300
Brooklyn, NY 11201

Hon. Maritza Davila
NYS Assembly Member
249 Wilson Avenue
Brooklyn, NY 11237

Hon. Charles Schumer
U.S. Senator
780 Third Avenue, Suite 2301
New York, NY 10017

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Hon. Kirsten Gillibrand
U.S. Senator
780 Third Avenue, Suite 2601
New York, NY 10017

Hon. Nydia Velazquez
U.S. House of Representatives
266 Broadway, Suite 201
Brooklyn, NY 11211

Adjacent Property Owner Contacts

North

1. MARTINEZ, JOSE
   143 BAYARD ST.
   BROOKLYN NY 11222-4951

   OCCUPANT / TENANT
   143 BAYARD STREET,
   BROOKLYN 11222

2. ABELIANS, ANAHID A.
   145 BAYARD STREET
   BROOKLYN NY 11222-495

   OCCUPANT / TENANT
   145 BAYARD STREET,
   BROOKLYN 11222

3. DISTILLED PROPERTIES LLC
   290 WEST STREET APT. 5B
   NEW YORK NY 10013-1483

   OCCUPANT / TENANT
   147 BAYARD STREET,
   BROOKLYN 11222

4. 149 BAYARD LLC
   149 BAYARD STREET
   BROOKLYN NY 11222-4951

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#

OCCUPANT / TENANT
149 BAYARD STREET,
BROOKLYN 11222

5. JOSE COTRICH
151 BAYARD STREET
BROOKLYN NY 11222-4951

OCCUPANT / TENANT
151 BAYARD STREET,
BROOKLYN 11222

6. WOLSKI , VICTOR
105 OAK STREET
BROOKLYN NY 11222-2513

OCCUPANT / TENANT
153 BAYARD STREET,
BROOKLYN 11222

7. TRICIA LAKE
489 GRAHAM AVENUE, LLC
900 3RD AVENUE FL. 29
NEW YORK NY 10022-4777

OCCUPANT / TENANT
489 GRAHAM AVENUE,
BROOKLYN 11222

8. ABUB REAL ESTATE CORP.
86 MONITOR STREET
BROOKLYN NY 11222-4751

OCCUPANT / TENANT
498 GRAHAM AVENUE,
BROOKLYN 11222

East

9. SEPE, PETER
488 GRAHAM AVENUE
BROOKLYN NY 11222-4912

#
#

OCCUPANT / TENANT
494 GRAHAM AVENUE,
BROOKLYN 11222

10. SEPE, PETER
488 GRAHAM AVENUE
BROOKLYN NY 11222-4912

OCCUPANT / TENANT
490 GRAHAM AVENUE,
BROOKLYN 11222

11. 486 GRAHAM LLC
164 MANHATTAN AVENUE
BROOKLYN NY 11206-2048

OCCUPANT / TENANT
486 GRAHAM AVENUE,
BROOKLYN 11222

South

12. 451 MEEKER AVE. RLTY CORP.
27 FELA DRIVE
OLD BRIDGE NJ 08857-3534

OCCUPANT / TENANT
451 MEEKER AVENUE,
BROOKLYN 11222

13. 447 MEEKER LLC
1303 53RD STREET SUITE 308
BROOKLYN NY 11219

OCCUPANT / TENANT
447 MEEKER AVENUE,
BROOKLYN 11222

14. 445 MEEKER LLC
199 LEE AVENUE # 894
BROOKLYN NY 11211-8919

#
#

OCCUPANT / TENANT
445 MEEKER AVENUE,
BROOKLYN 11222

West

15. CHATENARINE JOSEPH
144 BAYARD STREET
BROOKLYN NY 11222-4949

OCCUPANT / TENANT
144 BAYARD STREET,
BROOKLYN 11222

Local News Media

The Brooklyn Paper
One Metrotech Center, Suite 1001
Brooklyn, NY 11201
(718) 260-4504

New York Daily News
4 New York Plaza
New York, NY 10004

New York Post
1211 Avenue of the Americas
New York, NY 10036-8790

Spectrum NY 1 News
75 Ninth Avenue
New York, NY 10011

Courier-Life Publications
1 Metro-Tech Center North - 10th Floor
Brooklyn, NY 11201

Brooklyn Daily Eagle
16 Court Street, Suite 1208
Brooklyn, NY 11241

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#

Public Water Supplier

Vincent Sapienza, Commissioner
New York City Department of Environmental Protection
59-17 Junction Boulevard
Flushing, NY 11373

Requested Contacts

No requests have been made at this time.

Schools and Daycare Facilities

The following Schools were identified within 1,000 feet of the project Site:

Community, Civic, Religious and Other Environmental Organizations:

Marcy Houses - NYCHA
Attn: Management Development Office
452 Marcy Ave
Brooklyn, NY 11206

Marcy Houses - NYCHA
Attn: President – Resident Association
452 Marcy Ave
Brooklyn, NY 11206

Consolidated Edison Corporate Affairs
Antonia Yuille – Director
30 Flatbush Avenue
Brooklyn, NY 11217

Raquel Queme - President
90th NYPD Police Precinct Council
211 Union Avenue
Brooklyn, NY 11211

FDNY
Engine 230
701 PARK AVENUE
Brooklyn, NY 11206

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All Saints Catholic Church
115 Throop Ave
Brooklyn, NY 11206

Clinton Hill CSA
170 Gates Avenue
Brooklyn, NY 11238

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Part 2. List Important Information Needed <u>From</u> the Community, if Applicable.

- Can the community supplement knowledge about past/current uses of the site?
- Does the community have knowledge that the site may be significantly impacting nearby people, properties, natural resources, etc.?
- Are activities currently taking place at the site or at nearby properties that may need to be restricted?
- Who may be interested or affected by the site that has not yet been identified?
- Are there unique community characteristics that could affect how information is exchanged?
- Does the community and/or individuals have any concerns they want monitored?
- Does the community have information about other sources in the area for the contamination?

Part 3. List Major Issues and Information That Need to be Communicated <u>to</u> the Community.

- Specific site investigation or remediation activities currently underway, or that will begin in the near future.
- The process and general schedule to investigate, remediate and, if applicable, redevelop the site.
- Current understanding about the site contamination and effects, if any, on public health and the environment.
- Site impacts on the community and any restrictions on the public's use of the site and/or nearby properties.
- Planned CP activities, their schedule, and how they relate to the site's remedial process.
- Ways for the community to obtain/provide information (document repositories, contacts, etc.).

Part 4. Community Characteristics

a. - e. Obtain information from local officials, property owners and residents, site reports, site visits, "windshield surveys," other staff, etc.

f. Has the affected community experienced other **significant** present or past environmental problems unrelated to this site? Such experiences could significantly affect public concerns and perspectives about the site; how the community will relate to project staff; the image and credibility of project staff within the community; and the ways in which project staff communicate with the community.

g. In its remedial programs, DER seeks to integrate, and be consistent with, environmental justice principles set forth in *DEC Commissioner Policy 29 on Environmental Justice* and *DER 23 – Citizen Participation Handbook for Remedial Programs*. Is the site and/or affected community wholly or partly in an Environmental Justice (EJ) Area? Use the Search feature on DEC's public web site for "environmental justice". DEC's EJ pages define an EJ area, and link to county maps to help determine if the site and/or community are in an EJ area.

h. Consider factors such as:

- Is English the primary language of the affected community? If not, provisions should be considered regarding public outreach activities such as fact sheets, meetings, door-to-door visits and other activities to ensure their effectiveness.
- The age demographics of the community. For example, is there a significant number of senior citizens in the community? It may be difficult for some to attend public meetings and use document repositories. This may suggest adopting more direct interaction with the community with activities such as door-to-door visits, additional fact sheets, visits to community and church centers, nursing homes, etc.
- How do people travel about the community? Would most people drive to a public meeting or document repository? Is there adequate public transportation?

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Appendix C - Site Location Map

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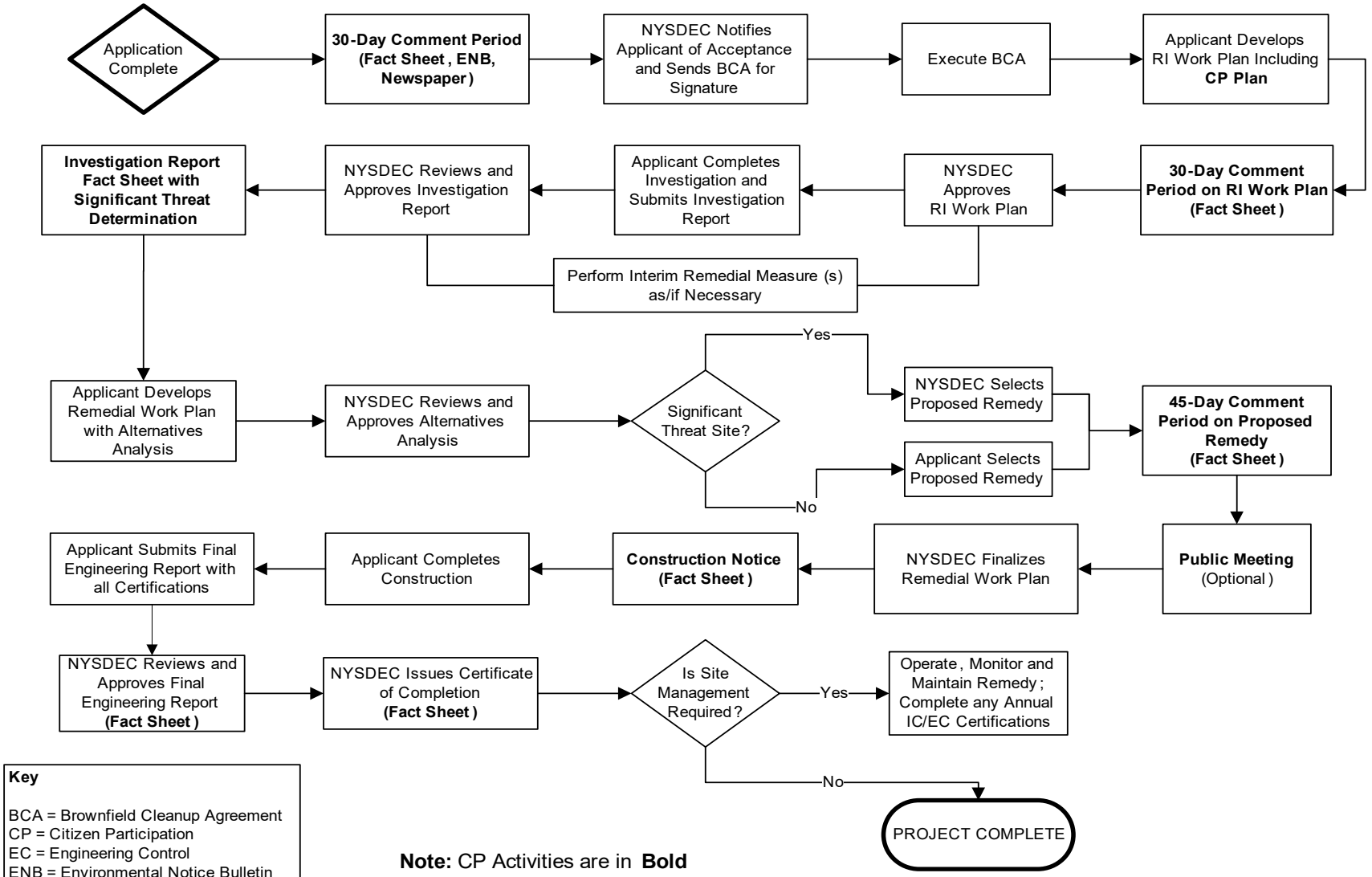
Appendix D– Brownfield Cleanup Program Process



Key

BCA = Brownfield Cleanup Agreement
CP = Citizen Participation
EC = Engineering Control
ENB = Environmental Notice Bulletin
IC = Institutional Control
RI = Remedial Investigation

Note: CP Activities are in **Bold**

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Division of Environmental Remediation

Remedial Programs
Scoping Sheet for Major Issues of Public Concern

Instructions

This Scoping Sheet assesses major issues of public concern; impacts of the site and its remedial program on the community; community interest in the site; information the public needs; and information needed from the public.

The information generated helps to plan and conduct required citizen participation (CP) activities, and to choose and conduct additional CP activities, if appropriate. The scoping sheet can be revisited and updated as appropriate during the site's remedial process to more effectively implement the site's CP program.

Note: Use the information as an aid to prepare and update the Major Issues of Public Concern section of the site CP Plan.

General Instructions

- When to prepare: During preparation of the CP Plan for the site. It can be revisited and updated anytime during the site remedial process.
- Fill in site name and other information as appropriate.
- The Scoping Sheet may be prepared by DEC or a remedial party, but must be reviewed and approved by the DER site project manager or his/her designee.

Instructions for Numbered Parts

Consider the bulleted issues and questions below and any others that may be unique or appropriate to the site and the community to help complete the five Parts of this Scoping Sheet. Identify the issue stakeholders in Parts 1 through 3 and adjust the site's contact list accordingly.

Part 1. List Major Issues of Public Concern and Information the Community Wants.

- Is our health being impacted? (e.g. Are there problems with our drinking water or air? Are you going to test our water, yards, sumps, basements? Have health studies been done?)
- There are odors in the neighborhood. Do they come from the site and are they hazardous?
- Are there restrictions on what we may do (e.g. Can our children play outside? Can we garden? Must we avoid certain areas? Can we recreate (fish, hunt, hike, etc. on/around the site?)
- How and when were the site's contamination problems created?
- What contaminants are of concern and why? How will you look for contamination and find out where it is going? What is the schedule for doing that?
- The site is affecting our property values!
- How can we get more information (e.g. who are the project contacts?)
- How will we be kept informed and involved during the site remedial process?
- Who has been contacted in the community about site remedial activities?
- What has been done to this point? What happens next and when?
- The site is going to be cleaned up for restricted use. What does that mean? We don't want redevelopment on a "dirty" site.

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Part 5. Affected/Interested Public.

Individuals and organizations who need or want information and input can change during the site's remedial process. This need is influenced by real, potential, or perceived impacts of the site or the remedial process. Some people may want information and input throughout the remedial process. Others may participate only during specific remedial stages, or may only be interested in particular issues.

It is important to revisit this question when reviewing this scoping sheet. Knowing who is interested in the site – and the issues that are important to them – will help to select and conduct appropriate outreach activities, and to identify their timing and the information to be exchanged.

Check all affected/interested parties that apply to the site. **Note: Adjust the site's contact list appropriately.** The following are some ways to identify affected/interested parties:

- Tax maps of adjacent property owners
- Attendees at public meetings
- Telephone discussions
- Letters and e-mails to DER, the remedial party, and other agencies
- Political jurisdictions and boundaries
- Media coverage
- Current/proposed uses of site and/or nearby properties (recreational, commercial, industrial)
- Discussions with community organizations: grass roots organizations, local environmental groups, environmental justice groups, churches, and neighborhood advisory groups

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Division of Environmental Remediation

Remedial Programs
Scoping Sheet for Major Issues of Public Concern (see instructions)

Site Name: 146 Bayard Street Site

Site Number: Click here to enter text.

Site Address and County: 146 Bayard Street, Brooklyn, NY – KINGS COUNTY

R**emedial Party(ies):** Bayard Holdings, LLC

Note: For Parts 1. – 3. the individuals, groups, organizations, businesses and units of government identified should be added to the site contact list as appropriate.

Part 1. List major issues of public concern and information the community wants. Identify individuals, groups, organizations, businesses and/or units of government related to the issue(s) and information needs. **Use this information as an aid to prepare or update the Major Issues of Public Concern section of the site Citizen Participation Plan.**
Vapors, odors, dust, truck traffic, and noise.

How were these issues and/or information needs identified?
Experience on similar projects in the area

Part 2. List important information needed **from** the community, if applicable. Identify individuals, groups, organizations, businesses and/or units of government related to the information needed.
N/A

How were these information needs identified?
Click here to enter text.

Part 3. List major issues and information that need to be communicated **to** the community. Identify individuals, groups, organizations, businesses and/or units of government related to the issue(s) and/or information.
See BCP CPP milestones and Site Contact list

How were these issues and/or information needs identified?
Applicable guidance

Part 4. Identify the following characteristics of the affected/interested community. This knowledge will help to identify and understand issues and information important to the community, and ways to effectively develop and implement the site citizen participation plan (mark all that apply):

a. Land use/zoning at and around site:
X **Residential** ☐ **Agricultural** ☐ **Recreational** X **Commercial** ☐ **Industrial**

b. Residential type around site:
X **Urban** ☐ **Suburban** ☐ **Rural**

c. Population density around site:
X **High** ☐ **Medium** ☐ **Low**

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d. Water supply of nearby residences:
X **Public** ☐ **Private Wells** ☐ **Mixed**

e. Is part or all of the water supply of the affected/interested community currently impacted by the site?
☐ **Yes** X **No**

Provide details if appropriate:
Click here to enter text.

f. Other environmental issues significantly impacted/impacting the affected community?
☐ **Yes** X **No**

Provide details if appropriate:
Click here to enter text.

g. Is the site and/or the affected/interested community wholly or partly in an Environmental Justice Area?
☐ **Yes** X **No**

h. Special considerations:
Language ☐ **Age** ☐ **Transportation** ☐ **Other**

Explain any marked categories in **h:**

Part 5. The site contact list must include, at a minimum, the individuals, groups, and organizations identified in Part 2. of the Citizen Participation Plan under 'Site Contact List'. Are *other* individuals, groups, organizations, and units of government affected by, or interested in, the site, or its remedial program? (Mark and identify all that apply, then adjust the site contact list as appropriate.)

X **Non-Adjacent Residents/Property Owners:** Click here to enter text.

X **Local Officials:** Click here to enter text.

X **Media:** Click here to enter text.

☐ **Business/Commercial Interests:** Click here to enter text.

☐ **Labor Group(s)/Employees:** Click here to enter text.

☐ **Indian Nation:** Click here to enter text.

X☐ **Citizens/Community Group(s):** Click here to enter text.

☐ **Environmental Justice Group(s):** Click here to enter text.

☐ **Environmental Group(s):** Click here to enter text.

☐X **Civic Group(s):** Click here to enter text.

☐ **Recreational Group(s):** Click here to enter text.

☐ **Other(s):** Click here to enter text.

Prepared/Updated By: Charles Sosik **Date:** 4/16/2019

Reviewed / Approved By: **Date:**

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ATTACHMENT F
Resumes

AMC Engineeting, PLLC
18-36 42nd Street
Astoria, NY 11105

ARIEL CZEMERINSKI, P.E.

Mr. Czemerinski is a New York State Professional Engineer and CEO of AMC Engineering PLLC an EBC affiliate. Mr. Czemerinski has with 22 years of experience in the chemical and environmental areas. Areas of expertise include environmental compliance, permitting, remedial system design, process and plant safety, and management of a production facility. Mr. Czemerinski is a Registered Professional Engineer in NY, IN, IL, and MI.

Professional Experience
AMC: 16
Prior: 6 years

Education
Master of Science in Chemical Engineering, Columbia University, New York, NY, Feb. 1990. Bachelor of Science in Chemical Engineering, University Of Buenos Aires, Buenos Aires, Argentina, May 1987

Areas of Expertise

- Vapor Intrusion - Barrier and Sub Slab Venting System Design
- Environmental Assessment Statements and Environmental Impact Assessments under CEQR, ULURP
- Remedial Program Design and Management
- Environmental Compliance, Clean Water Act, Clean Air Act, Hazardous Materials
- Dewatering & Treatment System Design
- NYCDEP Sewer Discharge Permitting
- Transfer Station Permitting and Compliance
- Chemical Process Design and Optimization
- Wastewater Treatment Systems and Permitting, SPEDES, Air
- Zoning Regulations and Permitting
- Safety and Environmental Training
- Waste Management Plans

Professional Certifications

- OSHA 40-hr HAZWOPER
- OSHA 10-hr Construction Safety and Health

AMC Engineeting, PLLC
18-36 42nd Street
Astoria, NY 11105

PROJECT EXPERIENCE (Representative Projects)

Project: Domsey Fiber Corp. - 431 Kent Avenue, Brooklyn NY
Project Description: NYS Brownfield cleanup project / NYC E-Designation. Soil contaminated with chlorinated solvents, petroleum and heavy metals requiring excavation, soil management and disposal under a Remedial Action Work Plan, Soil / Materials Management Plan, Construction Health and Safety Plan and Community Air Monitoring Plan
Client: Express Builders
Regulatory Authority: NYSDEC, NYCOER
Role: Mr. Czemerinski served as the Remedial Engineer for the project.

Project: Springfield Gardens Residential Area BMP - Springfield Gardens, Queens, NY
Project Description: NYC Residential infrastructure (sewer, gas, water) upgrade, drainage channel installation and pond restoration. Soil contaminated with, petroleum and heavy metals requiring excavation, soil management and disposal under a Materials Handling Plan, Construction Health and Safety Plan and Community Air Monitoring Plan
Client: EIC Associates - NYCEDC
Regulatory Authority: NYSDEC, NYCParks
Role: Mr. Czemerinski served as the Remedial Engineer for the project.

Project: Former Domino Sugar Site - Kent Avenue, Brooklyn NY
Project Description: NYC E-Designation. Soil contaminated with semi-volatile organic compounds and heavy metals requiring excavation, soil management and disposal under a Remedial Action Work Plan, Soil / Materials Management Plan, Construction Health and Safety Plan and Community Air Monitoring Plan
Client: Two Trees Management
Regulatory Authority: NYCOER
Role: Mr. Czemerinski served as the Remedial Engineer for the project.

Project: Former Uniforms For Industry Site - Jamaica Avenue, Queens NY
Project Description: NYS Brownfield cleanup project / NYC E-Designation. Soil contaminated with chlorinated solvents, petroleum, mop oil and heavy metals requiring excavation, soil management and disposal under a Remedial Action Work Plan, Soil / Materials Management Plan, Construction Health and Safety Plan and Community Air Monitoring Plan
Client: The Arker Companies
Regulatory Authority: NYSDEC, NYCOER
Role: Mr. Czemerinski served as the Remedial Engineer for the project.

AMC Engineeting, PLLC
18-36 42nd Street
Astoria, NY 11105

PROJECT EXPERIENCE (Representative Projects)

Project: Former Charles Pfizer & Co. Site - 407 Marcy Avenue, Brooklyn, NY
Project Description: NYS Brownfield cleanup project / NYC E-Designation. Soil contaminated with chlorinated solvents, petroleum, and heavy metals requiring excavation, soil management and disposal under a Remedial Action Work Plan, Soil / Materials Management Plan, Construction Health and Safety Plan and Community Air Monitoring Plan
Client: The Rabsky Group
Regulatory Authority: NYSDEC, NYCOER
Role: Mr. Czemerinski served as the Remedial Engineer for the project.

Project: Former East Coast Industrial Uniforms Site - 39 Skillman Street, Brooklyn, NY
Project Description: NYS Brownfield cleanup project / NYC E-Designation. Soil contaminated with chlorinated solvents, petroleum, and heavy metals requiring excavation, soil management and disposal under a Remedial Action Work Plan, Soil / Materials Management Plan, Construction Health and Safety Plan and Community Air Monitoring Plan
Client: Riverside Builders
Regulatory Authority: NYSDEC, NYCOER
Role: Mr. Czemerinski served as the Remedial Engineer for the project.

Project: Former BP Amoco Service Station Site - 1800 Southern Boulevard, Bronx, NY
Project Description: NYS Brownfield cleanup project / NYC E-Designation. Soil contaminated with petroleum, and heavy metals requiring excavation, soil management and disposal under a Remedial Action Work Plan, Soil / Materials Management Plan, Construction Health and Safety Plan and Community Air Monitoring Plan
Client: SoBro, Joy Construction
Regulatory Authority: NYSDEC, NYCOER
Role: Mr. Czemerinski served as the Remedial Engineer for the project.

Project: Former Dico G Auto & Truck Repair Site - 3035 White Plains Road, Bronx, NY
Project Description: NYS Brownfield cleanup project. Soil contaminated with petroleum, and heavy metals requiring excavation, soil management and disposal under a Remedial Action Work Plan, Soil / Materials Management Plan, Construction Health and Safety Plan and Community Air Monitoring Plan
Client: The Arker Companies
Regulatory Authority: NYSDEC
Role: Mr. Czemerinski served as the Remedial Engineer for the project.

EBC

ENVIRONMENTAL BUSINESS CONSULTANTS

Charles B. Sosik, PG, PHG, Principal

Professional Experience

28 years

Education

MS, Hydrogeology, Adelphi University, NY
BS, Geology, Northern Arizona University, AZ

Areas of Expertise

- Brownfields Redevelopment
- Hazardous Waste Site Investigations
- Pre-purchase Site Evaluations and Support
- Regulatory Negotiations
- Remedial Planning and "Cost to Cure" Analysis
- Strategic Planning
- Real Estate Transactions
- NYC "E" Designations

Professional Certification

- Professional Geologist, NH
- Professional Geologist, Hydrogeologist, WA
- OSHA 40-hr HAZMAT
- OSHA 8-hr. Supervisor
- NYC OER Qualified Environmental Professional

Professional Affiliation / Committees

- NYS Council of Professional Geologists (NYSCPG)
- Association of Groundwater Scientists & Engineers (AGSE)
- NYS RBCA Advisory Committee
- Massachusetts LSP Association
- New Hampshire Association of Professional Geologists
- Interstate Technology Regulatory Council/MTBE Team
- Environmental Business Association, Brownfields Task Force
- Part 375 Working Group

PROFILE

Mr. Sosik has 28 years of experience in environmental consulting. He specializes in advising clients on managing environmental compliance with federal, state, and municipal agencies and has successfully directed numerous investigation and remediation projects involving petroleum, pesticides, chlorinated solvents, heavy metals and radiologically activated media. His work included extensive three-dimensional investigations on MTBE, which have been used effectively to help shape public policy. He also has experience in applying models to groundwater related problems and has completed several large-scale projects to determine fate and transport of contaminants, establish spill scenarios, and closure criteria. His experience and expertise in the area of contaminant hydrogeology has resulted in requests from environmental attorneys, property owners and New York State to serve as an expert witness and technical advisor on a variety of legal disputes.

For the past 15 years Mr. Sosik has been primarily engaged in providing environmental consulting to developers responding to the extensive re-zoning of former industrial and commercial properties, which is currently taking place throughout New York City. These services include everything from pre-purchase evaluations and contract negotiations to gaining acceptance in and moving projects through the NYS Brownfields Program. Mr. Sosik has taken a pro-active role in the continued development of the NYS Brownfields Program and related policy, by attending numerous working seminars, active participation in work groups and task forces and by providing commentary to draft versions of new guidance documents. Throughout his professional career, Mr. Sosik has remained committed to developing innovative cost- efficient solutions to environmental issues, specifically tailored to the needs of his clients.

SELECTED PROJECTS

Scavenger Waste Treatment Facility (SWTF), Suffolk County, NY

Water Treatment Plant EIS - Focused EIS - In response to requests from the Suffolk County Council on Environmental Quality and the Brookhaven Conservation Advisory Council, Mr. Sosik prepared a focused EIS to evaluate the potential impacts to an important surface water resource from the proposed facility including cumulative and synergistic effects with established contaminant plumes in the area.

Advanced Residential Communities, Rockville Centre, NY

Brownfield Project – As the senior project manager on this large scale, high profile redevelopment project, Mr. Sosik was asked to develop a plan to accelerate the regulatory process in the face of general community opposition. Through numerous discussions with the BCP management team, He was able to condense the schedule and review period, through the submission of supporting documents (Investigation Report, Remedial Work Plan) with the BCP application package. Community opposition, which focused on the environmental condition of the site as a means to block the project, was used to advantage in expediting approval of the aggressive interim remedial plan. This will allow the developer to begin remedial work approximately 5 months ahead of schedule.

Former Temco Uniform site, West Haverstraw, NY

Brownfield Project – Mr. Sosik took over management of this project from another consultant following transition of this VCP site to the BCP. Mr. Sosik used the opportunity to renegotiate and revise the scope of work to allow a more cost effective and focused investigation plan without re-writing or resubmitting the RIWP. During the NYSDEC's review of the transition package, he met with and coordinated changes with the NYSDEC Project Manager to gain approval. The result saved the client a significant amount of money, but perhaps more importantly in this case, did so without loss of time.

Grovick Properties, Jackson Heights, NY

Brownfield Project – This Brownfield property is somewhat unique in that it had been investigated and partially remediated by the NYSDEC through the petroleum spill fund. The client was interested in

purchasing the property and redeveloping it as office and retail space. Mr. Sosik reviewed the NYSDEC investigation and developed a supplemental plan to meet the requirements of an RI under the BCP program. By performing this limited amount of field work "up-front" he was able to complete an RI Report and Remedial Plan and submit both with the BCP application package. The NYSDEC and NYSDOH approved the RI Report and the Remedial Plan with minor changes. This cut 120 days from the review process and allowed the client to arrange financing and move his project forward knowing what the clean-up costs would be at the outset.

Metro Management, Bronx, NY

Brownfield Project – The site of a former gas station, the developer had planned to construct a 12-story affordable housing apartment complex with first floor retail space. Since the site was located in an Environmental zone, potential tax credits of 22% for site development, remediation and tangible property could be realized under the BCP. In a pre-application meeting with the NYSDEC, Mr. Sosik realized that the department did not believe the site was eligible for the BCP, since it had been previously investigated and closed under the spills program.

Mr. Sosik assisted the developer in securing financing, and due to the demands of an aggressive construction schedule developed an Interim Remedial Measure (IRM), based on chemical oxidation treatment. Working closely with the clients environmental counsel, Mr. Sosik was able to get the IRM approved without a public comment period. Implementation of the IRM is currently underway.

The project was awarded the 2009 NYC Brownfield Award for Innovation.

Brandt Airflex, NY

Technical Consulting Services - Mr. Sosik provided senior level technical advice and strategic planning in developing an off-site RI/FS for the site, in negotiating a tax reduction for the property due to the environmental condition and in preparing a cost to cure estimate for settlement between business partners. After achieving a favorable tax consideration and settlement agreement for his client

Allied Aviation Services, Dallas, Fort Worth, Airport, Dallas, TX

Jet Fuel Investigation - Mr. Sosik developed and managed an investigative plan to quickly identify the extent and source of jet fuel which was discharging from the Airport's storm drain system to a creek a mile away. Through the use of a refined conceptual model, accelerated investigative techniques and a flexible work plan, he was able to identify the source of the fuel and the migration route within a single week. He then identifled remedial options and successfully negotiated a risk based plan with the Texas regulatory agency that had issued a notice of enforcement action against the facility.

KeySpan – Former LILCO Facilities, Various NY Locations

Pesticide Impact Evaluation - Mr. Sosik developed, negotiated and implemented a site screening procedure to evaluate impact to public health and the environment as the result of past herbicide use at 211 utility sites. Using an unsaturated zone leaching model (PRZM) on a small subset of the sites, he was able to establish mass loading schedules for the remaining sites. This was combined with public well data in a GIS environment to perform queries with respect to mass loading, time transport and proximity to vunerable public supply wells. Using this approach Mr. Sosik was able to show that there were no concerns for future impact. This effort satisfied the public health and resource concerns of the state environmental agency and county health department in a reasonable amount of time and at a fraction of the cost of a full scale investigation.

Former Computer Circuits (Superfund) Site, Hauppauge, NY

CERCLA RI/FS - As Senior Project Manager for the site, he played a major role in regaining control of the investigation activites for the PRP. This action prevented the USEPA from initiating an extensive investigation at the site using a RAC II contractor allowing the client to perform a more efficient investigation. He was involved in all negotiations with EPA and was the project lead in developing a revised site characterization plan (work plan, field sampling plan, quality assurance plan, etc.). By carefully managing all phases of the investigation and continued interaction with each of the three regulatory agencies involved, Mr. Sosik was able to keep the project focused and incrementally reinforce the clients position. The estimated cost of the revised investigation is expected to save the client 1.5 to 2 million dollars.

Sun Oil, Seaford, NY

Remediation Consuliting Services & Project Management - Under an atmosphere of regulatory distrust, political pressure and mounting public hostility toward the client, Mr. Sosik conducted an off-site 3-D investigation to define the extent of contamination and the potential impact on public health. By designing and implementing an aggressive source area remediation program and personal interaction with the public and regulatory agencies, he was able to successfully negotiate a limited off-site remediation favorable to the client. Source area remediation was completed within 6 months and the project successfully closed without damage to the client's public image or working relationship with the regulatory agencies.

Con Edison, Various Locations, NY

Hydrogeologic Consulting Services - Under a general consulting contract, Mr. Sosik conducted detailed subsurface hydrogeologic investigations at five locations to assist in the development of groundwater contingency planning. He also developed and implemented work plans to investigate and remediate existing petroleum, cable fluid, and PCB releases at many of the generating facilities and substations. An important aspect of his role was in assisting the client in strategic planning and negotiations with the regulatory agency.

Keyspan - Tuthill Substation, Aqueboque, NY

Accelerated Site Characterization - Using accelerated site characterization techniques, Mr. Sosik presented the project as a case study in establishing the transport of an herbacide and its metobolites aplied at utility sites in the 1980's The results were then used to establish a screening method for evaluating 211 similar sites controlled by the client in a reasonable and eficient manner.

NYSDEC Spill, East Moriches, NY

Spill Release Analysis - With recognized expertise in the area of gasoline plume development on Long Island, Mr. Sosik was asked by

Charles B. Sosik, PG, PHG, Principal

the State to establish the release date (and principal responsible party) of an extensive petroleum spill, which impacted a residential neighborhood. He used multiple lines of evidence, and a new EPA model (HSSM), which he has helped to refine, to reconstruct the release scenario and spill date, in support of the State Attorney General's cost recovery effort from the PRP.

Minmilt Realty, Farmingdale, NY

Fate & Transport Modeling - He completed an RI/FS at this location for a PCE plume that had been in transit for over 30 years. Mr. Sosik applied a conservative model to evaluate time/concentration impacts under a variety of transport scenarios to a municipal wellfield located 13,000 feet away. Through the use of the model and careful interpretation of an extensive data set compiled from several sources, Mr. Sosik was able to propose a plan which was both acceptable to the regulator and favorable to the client.

Sebonack Golf Course Project, Town of Southampton, NY

IPM Pesticide Study - Provided professional hydrogeologic services in support of the EIS prepared for the development of the site. The proposed development included an 18-hole golf course, clubhouse, dormitory facility, cottages, associated structures, and a 6,000 square foot research station for Southampton College. Mr. Sosik performed an extensive evaluation (using a pesticide-leaching model) on the effects of pesticide and nitrogen loading to groundwater as part of the projects commitment to an Integrated Pest Management (IPM) approach.

NYSDEC, Spills Division, Regions 1 – 4

Petroleum Spills Investigation & Remediation - As a prime contractor/consultant for the NYSDEC in Regions 1-4, Mr. Sosik has managed the investigation and remediation of numerous petroleum spills throughout the State. Many of these projects required the development of innovative investigation and remediation techniques to achieve project goals. He was also involved in many pilot projects and research studies to evaluate innovative investigation techniques such as accelerated site characterization, and alternative approaches to remediation such as monitored natural attenuation and risk based corrective action.

Sun Oil, E. Meadow, NY

Exposure Assessment - Performed to seek closure of the spill file, despite the presence of contaminants above standards, Mr. Sosik determined after the extended assessment that the level of remaining contamination would not pose a future threat to human health or the environment. He used multiple lines of evidence, and a fate and transport model to show that degradation processes would achieve standards within a reasonable time.

Sand & Gravel Mine, NY

Property Development - As part of the development of a sand and gravel mine, Mr. Sosik provided environmental consulting services to assist in obtaining a mining permit, which would result in the construction of a 150-acre lake. Specifically, Mr. Sosik investigated if the proposed lake would reduce groundwater quantity to domestic and public well fields, and/or accelerate the migration of potential surface contaminants to the lower part of the aquifer. After assuming the lead role in negotiations with the regulatory agency, Mr. Sosik was able to obtain a permit for the client by adequately addressing water quality and quantity issues, and by preparing a monitoring plan and spill response plan, acceptable to all parties.

NYSDEC, Mamaroneck, NY

Site Characterization / Source Identification - In a complex hydrogeologic setting consisting of contaminant transport through fractured metomorphic bedrock and variable overburden materials, Mr. Sosik was able to develop and implement a sub-surface investigation to differentiate and separate the impact associated with each of two sources. The results of this investigation were successful in encouraging the spiller to accept responsibility for the release.

Riverhead Municipal Water District, NY

Site Characterization / Remedial Planning - Using accelerated characterization techniques, he implemented a 3-D site investigation to identify two service stations 4,000 ft. away as the source of contamination impacting a municipal wellfield. In accordance with the strict time table imposed by the need to return the wellfield to production by early spring, he designed and implemented a multi-point (9 RW, 6 IW) recovery and injection well system using a 3-d numerical flow model, and completed the project on time. Using a contaminant transport model, Mr. Sosik developed clean-up goals which were achieved in 9 months of operation, well below the projected 3 to 5 year project duration.

Montauk Fire Department, NY

Site Assessment - Mr. Sosik performed a limited investigation and used a 2-D flow model to demonstrate that the property could not have been the source of contamination which had impacted an adjacent wellfield as per the results of a previous investigation. This small focused effort successfully reversed a $500,000, and rising, claim against the department by the water district and the NYSDEC.

PREVIOUS EXPERIENCE

P.W. Grosser Consulting, Bohemia, NY
Senior Project Manager, 1999-2006

Environmental Assessment & Remediation, Patchogue, NY
Senior Project Manager, 1994-1999

Miller Environmental Group, Calverton, NY
Project Manager, 1989-1994

DuPont Biosystems, Aston, PA
Hydrogeologist, 1988-1989

EBC

ENVIRONMENTAL BUSINESS CONSULTANTS

Keith W. Butler, Senior Project Manager

PROFILE

Mr. Butler has extensive project management experience with respect to environmental due diligence and subsurface investigations. He is responsible for the preparation of project proposals, Phase I and II Environmental Site Assessments, Work Plans, Health and Safety Plans, Quality Assurance Project Plans, and investigation reports. Additionally, Mr. Butler has conducted and managed numerous Phase I and II ESAs. In these roles, Mr. Butler is responsible for applying the various state and local regulations, which govern environmental compliance and determine the need for additional investigation and/or remediation.

SELECTED PROJECTS

Madison National Bank, Various Sites, New York

Mr. Butler served as the Project Manager and principal contact for Madison National Bank. He was responsible for the preparation of Transaction Screen and Phase I/II Environmental Site Assessments (ESAs) at various sites throughout the New York metropolitan area, as required by the bank to satisfy client mortgage or construction loan requests.

Jewish Home & Hospital, Manhattan, NY

Most recently, Mr. Butler completed a Phase I ESA at their Bronx campus to obtain US. Housing and Urban Development (HUD) funding for a future construction project. Mr. Butler was also responsible for implementing a Remedial Action Work (RAW) Plan at the Bronx facility as required by the NYSDEC under a Voluntary Cleanup Agreement. The RAW included the preparation of contract documents, excavation of over 2,000 tons petroleum contaminated soils, installation of a Soil Vapor Extraction (SVE) system remedial oversight, and sampling.

Pulte Homes of New York, Patchogue, NY

Mr. Butler served as the Project Manager for the re-development of this six-acre site and was responsible for field oversight and coordination between remediation contractors and various regulatory agencies. Initial phases of the project included the completion of Phase I and II ESAs. Subsequent remediation consisted of UST removal, excavation of petroleum-impacted soils, closure of three NYSDEC spill numbers, removal of contaminated UIC sediment/sludge, the closure of commercial and residential UIC structures and the excavation of arsenic and metals contaminated soil. The project was conducted under approved Remedial Work and Soil Management Plans with oversight from the State, County and Village agencies.

Town of Islip, Blydenburgh Road Landfill, Hauppauge, NY

Mr. Butler served as the Project Manager for the groundwater and leachate monitoring program at the Blydenburgh Road Landfill - Cleanfills 1 and 2 and Leachate Impoundment Area. Mr. Butler was the principal contact for the Town's Resource Recovery Agency. He prepared the quarterly and annual monitoring reports, oversaw sampling efforts, and coordinated with the Town's analytical laboratory and data validation contractors. Mr. Butler was also responsible for preparing quarterly well condition reports and leachate quality reports for compliance with the Town's Suffolk County Discharge Certification Permit.

Ogden Aviation, Various Sites, JFK International Airport, Jamaica, New York

Mr. Butler served as the project manager for the rehabilitation of the satellite fuel farm recovery well system. Recovery wells at the fuel farm had become clogged with iron deposits and bacteria limiting product recovery efforts. Mr. Butler developed and supervised chemical cleaning and redevelopment of recovery wells under the approval of the NYSDEC. The chemical treatment has resulted in significant increases in product recovery volumes.

Brookhaven National Laboratory, Upton, NY

Mr. Butler has worked on a number of remediation system and monitoring well installation projects at BNL. His duties included oversight of installations, system pump tests, performance evaluations, and well development. He also provided oversight of soil borings, temporary well construction, soil and water sampling, and air monitoring for groundwater screening survey of two operable units in hazardous and radioactive waste storage areas. Mr. Butler also provided oversight for groundwater monitoring, well construction, well abandonment, and methane-monitoring wells for landfill closure.

metroPCS, Various Sites, New York

Mr. Butler served as the Project Manager for metroPCS' Long Island region telecommunications site acquisition and expansion program. Mr. Butler was responsible for the preparation of Phase I ESAs, the conduct of Phase II ESAs, including asbestos, lead paint and soil sampling, and coordination of National Environmental Policy Act (NEPA) reports and planning studies at various locations proposed for construction of new cellular telephone facilities. Reports and associated communications were transmitted electronically through metroPCS' data management system.

Dormitory Authority - State of New York, Harlem Hospital Center Modernization Project - Hazardous and Universal Waste Survey, Harlem Hospital, New York, NY

Mr. Butler served as the field team leader for conducting hazardous and universal waste surveys in multiple buildings affiliated with Harlem Hospital Center. The survey included the identification of hazardous and universal waste materials including chemicals, paints, fluorescent bulbs, high intensity discharge bulbs/fixtures, battery operated equipment, above and underground petroleum storage tank identification, PCB containing light ballasts and electrical equipment.

Keith W. Butler, Senior Project Manager

The hospital is comprised of a number of buildings, many that were abandoned and slated for demolition.

SVE Monitoring at Newark International Airport, Elizabeth, NJ
A routine leak detection test indicated that two 10,000-gallon underground storage tanks, which were used to store unleaded gasoline, had failed tightness tests. Follow-up investigation revealed that the product had impacted the subsurface environment. In response to this, a soil vapor extraction system was installed to reduce the residual concentrations of petroleum constituents in soil and groundwater and to minimize vapor migration into subsurface utility vaults. Mr. Butler was responsible for implementing the Remedial Action Work Plan, developed for the site by Ogden and the State of New Jersey. Activities conducted under the RAW include quarterly groundwater monitoring, air sampling, vacuum pressure monitoring, system maintenance and reporting.

Federal Express Site, Newark International Airport, Elizabeth, NJ
Mr. Butler worked with Ogden Aviation and the State of New Jersey to address outstanding environmental issues at the site related to a spill of jet fuel, which occurred during a construction accident. Mr. Butler performed a site assessment, which included groundwater monitoring, product gauging, and groundwater flow modeling. After reviewing these data, Mr. Butler determined that fill material at the site was contributing to soil and groundwater contamination and has petitioned the State for partial site closure. Mr. Butler is continuing to address the remaining area of concern through product recovery and continued monitoring.

Northrop Grumman, Various Sites
Mr. Butler conducted three Phase I ESAs and a Phase II investigation for the presence of PCBs in soil. He also inspected and supervised the removal of underground storage tanks, asbestos abatement projects, and sanitary system closures related to the facility decommissioning. Mr. Butler also conducted groundwater investigations and provided oversight during soil sampling, drilling and soil remediation activities.

New York City Department of Environmental Protection, Various Sites
Mr. Butler served as an Environmental Scientist for hazard investigation at seven sewage pump stations. Mr. Butler addressed a wide range of environmental concerns including asbestos, lead based paints, PCB oil, light ballasts, and other hazardous building materials. He conducted field investigations, sampling, and prepared Hazardous Materials Survey Reports for use during preparation of plans and specifications for proposed pump station construction projects.

Fresh Kills Landfill, Staten Island, New York
Mr. Butler participated in the field operations during pump and yield tests conducted on Cells 1 and 9. The tests were performed to determine the hydraulic properties of the landfill's refuse. He collected groundwater and leachate measurements in recovery wells and in adjacent observation wells under pumping and non-pumping conditions.

PREVIOUS EXPERIENCE

DECA Real Estate Advisors
Director of Environmental Services, 2011-2017

VHB Engineering, Surveying and Landscape Architecture PC, Hauppague NY
Senior Project Manager, 2005-2011

Parsons Brinkerhoff, Inc. New York NY
Senior Project Manager, 2004-2005

P.W. Grosser Consulting, Bohemia, NY
Senior Project Manager, 1998-2004

Eder Associates, Locust Valley, NY
Field Hydrogeologist, 1992-1998

EDUCATION

BS, Geology, Slippery Rock University of Pennsylvania, 1990

PROFESSIONAL REGISTRATIONS/CERTIFICATIONS

OSHA Certification, 40-hour Health & Safety Training at Hazardous Waste Sites

OSHA Certification, 8-hour Refresher Health & Safety Training at Hazardous Waste Sites

OSHA Confined Space Entry Training

EBC

ENVIRONMENTAL BUSINESS CONSULTANTS

Chawinie Reilly, Project Manager / Industrial Hygienist

Professional Experience
EBC: March 2013
Prior: 8 years

Education
Bachelor of Science, Health Sciences, Concentration in Environmental Health and Safety, Stony Brook University, NY

Areas of Expertise
- Remedial Investigation Work Plans, Remedial Investigation Reports, Remedial Action Work Plans
- Phase I / Property Condition Assessments
- Occupational Health and Safety Sampling
- Indoor Air Quality (IAQ) Investigations
- Mold Investigations and Remediation
- Soil and Ground Water Investigations
- Noise Studies
- Lead Paint and Asbestos Surveys
- Hazardous Materials Assessments

Professional Certification
- OSHA 40-hr HAZWOPER
- NYS Asbestos Inspector
- NYC Asbestos Investigator
- USEPA Lead Inspector
- USEPA Lead Risk Assessor
- OSHA 10-hr Construction Health and Safety
- Hazard Analysis and Critical Control Point (HACCP) Certified

PROFILE

Mrs. Reilly has 13 year's experience as an environmental consultant/contractor and has worked on and managed a wide range of environmental projects. Major responsibilities include Remedial Investigation Work Plans, Remedial Investigation Reports, Remedial Action Work Plan and Noise Remedial Action Work Plans. Mrs. Reilly has conducted Phase Is and Property Condition Assessments for commercial, industrial, and residential properties in New York, New Jersey and Connecticut. In addition, Mrs. Reilly has conducted various IAQ, asbestos, mold and occupational health and safety sampling investigations for a variety of city, state, federal and private clients.

PREVIOUS EXPERIENCE

The Louis Berger Group, New York, New York-Industrial Hygienist, 2008-2013
AEI Consultants, Jersey City, New Jersey- Environmental Scientist, 2005-2008

EBC

ENVIRONMENTAL BUSINESS CONSULTANTS

Thomas Gallo, Field Manager / Project Manager

Professional Experience
EBC: July 2015

Education
Bachelor of Arts, Geology, State University of New York at Potsdam, NY

Areas of Expertise
- Phase I Property Assessments
- Phase II Subsurface Investigations
- Indoor Air Quality (IAQ) Investigations
- NYSDEC Spill Site Investigations
- Asbestos Surveys
- Hazardous Materials Assessments
- Remedial Investigation Work Plans, Remedial Investigation Reports, Remedial Action Work Plans
- Remedial Oversight of NYC E-Designation Sites

Professional Certification
- OSHA 40-hr HAZWOPER
- NYS Asbestos Inspector
- OSHA 10-hr Construction Health and Safety

PROFILE

Mr. Gallo has 4 years' experience as an environmental consultant and has worked on and managed a wide range of environmental projects. Major responsibilities include Phase I and Phase II Site Assessments and Investigations for commercial, industrial, and residential properties in New York and New Jersey. Additional responsibilities include Remedial Investigation Work Plans, Remedial Investigation Reports, and Remedial Investigation Work Plans.

Mr. Gallos' field experience includes environmental sampling (groundwater, soil, surface water, air, soil gas), the oversight of soil boring and well installations, managing remediation on Site, tank removals, and spill management and closure. Mr. Gallo has prepared reports for both regulatory and client use.

Sherri Pullar

Project Scientist

EDUCATION

B.S., State University of New York, New Paltz, NY

TRAINING / CERTIFICATIONS

EPA Guidance on QAPP/eQAPP

Training in ADR and EDMS

DOD database training

WORK HISTORY

Years with firm: 10 years

Years Experience: 25 years

Sherri specializes in data validation of inorganic, organic, and wet chemistry data including PFAS and 1,4-dioxane (including ADR and EDMS). Sherri has extensive experience preparing, supporting, and developing numerous quality assurance project plans, sampling analysis plans, quality assurance sampling plans, precision, accuracy, reproducibility, completeness, and comparability reports, and standard operating procedures for field sampling, work plans, remedial investigations, feasibility studies, remedial actions, health and safety plans, and reviewing data packages for quality control and acceptability. Sherri has extensive experience with database entry for DOD and NJDEP.

BACKGROUND / EXPERIENCE

Environmental Business Consultants (EBC), Numerous Projects, Ridge, NY Project Scientist. Worked on numerous sites with EBC to perform EPA Region II, level IV inorganic data validation, including metals and wet chemistry and organic data validation including volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, PCSs, 1,4-dioxane, and PFOS in soil, sediment, groundwater, and air samples.

U.S. Navy, LTM, Former Naval Air Warfare Center Trenton, West Trenton NJ Project Scientist. Performed inorganic data validation, including metals and wet chemistry and organic data validation including VOC and SVOC in groundwater, soil and air samples. Responsible for uploading data into Navy database.

U.S. Navy, LTM, Naval Weapons Industrial Reserve Plant NWIRP, Bedford MA Project Scientist. Performed inorganic data validation, including metals and wet chemistry and organic data validation including VOC and SVOC in groundwater, soil and air samples. Responsible for uploading data into Navy database.

USACE New England District, LTM, Former Fort Devens, MA Project Scientist. Performed organic data validation, including explosives and perchlorate using automated data validation (ADR) for groundwater and soil.

Northeastern Environmental Technologies (NEET), Numerous Projects, Ballston Spa, NY Project Scientist. Worked on two sites with NEET to perform EPA Region II, level IV inorganic data validation, including metals and wet chemistry and organic data validation including volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), in soil, groundwater, and air samples.

U.S. Navy, LTM, Naval Weapons Industrial Reserve Plant NWIRP, Calverton, NY Project Scientist. Performed inorganic data validation, including metals and wet chemistry and organic data validation including VOC and SVOC in groundwater and soil samples. Responsible for uploading data into Navy database.

Foote Mineral GMP, LTM, East Whiteland Township, PA. Project Scientist. Performed inorganic data validation, including metals and wet chemistry and organic data validation including VOC in groundwater samples. Responsible for uploading data into Navy database.

USACE New England District, LTM, Former Massachusetts Military Reservation, MA. Project Scientist. Performed organic data validation, including explosives and perchlorate and inorganic data validation, metals and wet chemistry using automated data validation (ADR) for soil and groundwater.

ATTACHMENT G
Estimated Remedial Costs

146 BAYARD
Brooklyn, NY

Summary of Project Costs

NYS Brownfields Cleanup Program
Costs by Task

TASK - ENVIRONMENTAL REMEDIATION	Alternative 1 - Track 1	Alternative 2 - Track 2	Alternative 3 - Track 4
Excavation and Disposal	$ 581,334.40	$ 364,958.40	-
Cover System	-	-	$ 150,000.00
Endpoint analyis, DUSR, EDDs	$ 16,400.00	$ 16,400.00	-
Air Monitoring and Field Oversight	$ 68,800.00	$ 60,300.00	-
Project Management	$ 26,300.00	$ 26,300.00	$ 26,300.00
Dewatering Permits and Treatment System	$ 210,750.00	-	-
Status Reports	$ 4,200.00	$ 4,200.00	$ 4,200.00
Environmental Easement Package	-	$ 12,500.00	$ 12,500.00
Site Management Plan	-	$ 11,500.00	$ 11,500.00
Final Engineering Report	$ 25,450.00	$ 25,450.00	$ 25,450.00
Subtotal	$ 933,234.40	$ 521,608.40	$ 229,950.00
15% Contigency	$ 139,985.16	$ 78,241.26	$ 34,492.50
Total	**$ 1,073,219.56**	**$ 599,849.66**	**$ 264,442.50**